How Heritage Learns

Dutch Public Housing Heritage Evolution in Ecosystemic Perspective

Nicholas J Clarke

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A+BE | Architecture and the Built Environment | TU Delft BK

21#14

Design | Sirene Ontwerpers, Véro Crickx

Cover photo | Archivolt Architects, Amsterdam, 2012

ISBN 978-94-6366-438-7
ISSN 2212-3202

This dissertation is open access at https://doi.org/10.7480/abe.2021.14

How Heritage Learns

Dutch Public Housing Heritage Evolution in Ecosystemic Perspective

Dissertation

for the purpose of obtaining the degree of doctor
at Delft University of Technology
by the authority of the Rector Magnificus, Prof.dr.ir. T.H.J.J. van der Hagen
chair of the Board for Doctorates
to be defended publicly on
Friday 25 June 2021 at 12:30 o'clock

by

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不闻不若闻之, 闻之不若见之, 见之不若知之, 知之不若行之[1]

1 “Tell me and I forget, teach me and I may remember, involve me and I learn.” Based on Confucian philosopher Xun Kuang (312–230 BCE); quoted in (Cherry, 2021. p. 167)

Acknowledgements

This dissertation is the product of many years research, interrupted. Work, life and other projects continuously intersected its path to completion, making great demands on the patience of especially my supervisors. Yet, despite my being continuously districted, they, Prof. Dr. Marieke Kuipers and Assoc. Prof. Dr. ir. Hielkje Zijlstra, never faltered. Their continuous encouragement, considered advice, critical challenging and unfailing support were crucial for me during this process. Marieke and Hielkje, thank you both very much!

Likewise, the many current and past colleagues at the Section for Heritage and Architecture (H&A) at the TUDelft remained supportive of and interested in this project. I could always rely on their encouragement and, equally important, critical feedback throughout this process. I am very grateful for the support that I was given by my colleagues at H&A, especially my head, Prof. Wessel de Jonge, to pursue this research. My thanks also to Véro Crickx of Sirene Ontwerpers for her patient assistance with the layout of this document.

My former colleagues and dear friends at the Department of Architecture at the University of Pretoria encouraged me to take the leap to Delft. I am especially indebted to my former head there, the late Prof. Karel Bakker, for giving me both the space and the time to root in the Netherlands by facilitating my keeping a foot on both continents. Many of the ideas that formed this dissertation grew from seeds planted during rambling discussions with my former teacher and later dear friend and collaborator Prof. Roger Fisher, while traveling the highroads and byroads of the endlessly astonishing South African (cultural) landscape.

The three case studies presented in this dissertation rely on many discussions with architects, engineers, housing and heritage specialists and contractors. I am very grateful for their time, the candid discussions and in many instances their giving me unfettered access to their archives and working files. For the **Justus van Effen Quarter**, Joris Molenaar, Arjan Hebly, Siem Goede and Han Michel were my guides. Philip Breedveld, Frederike Kuipers, Wim de Waard, Martin de Jong, Antonin van de Bree, Cees Stam and Frans Horst all answered endless questions, guided me through the complexities of their **Koningsvrouwen van Landlust** renovation project. Iskander Pané provided me with insights into the Bosleeuw-Midden project. The **Jeruzalem Frankendaal** case study analysis would not have been possible without the kind and

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always patience assistance of Ron Baltussen. Additionally, Harmen van Vlissingen, Renate Pekaar and Emile Grotenbreg agreed to spend their valuable time answering my many questions, both in person and by email, adding their perspectives on what was an unusually complex renovation process.

My greatest inspiration is my mom, Prof. Françoise Clarke. She is for me an example of calm determination, expediency and humility to me and my siblings. She infused a scientific and emotional love for the natural world in me, which I believe shines through in this dissertation. *Baie dankie, mamma. How Heritage Learns* is dedicated to you.

Finally, I want to thank my partner, drs. Jean-Paul Corten, for the love, care, support, evenings filled with topical discussions and especially continuously patient encouragement with which he has always supported. You [are my] rock.

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Summary

The Netherlands is internationally famous for its public housing heritage. Its production came to first bloom during and directly after the First World War (WWI) and again after the Second World War (WWII).

Today more than half of all heritage protected buildings in the Netherlands still serve as housing. Valourised housing heritage buildings have a double-purpose. On the one hand they need to be efficient, economical and comfortable. The current drive towards energy reduction in service of sustainable development is continuously moving the goal-posts for what is acceptably efficient, affordable and comfortable. Measures for energy-use reduction dominate the policies and practices of housing renovation. On the other hand, heritage protected housing are highly regarded by the public because of the commonly held values that they embody, which transcend the interests of the owners and occupants.

How Heritage Learns explores the dynamics that come into play when public housing dating from 1910–65 becomes valourised as heritage in the Netherlands and how it, in turn modulates the evolution of the valourised housing. It builds on the Steward Brand 1994 thesis on How Buildings Learn which posits that buildings learn by adapting to external forces: changing fashion, technologies and economy.

This dissertation investigates the tensions between the use of housing and its value as heritage, taking the twentieth century heritage protected Dutch public housing as subject and tracking the decision making for, and the consequence of change in context over time. Public housing heritage today needs to respond to three–partly conflicting–imperatives: the Social (affordable dwellings), the Environmental (energy reduction) and the Cultural (architectural conservation).

In this dissertation, the tensions between these rival regimes are referred to as the *challenge of change*. This challenge has been a central concern of the conservation movement, which responded by developing cultural-historically informed strategies since the 1980s to accommodate change.

Three contemporary drivers for change in public housing heritage are posited centrally in this study: Energy use reduction, Economy and Comfort (2E+Co). Change is in part driven by the development of new technologies which are, in

our current context, stimulated by the Environmental imperative, informed by the Economical. These technologies hold the promise of future improved 2E+Co, but also have consequences, sometimes unforeseen, for the continued survival of a building. Lessons can be drawn from case studies of past renovation projects, not only on what these consequences are, but also on the manner in which they are made and why decisions are taken. This leads to the first research questions:

- *Which factors informed decisions for the inclusion of 2E+Co technologies in practice during the renovation of heritage protected public housing complexes in the Netherlands?*
- *What is the consequential after-life effect of technology upgrades for 2E+Co on the survival and robustness of twentieth-century lived in large scale valourised residential heritage fabric in the Netherlands?*

An ecosystemic approach is applied in order to be able to track cause and effect, identify actors and factors and position the housing heritage in the context of time. It builds on the work of Steward Brand who also attempted to study buildings as organisms evolving in response to changing forces in their ecologies. This leads to the third research question:

- *Can the application of ecosystemic evolutionary thinking to the field of heritage value-based management bring new insights to the process of how heritage learns in the face of the challenge of chance?*

To give an answer to these questions, the genesis and development of Dutch public housing dating from the period of 1901–65 is studied from its inception to the most recent renovation and concludes in a synthesis of a punctuated chronology and housing type.

To identify and assess the drivers that influence decisions for intervention in built heritage as well as the processes that influence learning, an Ecology of Ideas is forged. This is partly based in the tradition of western architecture and is augmented by analogous models taken from the biological sciences which provide a frame for understanding the reactions of buildings to internal and external stimuli through their existences.

The analogous model of architectural genes, AR-DNA, is adopted to represent the fabric and resultant form of the building as an organism which evolves through processes analogous to the punctuated equilibrium as seen in the natural world.

These concepts are combined with analogous borrowings from the developmental sciences to establish a theoretical model, which describes learning as an iterative cycle. Seen as such, every building is potentially the aim and product of a learning cycle. A novel model for the analysis of how heritage learns is developed that combines Time and Learning Buildings (TLB) with their Societal Economical and Technologal (SET) context. This is further augmented by perspectives from the field of change management to understand the mechanisms involved in change and thereby addressing the challenge of change.

This model serves the analysis of the evolution of three iconic heritage protected public housing complexes, selected as case studies. These, the Justus van Effen Quarter in Rotterdam (constructed 1921–22), and the Kings Wives of Landlust (constructed 1937–38) and Jeruzalem (constructed 1949–52) public housing complexes, in Amsterdam, are all three exceptional architectural monuments. They are also exemplary for technological innovations and access systems, being directly linked to their urban structure and have all undergone recent deep award-winning renovations.

The 2E+Co ambitions of the first renovation (1983–85/89) of the Justus Quarter in Rotterdam led to a total Space Plan remodelling, all new Services, structural interventions and modifcation of the façade, including painting. During the second renovation (2010–12), the previous restoration was de-restored and not conserved. Rather, the legendary appearance was restored and the 2E+Co changes were presented as a reinterpretation of the original communal block heating system.

The first renovation of the Landlust zeilenbau blocks, Amsterdam-West (1984) only addressed the windows, totally driven by the ambition to reduce energy use and increase comfort. During the Koningsvrouwen van Landlust renovation (2009–14) all shearing layers, except for the Structure were adapted to accommodate improved 2E+Co. The energy efficient appliances were also presented as a continuation of the original communal heating system. The Heristory had the greatest impact on the Skin.

The first renovations of the Frankendaal/Jeruzalem estate, Amsterdam-East (2010–11) addressed the thermal performance and aesthetics of the Skin. The second, experimental project (2014–18) saw different changes made to different blocks as a result of different ownership and protection regimes. The Space Plans of some of the National Monument and Aesthetics Policy protected houses were altered, Services and Skin were upgraded. The Heristory was also instrumental in the survival of the buildings in their totality. Without protection, these would have been demolished, like other, non-protected blocks.

These three extensive case studies map the complexity of decision-making in housing renovation, uncover the consequences of these decisions over the long term and highlight the factors that influence these decisions. From the case studies it becomes clear that the hypothesized 2E+Co ambitions are indeed the main factors driving change in public housing heritage. Decisions for change are found to be dependent on two stories: the 2E+Costory and the Heristory, representing the promise of 2E+Co improvement and the commonly held heritage ideal, respectively. The potency of these stories in decision-making depends very much on the Dutch subsidy system, which is strongly biased towards the 2E+Co performance.

The 2E+Costory and Heristory are identified to have agency in the way in which the buildings evolve, like the gene has in the way in which the organism evolves. In buildings this would, analogously mean that AR-genes, the stones, can express differently as phenotype over time due to the influence of the story or associated narrative. This narrative answers to the description of the meme: a unit of cultural transmission that can replicate and evolve through the evolution of culture.

The findings provide new insights in the way in which the mechanisms of conservation and change in the built environment are understood and can be modulated. They lead to the conclusion that for built heritage, change is the result of the interaction between the qualities of a building, its environment and the ideals held for the future of the building, the latter defined as the memeplex.

This can be summarized as follows:

$$C = f(Q \bullet E \bullet M)$$

C=The resultant Change (phenotypic expression); Q=Qualities of the building (AR-DNA/genotype); E=Environment of the building; M=Memeplex

The conclusions can be directly translated into conservation practice (and beyond) as five lessons:

1. When it comes to technologies, look first…;
2. Listing matters, but is never enough;
3. Because money talks, words matter;
4. Branding matters. Archives matter – Curate the meme to conserve housing heritage;
5. Heritage is a construct of our own fabrication. We can teach heritage to learn.

Heritage can only learn if the learning cycle is consciously completed and is stimulated to continue into a new iterative cycle. In the iconic and awarded renovation case studies analysed, the learning cycle was, however, never fully completed and only continued in a limited manner, with consequences for many actors as well as the building complex, as housing and as built heritage. In a broader context, it can be concluded that for *heritage to learn* structural changes need to be executed to how we manage the built environment. Both the ability and the means for reflective observation, and therefore, for learning are lacking at present.

These conclusions are all the more relevant, and to a very large extent alarming, in the light of the large renovation wave that will roll over the Netherlands to reduce the negative environmental impact of heating homes. This unprecedented renovation project calls for a near total renovation of the Dutch housing landscape at a rate of roughly 1 000 houses per day. On a European scale, these ambitions are estimated to lead to the renovation for 2E+Co improvement of roughly 800 000 public housing units per year before 2050.

An unintended result of the extensive cases studied is the discovery of new historical facts/data for the three geneses investigated and the conclusion that the canonical histories for these and potentially many other iconic Dutch public housing schemes, may not be historically correct. This is important as it has consequences for the evolution of these heritage-protected public housing complexes over time.

Like the Economic and Environmental imperatives, the obligation of careful stewardship of public housing as Cultural imperative has become more urgent and critical than ever before alongside the Social imperative of providing affordable housing. It is therefore crucial that for *heritage*, and all other *buildings* likewise, we take the opportunity to *learn*. This calls for a structural change in current built environment practice, including management, documentation, project planning and execution.

Samenvatting

Nederland is internationaal bekend om zijn volkshuisvestelijk erfgoed. De productie ervan kwam voor het eerst tot bloei tijdens en direct na de Eerste Wereldoorlog en beleefde zijn tweede hoogtepunt na de Tweede Wereldoorlog (WO II). Vandaag de dag is meer dan de helft van al het gebouwd erfgoed in Nederland bestemd als huisvesting. Gerenoveerde woningbouwmonumenten dienen een dubbel doel. Enerzijds moeten ze efficiënt, zuinig en comfortabel zijn; anderzijds dienen zij een cultureel belang. De huidige drang naar energiereductie ten dienste van duurzame ontwikkeling verlegt voortdurend de grenzen van wat aanvaardbaar wordt geacht als efficiënt, betaalbaar en comfortabel. Maatregelen ter vermindering van het energieverbruik domineren het beleid en de praktijk van de woningrenovatie. Tegelijkertijd zijn woningen die beschermd zijn als erfgoed een publiek bezit vanwege de algemeen aanvaarde waarden die zij belichamen, die de (particuliere) belangen van de eigenaaren en bewoners overstijgen.

How Heritage Learns onderzoekt de dynamiek die ontstaat wanneer Nederlandse volkshuisvesting uit de periode 1910–65 tot erfgoed wordt verheven en hoe dat op zijn beurt de evolutie van die huisvesting moduleert. Het onderzoek is een vervolg op de theorie van Steward Brand over *How Buildings Learn* uit 1994, waarin wordt gesteld dat gebouwen leren door zich aan te passen aan externe factoren: veranderende mode, technologieën en economie.

Deze dissertatie onderzoekt de spanningen tussen het gebruik van woningen en de waarde ervan als erfgoed, waarbij de twintigste-eeuwse beschermde Nederlandse volkshuisvesting als onderwerp is gekozen. Daarbij worden de besluitvorming tot en het gevolg van verandering in de context van de tijd gevolgd. Het volkshuisvestelijk erfgoed moet vandaag inspelen op drie – deels tegenstrijdige – opgaven: de Maatschapelijkke (betaalbare woningen), de Milieutechnische (energiebesparing) en de Culturele (behoud van gebouwd erfgoed).

In dit proefschrift wordt naar de spanningen tussen deze rivaliserende regimes verwezen als de challenge of change [uitdaging van verandering]. Deze uitdaging is een centraal aandachtspunt van de conservatiebeweging sinds de jaren 1980, die daarop heeft gereageerd door cultuurhistorisch geïnformeerde strategieën te ontwikkelen om aan de verandering tegemoet te komen.

Drie actuele aanjagers van verandering in het volkshuisvestingspatrimonium worden in deze studie centraal gesteld: Energiebesparing, Economie en Comfort (2E+Co). Verandering wordt deels gedreven door de ontwikkeling van nieuwe technologieën, die in onze huidige context worden gestimuleerd door de noodzaak van Energiebesparing, geïnformeerd door de Economisch ambities. Deze technologieën houden de belofte in van een verbeterde 2E+Co in de toekomst, maar hebben ook gevolgen, soms onvoorzien, voor het voortbestaan van een gebouw. Uit casestudies van renovatieprojecten uit het verleden kunnen lessen worden getrokken, niet alleen over wat deze gevolgen zijn, maar ook over de manier waarop ze tot stand zijn gekomen en waarom beslissingen worden genomen. Dit leidt tot de eerste onderzoeksvragen:

- *Welke factoren hebben de beslissingen beïnvloed voor de toepassing van 2E+Co technologieën in de praktijk tijdens de renovatie van erfgoed-beschermde woningbouwcomplexen in Nederland?*
- *Wat is het langtermijn effect van technologische upgrades voor 2E+Co op de overleving en robuustheid van bewoond grootschalig woningbouwerfgoed uit de twintigste-eeuw in Nederland?*

Om oorzaak en gevolg te kunnen traceren, actoren en factoren te identificeren en het woningbouwerfgoed in de context van de tijd te plaatsen is een ecosystemische benadering toegepast. Deze benadering bouwt voort op het werk van Brand die probeerde gebouwen te bestuderen als organismen die evolueren in antwoord op veranderende krachten in hun ecologieën. Dit leidt tot de derde onderzoeksvraag:

- *Kan de toepassing van ecosystemisch evolutionair denken op het gebied van erfgoed management nieuwe inzichten geven in het leerproces van erfgoed in het licht van de uitdaging van verandering?*

Om een antwoord te geven op deze vragen is de ontstaansgeschiedenis en ontwikkeling van de Nederlandse volkshuisvesting uit de periode 1901-65 bestudeerd, vanaf het begin tot de meest recente renovatie. Dit heeft geresulteerd in een synthese van een gefaseerde chronologie en woningtype.

Om de drijvende krachten die beslissingen voor interventies in gebouwd erfgoed beïnvloeden te identificeren en te beoordelen, evenals de processen die het leren beïnvloeden, is een Ecologie van Ideeën geformuleerd. Deze is gedeeltelijk gebaseerd op de traditie van de westerse architectuur en aangevuld met analoge modellen uit de biologische wetenschappen die een kader bieden om de reacties van gebouwen op interne en externe stimuli tijdens hun bestaan te begrijpen. Zo wordt het analoge model van architectonische genen, AR-DNA, overgenomen om het weefsel en de successievelijke vorm van het gebouw te beschrijven als organisme dat zich ontwikkelt via processen die analoog zijn aan het onderbroken evenwicht dat in de natuurlijke wereld te zien is. Deze concepten worden gecombineerd met analoge ontleningen aan de ontwikkelingswetenschappen om een theoretisch model op te stellen, dat leren beschrijft als een iteratieve cyclus. Zo bezien is elk gebouw potentieel het doel en het product van een leercyclus. Voor de analyse van 'hoe erfgoed leert' is een nieuw model ontwikkeld, dat Tijd en Lerende Gebouwen (TLB) combineert met hun Sociaal-Economische en Technologische (SET) context. Dit wordt verder aangevuld met perspectieven uit het domein van verandermanagment om de mechanismen te begrijpen die betrokken zijn bij verandering, en zo de uitdaging van de challenge of change aan te spreken. Dit model dient voor de analyse van de evolutie van drie iconische, als erfgoed beschermde, volkshuisvestingscomplexen die zijn geselecteerd als casestudies. Deze, het Justus van Effenkwartier in Rotterdam (gebouwd 1921-22), de Koningsvrouwen van Landlust (gebouwd 1937-38) en Frankendaal/Jeruzalem (gebouwd 1949-52), beide in Amsterdam, zijn alle uitzonderlijke architectonische monumenten. Zij zijn ook exemplarisch voor technologische innovaties en ontsluitingssystemen, hetgeen rechtstreeks verband houdt met hun stedelijke structuur. Zij hebben alle recentelijk prijswinnende ingrijpende renovaties ondergaan.

De 2E+Co ambities van de eerste renovatie (1983–85/89) van het Justuskwartier, Rotterdam leidden tot een totale verbouwing van de plattegronden, nieuwe voorzieningen, bouwkundige ingrepen en het aanpassen van de gevel, inclusief schilderwerk. Tijdens de tweede renovatie (2010–12) is de voorgaande restauratie ongedaan gemaakt en niet geconserveerd. In plaats daarvan werd het iconisch uiterlijk hersteld en werden de 2E+Co-wijzigingen gepresenteerd als een herinterpretatie van het oorspronkelijke blokverwarmingssysteem.

De eerste renovatie van de Landlust-strokenbouw, Amsterdam-West (1984) had alleen betrekking op de ramen, geheel gedreven door de ambitie om het energieverbruik te verminderen en het comfort te verhogen. Tijdens de renovatie van Koningsvrouwen van Landlust (2009–14) werden alle Shearing Layers [schuiflagen], behalve de Structuur, aangepast voor een verbeterde 2E+Co. De energiezuinige toestellen werden ook hier gepresenteerd als een voortzetting van de oorspronkelijke gemeenschappelijke verwarmingsinstallatie. De 'Heristory' had de grootste impact op de Buitenhuid.

De eerste renovaties van het landgoed Frankendaal/Jeruzalem, Amsterdam-Oost (2010–11) hadden betrekking op de thermische prestaties en de esthetiek van de Buitenhuid. Bij het tweede, experimentele renovatieproject (2014–18) werden verschillende wijzigingen aangebracht in de diverse blokken als gevolg van de verschillen in eigendomsrechten en beschermingsregimes. De plattegronden van de rijksbeschermde woningbouwmonumenten of onder een Welstandsorde vallende woningen werden gewijzigd, technische voorzieningen en de Buitenhuid werden opgewaardeerd.

Deze casestudies brengen de complexiteit van de besluitvorming bij woningrenovatie in kaart, brengen de gevolgen van de genomen beslissingen op lange termijn aan het licht en tonen de factoren die deze beslissingen beïnvloeden. Uit de casestudies wordt duidelijk dat de veronderstelde 2E+Co ambities inderdaad de belangrijkste factoren zijn die verandering in het volkshuisvestelijk erfgoed teweegbrengen.

Beslissingen voor verandering blijken afhankelijk te zijn van twee verhalen of *stories*: *2E+Costory* [2E+Co-verhaal] en *Heristory* [Erfgoedverhaal], die respectievelijk de belofte van 2E+Co verbetering en het algemeen aanvaarde erfgoedideaal vertegenwoordigen. De potentie van deze verhalen in de besluitvorming is sterk afhankelijk van het Nederlandse subsidiesysteem, dat sterk bevooroordeeld is ten opzichte van de 2E+Co prestaties. De *Heristory* speelde ook een belangrijke rol bij het voortbestaan van de gebouwen in hun totaliteit. Zonder bescherming zouden deze zijn gesloopt, net als de niet als erfgoed beschermde blokken.

2E+Costory en de *Heristory* hebben invloed op de manier waarop de gebouwen evolueren, zoals een gen dat heeft op de manier waarop een organisme evolueert. Analoog zou dit in gebouwen betekenen dat AR-genen, de stenen/stones, zich in de loop der tijd anders kunnen manifesteren als fenotype onder invloed van het verhaal/story. Dit narratief beantwoordt aan de beschrijving van de meme: een eenheid van culturele overdracht die zich kan repliceren en evolueren door de evolutie van de cultuur heen.

De bevindingen verschaffen nieuwe inzichten in de manier waarop de mechanismen van behoud en verandering in de gebouwde omgeving worden begrepen en kunnen worden gemoduleerd. Ze leiden tot de conclusie dat voor het onroerend erfgoed, verandering het resultaat is van de interactie tussen de kwaliteiten van een gebouw, zijn omgeving en de idealen die men koestert voor de toekomst van het gebouw, dit laatste gedefinieerd als de memeplex.

Dit kan als volgt worden samengevat:

$$V = f(K \cdot O \cdot M)$$

V=De resulterende verandering (fenotypische expressie); K=Kwaliteiten van het gebouw (AR-DNA/genotype); O=Omgeving/Milieu van het gebouw; M=Memeplex

De conclusies kunnen rechtstreeks worden vertaald naar de instandhoudingspraktijk (en daarbuiten) in de vorm van vijf lessen:

1. Als het om technologieën gaat, kijk dan eerst...;
2. Bescherming als monumenten is belangrijk, maar is nooit genoeg;
3. Geld is belangrijk, maar woorden geven betekenis.
4. Profileren van het merk van monument is belangrijk. Archieven zijn belangrijk – Draag zorg voor de meme om het volkshuisvestelijk erfgoed in stand te houden;
5. Omdat erfgoed een constructie van onze eigen makelij is, kunnen we erfgoed onderrichten om te leren.

Erfgoed kan alleen leren als de leercyclus wordt voltooid en bewust wordt gestimuleerd om voort te gaan in een nieuwe iteratieve cyclus. In de geanalyseerde iconische en bekroonde renovatiecasestudies werd de leercyclus echter nooit volledig voltooid en alleen op beperkte wijze opnieuw doorgezet, met gevolgen voor zowel vele actoren als voor het gebouwencomplex als volkshuisvesting en als erfgoed. In een bredere context kan worden geconcludeerd dat, wil erfgoed kunnen leren, er structurele veranderingen moeten worden aangebracht in de manier waarop wij de gebouwde omgeving beheren. Zowel het vermogen als de middelen voor reflectieve observatie, en dus voor leren, ontbreken op dit moment.

Deze conclusies zijn des te relevanter, en in zeer grote mate alarmerend, in het licht van de grote renovatiegolf die over Nederland wordt uitgerold om de negatieve milieueffecten van het verwarmen van woningen te verminderen. Dit ongekende renovatieprogramma vergt een bijna totale renovatie van het Nederlandse woninglandschap in een tempo van ruwweg 1 000 woningen per dag. Op Europese schaal zullen deze ambities naar schatting leiden tot de renovatie voor 2E+Co verbetering van ruwweg 800 000 volkshuisvestingseenheden per jaar vóór 2050.

Een onbedoeld resultaat van de uitgebreide casestudies is de ontdekking van nieuwe historische feiten/gegevens voor de drie onderzochte geneses en de conclusie dat de canonieke geschiedenissen voor deze, en mogelijk vele andere iconische Nederlandse volkshuisvestingscomplexen, historisch niet correct zijn. Dit is belangrijk omdat deze studie heeft aangetoond dat het Erfgoedverhaal consequenties heeft voor de evolutie van deze als erfgoed beschermde volkshuisvestingscomplexen in de tijd.

Net als de sociale, economische en milieutechnische eisen is zorgvuldig rentmeesterschap van de volkshuisvesting als culturele noodzaak urgenter en kritischer geworden dan ooit tevoren. Het is daarom van cruciaal belang dat wij bij *erfgoed*, en alle andere *gebouwen* evenzeer, onszelf de kans geven om te *leren*. Dit vraagt om een structurele verandering van de huidige bouwpraktijk, met inbegrip van beheer, documentatie, projectplanning en uitvoering.

Housing in the Kraaipan Street in Amsterdam’s Transvaal neighbourhood, designed by Gratama & Versteeg, constructed between 1918–23 (CWJ Schorteldoek, 1940; SAA: ANWE00361000050).

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1 Dutch housing heritage in evolution

The challenge of change

1.1 Introduction

The Netherlands is not only famous for its historic city centres with their great variety of historic water-side houses, but also for its large corpus of public-funded housing in its twentieth century town extensions. Since the 1980s, especially public housing dating from the twentieth century has been recognised as being of cultural historical value, and consequently protected by listing as built heritage, or monuments in the Netherlands. The Netherlands of course does not stand alone. Housing forms the largest sector of extant building stock on the planet, the vast majority of which originated in the twentieth century. The growing awareness of the value of the built legacy of the twentieth century has created a challenge concerning identification and selection.[1] The peculiarities of this legacy bring with it its own specific conservation demands.[2] Where the preceding centuries had seen the application of a small array of traditional materials in combination with a handful of constructional techniques within a limited typology, the twentieth century saw a proliferation of these. A core occupation of twentieth century architecture involved the implementation of new technologies to create cost effective and efficient large

1 (ICOMOS, 1995); (Macdonald, Ostergren, & Getty Conservation Institute, 2013, p. 2).

2 (Prudon, 2008, pp. 268–72).

volumes of housing, resulting in new types, constructional methods, environmental technologies and living modes. In the global West, housing production was aligned with, and its focus sharpened by a growing social consciousness, fuelled by increases in the average personal wealth.

Ambitions for warming, watering, wiring, and now, the wireless web have spawned technologies that have in turn modulated housing design and adaptation over the course of the twentieth century and still do so today, also in the Netherlands. The ideals for a salubrious home have continuously shifted from a need for improved sanitation for reasons of health at the outset of the century, to being *sustainable* at its termination. We now presuppose both a sustainable and *smart* future for our homes.[3] Technological advancements in heating and cooling, sanitation, insulation, ventilation, energy and communication have made these ambitions possible, turning shelter into a comfortable efficient well-serviced home.[4]

The twentieth century was also an era in which, for the most, energy-use in the Dutch home transitioned from cumbersome coal to gas-from-coal–both which polluted urban areas–to natural gas and now to electricity as energy source. It has become relatively cheaper, more easily attainable and, moreover, seemingly cleaner and cleaner (at the point of consumption at least) over time. This preconception started to exhibit cracks towards the latter quarter of the twentieth century when political intrigue brought about a fuel crisis and a re-evaluation of the then prevalent energy models was necessitated.[5]

Concurrently, the global impact of pollution due to energy generation also became evident. This had consequences for both new construction and retrofitting of existing buildings, firstly due to the apparent abundance of energy and later, to the small interim of energy shortage. During the so-called energy crisis of the middle to late 1970s to early 1980s, the adaptation of extant housing stock as well as new construction of new housing for lower energy use initiated a new paradigm: our current unlimited thirst-for-less, for energy use and cost reduction. Today, the need to find a fitness for inherited inhabited dwellings in an era of limited energy and resource can be seen as a global challenge.

3 (Kember, 2018).

4 (Rybczynski, 1986, p. 167).

5 (Banham, 1984, p. 13).

Sustainability development–which can be defined as the long-term benign equilibrium of the ecological, economic and social realms–does not describe the cultural aspects or the other ambitions that inform the decisions that are made. Where do heritage and the associative cultural values we ascribe to our [common] heritage of housing find 'fit' in this headlong rush, and what is their role in modulating change?

1.2 Motivation

This thesis is the result of a personal intrigue that has grown from my professional life as an architect who has also participated in restoration and adaptive reuse practice. I have in all such projects encountered tensions that arise in restoration and adaptive reuse practice between cultural historic values along with the attributes that embody them on the one side, and contemporary use on the other. The one seems to attempt to slow down the hands on the clockface, while the other hurries them along. This challenge of change is essential to all projects that intervene in existing buildings, but is made all the more poignant when dealing with buildings with overt cultural historical values, commonly referred to as built heritage or monuments.

Evolutionary biologist and visionary Stewart Brand's seminal book *How buildings learn: what happens after they are built,* published in 1994, offered me a perspective on change in buildings. In it, he postulates that buildings can be understood as consisting of shearing layers that correspond to the sequence in which they are designed and constructed (starting with site preparation) (Figure 1.2). But these layers also have separate rates of change during the life of buildings. He rates these on a scale from "lethargic to dazingly fast." The qualities of the slow layers dominate the possibilities for change of the faster ones. [6] So, for instance, in general, *Structure* will dictate the capacity for change of Skin, Services, Space Plan and Stuff.

6 (Brand, 1994, p. 17).

Brand does make the distinction between what he refers to as *high-road, low-road* and *no-road* buildings. No-road buildings are buildings that avoid any relationship with time.[7] Low road buildings are those that embrace time: they have "low visibility, low-rent, no-style, high-turnover… where …nobody cares what you do in there".[8] Clearly for low-road buildings, the challenge of change is down to physical and economical pragmatics. High road buildings are, on the other hand, "those that transcend style and turn it into history." They have a character: "high intent, duration of purpose, duration of care, time, and a steady supply of confident dictators."[9] Put otherwise, they have cultural historical values which mandate long-term curation. And yet, as Brand so eloquently puts it: "[c]onstant revision is the fate of even the most institutional and High Road of all buildings…"[10] even if "...putting modern plumbing and heating into... [a High Road building is] ... like performing lung surgery on a tetchy giant".[11]

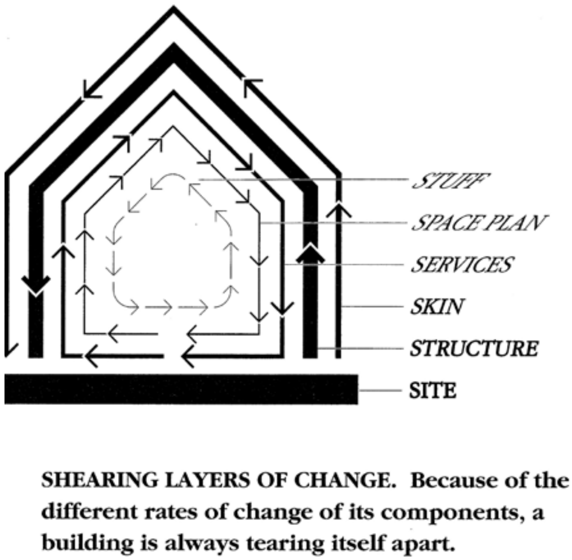

FIG. 1.1 Brand's well-known 'Shearing layers of change' model as first published in 1994– the thicker the line, the slower the cycle (Brand, 1994, p. 13).

7 (Brand, 1994, p. 52).

8 (Brand, 1994, p. 24).

9 (Brand, 1994, p. 35).

10 (Brand, 1994, p. 37).

11 (Brand, 1994, p. 36).

But Brand does not label high-road buildings specifically as heritage and he does not give a position to the role their monument status or cultural historical values could play as factors influencing change. Yet, these are the buildings in which the challenge of change is most apparent. This is where my interest lies, to deepen my (and our) understanding of whether, and if so, *how heritage learns*.

When it comes to the kind of buildings, or type, Brand notes that: "[d]omestic buildings–homes–are the steadiest changers, responding directly to the family's ideas and annoyances, growth and prospects."[12] Studying housing heritage brings the inevitability of constant revision of High-road buildings into a stark relief with the steady change of domestic buildings. But studying the change in buildings over time requires evidence of the past: records. Change in individual houses is not well documented as private owners usually do not keep minutes of meetings and project budgets. This makes finding out how and why decisions for change were made difficult. Public housing complexes on the other hand, offer a subject for study in which renovations are planned by multi-disciplinary teams to meet predefined ambitions. Records are kept, ambitions noted and, importantly, services upgrades take a central position. The archive is even richer when these public housing complexes are monuments. In these renovation projects, actors respond to current conditions as well as the ambitions of the building owners and/or the occupants. These choices made by actors are modulated by factors such as policy, rules, societal norms, economic cost and benefit and technological advances, all modulated, in the case of public housing heritage, by the known cultural historical values.

Our current race to reduce our carbon emissions to stem anthropogenic climate change threatening our very existence is driving the introduction of more technologies into homes, but only if they are financially feasible. At the same time our comfort norms have, and are still continuing to, increase. Three imperatives meet in housing heritage: the environmental, social and cultural, which influence how cultural value and contemporary use find common ground. This is why I chose to study the drivers and consequences of change in public housing heritage with specific focus on the modulation of homes and introduction of new technologies at the interface of energy, economy and comfort. The geographical location of the study in the Netherlands is chosen because it not only has a celebrated public housing tradition, but also an equally illustrious culture of monuments care.

12 (Brand, 1994, p. 7).

1.3 Housing heritage in the Netherlands

The Netherlands has a distinguished public housing history, resulting in its notable housing legacy. This history dates as far back as the late-Middle Ages when charitable institutions, often church-aligned, or wealthy families established alms-houses, referred to colloquially as *hofjes*, for the destitute (often impoverished single or widowed women).[13] But the Netherlands is especially known for its public housing programme of the twentieth century, following the promulgation of the 1901 *Woningwet* (Housing Act). Today the vast majority of the extant Dutch housing stock (over 80%) dates to the twentieth century and it presents a remarkable heritage, already noted internationally as far back as the late 1970s.[14] Today the housing heritage legacy of the twentieth century is a ubiquitous but unique constituent of the Dutch built heritage environment.

The first Dutch *Monumentenwet* (monuments act) of 1961 provided for the registration and protection of a building as a national monument if older than 50 years and of proven beauty, scientific interest, with folklore value (*volkskundige waarde*) or if associated with historical memory.[15] As it did not bar provincial and municipal authorities from enacting their own by-laws to protect built heritage and archaeological resources as monuments at their administrative levels, many did. Today, the Netherlands count 63 323 National Monuments. Additionally, 811 buildings, complexes, archaeological sites and objects are protected as Provincial Monuments[16] and over 56 000 as Municipal Monuments.[17]

The first decade of the Monumentenwet saw a steep increase in the number of listed National Monuments, driven by an increased interest in *the many old houses of simple yet harmonious architecture* in historical centres and in farms and mills

13 (Grinberg, 1977, p. 18).

14 (Casciato, et al., 1979).

15 (Koninkrijk der Nederlanden, 1961).

16 (Rijksdienst voor het Cultueel Erfgoed, 2020).

17 Own survey conducted in September 2020 reached 56 231, this number represents an informed estimate. This means that the Netherlands now counts one designated monument per 145 inhabitants, calculated at population estimate of 2020 of 17 418 808 people.

located in rural areas that were under threat from fervent post-Second World War (WWII, 1940–5) urban reconstruction and industrialisation.[18]

A second steep increase, which picked up pace in c. 1995, was the result of the national *Monumenten Inventarisatie Project* (Monuments Inventorying Project, MIP) initiated in 1987, followed by the subsequent *Monumenten Selectie Project* (Monuments Selection Project, MSP; Figure 1.3).[19]

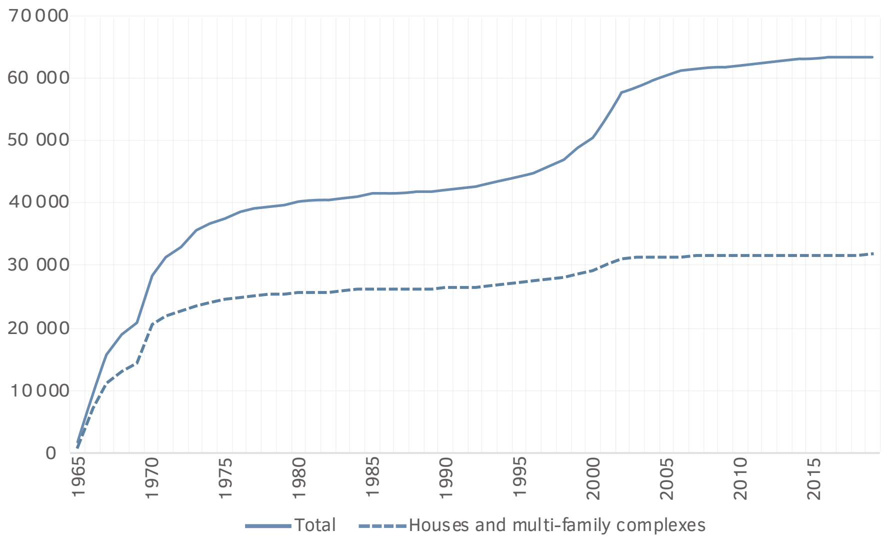

FIG. 1.2 Number of Dutch houses and multi-family complexes protected as listed National Monuments in relation to the total number of listed National Monuments (configured from CBS Statline 2020a).

Both these programmes were spearheaded by the then *Rijksdienst voor het Monumentenzorg* (National Monuments Care Department, RDMZ). They aimed to explore, identify, evaluate (MIP) and then select (MSP) so-called 'younger' monuments from the period 1850–1940 for eventual protection through listing on National level through the Monuments Registration Procedure (MRP). In instances, the MIP also led to buildings being included in municipal monuments registers.[20]

18 "...door de inmiddels gerezen belangstelling voor de vele oude woonhuizen 'van eenvoudig doch harmonische architectuur' in de historische kernen en voor de boerderijen en molens in het buitengebied." (Kuipers, 1997, p. 133).

19 See (Kuipers, 1994).

20 (Kuipers, 1994, p. 9).

It therefore comes as no surprise that just over 50% of Dutch National Monuments, 31 728 to be exact, are statistically identified as houses or housing complexes[21] and it is safe to say that the majority of all other heritage-protected buildings have a residential function. Yet, because these inventories maintained 1940 as their cut-off date, they assessed less than 10% of the total housing production of the twentieth century. Continuing on from the MIP/MSP, the Cultural Heritage Agency of the Netherlands (RCE), successor to the RDMZ, in 2017 completed a programme to study the nearly 2,5 million new buildings constructed in the post-War Reconstruction Period between 1940–65. The apparently slow increase in the number of houses and multi-family home National Monuments after 2000 is not indicative of the number of dwellings protected under this programme. In many cases National Monuments consist of multiple components, especially in the case of multi-family buildings and complexes. The national monuments service, the RCE has since initiated its Post-65 programme to explore the built landscape of the Netherlands up to 1990.[22] The continuity of conservation and maintenance of this lived-in heritage, to address the urgent environmental imperative, is a growing challenge that needs to take place without forsaking the social and cultural imperatives.

1.4 Three imperatives

1.4.1 The social imperative

The social imperative in public housing in the Netherlands is still the same as when the first public housing associations were founded over 150 years ago. The first Dutch public housing association, *the Vereeniging ten behoeve der Arbeidersklasse te Amsterdam* (VAK), was established in Amsterdam in 1852 with the aim of providing good and healthy homes to those who could not afford to provide for

21 Excluding agricultural and rural accommodation such farmhouses and mill-keepers houses. (CBS Statline 2020). This does not translate directly to the number of dwelling units, as many of these nationally listed buildings are multi-family complexes.

22 (Linssen & Rijksdienst voor het Cultureel Erfgoed, 2019).

themselves.[23] The public housing mandate is still today defined by the Dutch association of housing corporations, Aedes, as, first and foremost: providing good and affordable homes. To this is added, amongst others, that the members of Aedes aim to provide sufficient and suitable social housing everywhere and achieve environmentally responsible rental properties without incurring extra rental costs for tenants.[24] These ambitions speak directly to the issues of comfort, energy use and cost. The members of Aedes have a significant role to play in addressing the environmental imperative in the Netherlands.

1.4.2 The environmental imperative

Addressing the climate crisis is an international imperative. Global awareness of the limitations of our planet and our impact thereon have been steadily growing since the 1972 publication of the Club of Rome *The limits to growth* report, which highlighted what its authors called the "Predicament of mankind":

"…poverty in the midst of plenty; degradation of the environment; loss of faith in institutions; uncontrolled urban spread; insecurity of employment; alienation of youth; rejection of traditional values; and inflation and other monetary and economic disruptions."[25]

The growing evidence of our impact on the climate and biophysical systems of our planet has since expanded. A notable milestone in our awareness is the World Commission on Environment and Development's 1987 conclusion, published as *Our common future*, also known as the *Brundtland report*.[26] The 1992 *United Nations Framework Convention on Climate Change* (UNFCCC), presented at the 1992 United Nations Conference on Environment and Development, also known as the Rio de Janeiro *Earth Summit*, created a framework towards agreeing to global action on anthropogenic interference with our planet's climate system.[27] This culminated in the 2015 *Paris Accord*. The Netherlands is signatory to the 2015 Paris Accord, which commits the country to:

23 (Schade, 1981).
24 (Aedes Vereniging van Woningcorporaties, 2020).
25 (Meadows et al., 1972, p. 10).
26 (Brundtland & World Commission on Environment and Development, 1987).
27 (United Nations, 1992, Article. 2).

A “Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;

B Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production; and

C Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.”[28]

The 2015 United National Sustainable Development Goals (SDGs) identified 17 goals as a global development agenda towards 2030. The goals are cross-cutting, with the built environment included in goal 11: “Sustainable cities and communities.” The Agenda for implementation of the SGD’s includes Goal 11.4 “…Strengthen efforts to protect and safeguard the world cultural and natural heritage.”[29] In the 2015 Resolution of the UN General Assembly is included the commitment to “…reduce the negative impacts of urban activities and of chemicals which are hazardous for human health and the environment, including through the environmentally sound management and safe use of chemicals, the reduction and recycling of waste and the more efficient use of water and energy.”[30]

As the UN SDG’s contest to, our built environment is one of the causes of the predicament that the Paris Accord aims to address. Buildings form the largest single energy-use sector in the European Union. The energy used in buildings represents roughly 40% of the annual consumption in Europe, resulting in 24% of the EU’s greenhouse gas emissions.[31] Energy use reduction in the built environment is therefore seen as essential towards reducing the environmental impact of the EU member-states. The European Union has actively advanced energy reduction in buildings since 1988, when the European Council Directive Council *Directive 89/106/EEC* required of Member States to ensure that “…construction works and their heating, cooling and ventilation installations to be designed and built in such a way that the amount of energy required in use will be low, having regard to the climatic conditions of the location and the occupants.”[32]

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28 (Paris Accord, Article 2, 1(a-c)).

29 (United Nations General Assembly, 2015).

30 (United Nations General Assembly, 2015, Par. 34.)

31 (D’Agostino et al., 2016, p. 4).

32 (European Parliament and Council, 1988, Article 6).

This directive was further strengthened and expanded by EU Directive *2002/91/EC of 16 December 2002 on the energy performance of buildings,* recast in 2010 as *Directive 2010/31/EU*, requires that existing buildings, "…that are subject to major renovation, should therefore meet minimum energy performance requirements adapted to the local climate",[33] with the proviso that these be *cost-effective* or *cost-optimal.* Cost-optimal is defined as the "…balance between the investments involved and the energy costs saved throughout the lifecycle of the building."[34]

Along with costs, the heating and cooling of buildings take centre-stage in the EU Directives. This should not surprise, as the Buildings Performance Institute Europe (BPIE) has estimated that 70% of the total energy use in the residential building sector in Europe is spent on the heating of homes. This effectively means that roughly 28% of all energy consumed in Europe relates to the heating of dwellings.

For the Netherlands specifically, operating the built environment contributed 16% to all its greenhouse gas emissions in 2018.[35] As sector, housing was the second largest annual energy consuming sector of the Netherlands in 2017, using 22% of all energy nationally, most of it for space heating.[36]

Since 1 January 2008, when selling or renting out a property, every owner of a building in the Netherlands is obliged to present an 'energy label' (G to A, lowest to highest) to the other party.[37] In preparation the then Dutch Ministry of Housing Spatial Planning and the Environment (*Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer*, VROM) conducted a survey of approximately 500 houses to assess their energy performance. The results published in its overview of housing: *Kernpublicatie WoON Energie 2006.* Significantly, this presented estimated energy-labels for all extant Dutch housing based on a number of indicators: type of housing, ownership category, residents' age and income, building type and heating system. Its conclusions were that effectively all dwellings built before 1970 had a low energy-label of categories E, F or G. Seventy percent of those houses built before 1940, an energy performance that equated to either of the two lowest energy labels.[38] Of the total Dutch housing stock, 21% was estimated to achieve Label C, with only 16% having a higher performance (A and B). The remaining 63% scored in the ranges

33 (European Parliament and Council, 2010, Article 15).

34 (European Parliament and Council, 2010, Article 10).

35 (Rijksdienst voor Ondernemend Nederland, 2018, p. 28).

36 (Rijksdienst voor Ondernemend Nederland, 2018, p 27).

37 (Ministerie van VROM, 2006, p. 3).

38 (Ministerie van VROM, 2006, p. 17).

of labels D - G, with as many homes with a G Label as the sum of homes with an A or B Label.

Of course, housing was being renovated for energy-use reduction already before these calculations were made. The Netherlands initiated a national programme to retrofit insulation to dwellings in 1978.[39] The Dutch residential sector showed the largest reduction in energy use over the period 1990–2007 (20%).[40] Despite these advances, the PBL Netherlands Environmental Assessment Agency in 2014 calculated that thermal retrofitting (insulation) of 30 000 homes per year would be needed to reduce the sector's 2010 CO_2 emissions by half in 2050.[41]

It is estimated that 75% of all existing Dutch housing will still be in use in 2050.[42] A drastic energy-reduction renovation of the existing housing stock is needed for the Netherlands to meet its 2015 Paris Accord commitments. At the same time, these interventions in the housing landscape also have an immediate social dimension, as they relate to the affordability of housing, the comfort and efficacy of inhabitation, while requiring an extensive remodelling of extant built fabric and form. This has a potentially far-reaching consequence for the social housing complexes and urban environments in the Netherlands, notably in their appearance. It also raises questions about the future of valourised public housing complexes in this changing environment as these may require more investment than most other complexes to achieve environmental ambitions.

Today an energy-upgrade revolution of the Dutch building landscape is gearing up. The country also faces a new construction boom: the government estimates that by 2035, the country will suffer a shortage of one million new homes, if no action is undertaken.[43]

The Netherlands Government has entered into agreements with various Dutch sectors and environmental groups to achieve these commitments. After months of negotiation, the *Klimaatakkoord* (Climate Agreement) was agreed to in June 2019,

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39 (Rijksdienst voor Ondernemend Nederland, 2018 p. 16).

40 (Energy Research Centre of the Netherlands, 2009, pp. 5–6).

41 (Planbureau voor de Leefomgeving (PBL), 2016).

42 (Ipsos Belgium & Navigant, 2019, p. 7).

43 (Ollongren & Ministry of Interior, 2020).

and encapsulated in the 2 July 2019 *Klimaatwet* (Climate Act).[44] The Act has as aim the "…irreversible and gradual reduction of greenhouse gas emissions in the Netherlands to 95% below 1990 levels by 2050 in order to limit global warming and climate change."[45]

The 2019 Climate Agreement plans an interim step towards 2050: a 49% reduction of greenhouse gasses in 2030, in comparison to the 1990 levels. However, despite concerned efforts predating the Paris Agreement, the county has achieved a just-under 15% reduction of the 1990 levels over the past 28 years, which means that just more than 33% reduction will need to be achieved over the next 10 years.[46]

Together, the Climate Agreement and Climate Act hold great consequence for the existing and future built environment of the Netherlands, also for designated lived-in monuments that make up about half of the country's National Monuments list.

1.4.3 The cultural imperative

The manner in which the adaptation of built heritage is undertaken can potentially strengthen or weaken the resilience of the heritage value of such buildings and needs careful consideration. Heritage values, like all other things of value, have been acknowledged as a resource, for instance by the Council of Europe, which has identified this resource as an essential part of its *European Cultural Heritage Strategy for the 21st century*.[47] If anything, the twentieth century has taught us that resources are valuable and need careful curating. The task of the twenty-first century is to learn to manage these values effectively.

The values-based approach in conservation has its origin just over a century ago. The ground-work was laid by English art critic John Ruskin. Ruskin posited that buildings could tell stories–be *voiceful* by providing evidence of the passing of time–due to their age. For him this voicefulness was the essence of the cultural historical

44 "Wet van 2 juli 2019, houdende een kader voor het ontwikkelen van beleid gericht op onomkeerbaar en stapsgewijs terugdringen van de Nederlandse emissies van broeikasgassen teneinde wereldwijde opwarming van de aarde en de verandering van het klimaat te beperken (Klimaatwet)." (Koninkrijk der Nederlanden, 2019).

45 "het onomkeerbaar en stapsgewijs terugdringen van de emissies van broeikasgassen in Nederland, tot een niveau dat 95% lager ligt in 2050 dan in 1990, teneinde wereldwijde opwarming van de aarde en de verandering van het klimaat te beperken." (Koninkrijk der Nederlanden, 2019, Article 1).

46 (Van den Wijngaart et al, 2014, p. 6).

47 (Committee of Ministers of the Council of Europe, 2017).

value. Ruskin illuminated his thinking with *Seven lamps of architecture*[48] (what today would be referred to as 'lenses'), through which architectural heritage could be seen as encapsulating history (*lamp of… sacrifice*), *truth*, persistence (..*power*), *beauty*, continuity (..*life*), age (..*memory*), and tradition (…*obedience*).

Ruskin's person as well as his *Seven lamps of architecture* heavily influenced the thinking of designer, philosopher and co-founder of the Society for the Protection of Ancient Buildings (SPAB) in the United Kingdom in 1877, William Morris. Alarmed by overly-zealous restoration of historic buildings undertaken by Victorian architects, the SPAB adopted a manifesto that implored:

"It is for all these buildings, therefore, of all times and styles, that we plead, and call upon those who have to deal with them, to put Protection in the place of Restoration, to stave off decay by daily care, to prop a perilous wall or mend a leaky roof by such means as are obviously meant for support or covering, and show no pretence of other art, and otherwise to resist all tampering with either the fabric or ornament of the building as it stands."[49]

The SPAB stood for regular maintenance through proven methods, craftsmanship, a respect for age, repair as preference to restoration, and good new contemporary design. This was in stark contrast to the school of thinking initiated by the partly illusory reconstructions of historic monuments, epitomized by French architect Eugène Viollet-le-Duc, in which conservation aimed for the recovery of an 'ideal form'; i.e. not that which was historically there, but that which could be postulated as had been intended, even if not possible at the time of construction.[50] In this school of thinking the action of time was denied and technologies were often embraced to achieve the ideal and the restored result "…lacking any patina of age."[51]

These two schools of thought stood diametrically opposed to each other, the one embracing truth, the other character. The Austrian art historian Alois Riegl, was the first to bring these two approaches into a union, albeit a dialectic one. Riegl, in his seminal 1903 essay on *Der moderne Denkmalkultus, sein Wesen und seine Entstehung* (The modern cult of monuments: Its essence and its development) reframed these divergent schools of conservation thinking into two dialectic value-sets:

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48 (Ruskin, 1849).

49 (The Society of the Protection of Ancient Buildings et al., 1877).

50 (Kuipers & De Jonge, 2017, p. 67).

51 (Glendinning, 2013, p. 92).

what he termed the *Commemorative Values*–age, historical and deliberate commemorative values–and *Present-day Values*–use value, newness value and relative art value.[52]

In the Netherlands these same debates were raging. The country had established a *Rijkscommissie tot het opmaken en uitgeven van een inventaris in eene beschrijving van de Nederlandsche Monumenten van geschiedenis en kunst* [National Commission to draw up and publish an inventory and description of the Dutch artistic and historical monuments] in 1903, which stimulated discussion on only the identification and description, but also further care–be it restorative or conservationist–of these edifices that were deemed to be valuable.[53] It was not only a question of what and why but also of how, a question that was eagerly debated within the *Nederlandse Oudheidkundige Bond* [NOB, Dutch Antiquities Association, today carrying the designation 'Royal' and known as the KNOB], founded in 1899.

Stimulated by a sometimes-fierce national debate about the restoration and reconstruction of churches and castles in the Netherlands, the NOB published its *Grondbeginselen en voorschriften voor het behoud, de herstelling en de uitbreiding van oude bouwwerken,* [Principles and regulations for the preservation, repair and extension of old buildings]. Prefaced by its secretary, Jan Kalf, in 1917, the 31 principles of the *Grondbeginselen* stemmed from the principle *Behoud gaat voor vernieuwing*,[54] reflecting both the Ruskinian and the SPAB positions. The *Grondbeginselen* further covered the range of built heritage from ruins to buildings in use. It borrowed heavily from Riegls *Der moderne denkmalkultus*.[55] For buildings still in use, it advised that the approach should entail "…not the complete reconstruction of an earlier state, but the preservation of what is left of it in the existing state and of the later alterations and additions, where these have an archaeological, historic or artistic value."[56]

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52 (Riegl, 1903/1996, pp. 78–81).

53 (Tillema, 1975, p. 120).

54 (Van Emstede, 2015, p. 25).

55 (Van Emstede, 2015, p. 26).

56 "… niet zijn de volledige herbouw van een vroegere toestand, doch het behoud van hetgeen daarvan in den bestaande toestand is overgebleven en van de latere wijzigingen en toevoegingen, die oudheidkundige, historische of kunst-waarde bezitten." Quoted in (Tillema, 1975, p. 123).

1.5 Managing change

Already in 1911, Jan Kalf–who was not only the secretary of two NOB committees, but was later in 1918 to become secretary of the permanent *Rijkscommissie* as well as director of the *Rijksbureau voor de Monumentenzorg* (National Bureau for Monuments Care)[57]–noted an internal contradiction in the ideals of conservation, namely that: "…restoration is forgery, but [that] it is impossible to escape from that falsification."[58] This is an internal contradiction in a principle point of departure of the conservation movement: that the passing of time is essential in creating historical values; while in its essence the movement has the ambition to either erase the results of the passing of time (the Viollet-le-Duc school of thinking/restoration) or halting its actions (the Ruskin paradigm/preservation).

Yet, any intervention in an existing building is change; but change is ever-present even without intervention. In the words of archaeologist Graham Fairclough: "There is no question of arresting change."[59] Or as John Allan, architect-conservator of Modern Movement architecture, phrased it about a century after Kalf: "It would be a mistake, therefore, to imagine that even in those rare cases of buildings where the client is constitutionally committed to conservation, such buildings do not also have to undergo change in order to remain 'the same'."[60]

Change may be ubiquitous and inevitable, but responses to change can take a range of forms and lead to a number of results. Four attitudes can be identified when it comes to conservation and change. A single project may of course include a mix of these.

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57 (De Jong, 2013).

58 "Restaureeren is vervalschen, maar aan dat vervalschen is niet te ontkomen." (s.n., 1911, p. 325).

59 (Fairclough, 2001, p. 23).

60 (Allan, 2007, p. 24).

TABLE 1.1 Four principles, approached and focusses of change in conservation.

Principle	Approach	Focus on...
halting change	*archaeological*	preserving the fabric as historical evidence
managing change	*architectural*	preserving the historic form, including appearance, and adding new additions
embracing change	*technical/pragmatic*	safety, efficiency of operation and currency
employing change	*aesthetic/economical*	appearance, also as investment for fiscal return, even if returning a building to an earlier form

The inevitability of the environmental imperative has now led to a wide-ranging acceptance of change. The scale of the climate crisis forces a pragmatic approach to conservation of built heritage. Sustainable management of heritage resources presupposed that they have possibilities for change. Faced with the urgency and inescapability of the need for sustainable development, which implicitly calls for adaptation, the conservation movement has had no other option but to ensure that built heritage is positioned as contributing to, and remaining relevant to sustainable development in general. Architects have eagerly adapted to the challenge, and 'adaptability' has become a field of study in both reuse of buildings[61] and new design.[62]

1.5.1 Change in the international context

The values-based approach has become a central tenant of the Conservation Movement–as it has been labelled by Glendinning[63]–ranging from the conservation of 'Outstanding Universal Value' or 'OUV' of World Heritage, to the level of conservation through local by-laws. Dutch heritage legislation is no exception. Since the promulgation of the first 1961 Act, values have legally served as criteria for identification, protection and listing of a building as National Monument.[64]

Yet, the inevitability of change due to natural degradation and/or adaptation has been one of the conservation movement's biggest challenges. The 1964 Charter of

61 (Zijlstra, 2006a), (Wong, 2016).

62 (Schmidt & Austin, 2016).

63 (Glendinning, 2013, p. 2).

64 (Koninkrijk der Nederlanden, 1961). The most recent heritage legislation, the *Erfgoedwet* defines a monument simply as 'immovable property forming part of cultural heritage', without prescribing any minimum age requirement (Koninkrijk der Nederlanden, 2015b).

Venice, a document conceived in reaction to radical interventions (mainly in Europe) by post-WWII modernists, notes that the monument is "inseparable from its history", and acknowledges that changes in function could be essential for the purpose of conservation. Consequently, it deals with potential changes in use as allowable, but only if the layout and decoration of a building are not altered.[65] These hesitant concessions were an attempt by the conservation movement to address a growing challenge: that of relevance and addressing the need to change buildings to keep them in use.

When 1975 was declared European Architectural Heritage Year (EAHY) by the Council of Europe, the title chosen for the thematic year *A future for our past* implicitly acknowledged this crisis of relevance and unstoppable change. In its *European charter of the architectural heritage* the European Council of Ministers also acknowledged the danger of not only neglect or misuse, but also "…misapplied contemporary technologies and ill-considered restorations."[66] The solution, according to the council, was ensuring the "…integration [of built heritage] into the context of people's lives and upon the weight given to it in regional planning and development schemes." [67] The *Declaration of Amsterdam*, the culmination of the year-long EAHY programme, validated the *integrated approach,* wherein the conservation of the architectural heritage was positioned as a major objective of urban and regional planning in the belief that this alignment would ameliorate the impacts of the change brought by large scale urban redevelopment.[68]

From the 1970s onwards the conservation movement started to embrace *adaptive reuse,* commonly understood as the process of changing existing buildings to accommodate a new function (i.e., other than the purpose for which it was originally constructed), as a valid conservation approach.[69]

The 1979 ICOMOS Australia Burra Charter initially eschewed change. Advocating compatibility as principle, it defined compatible use, as use that does not involve change.[70] It did, however, acknowledge that change due to new use could be acceptable if it is "…substantially reversable or has minimum impact on the

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65 (ICOMOS, 1964, Articles 5 & 7).

66 (Committee of Ministers of the Council of Europe, 1975).

67 (Committee of Ministers of the Council of Europe, 1975).

68 (Congres on the European architectural heritage on 24 October 1975, 2015); (Kuipers, 2015, p. 241–2).

69 (Chatzi Rodopoulou, 2020) gives a broad overview.

70 ICOMOS Australia, 1979, Article 7).

culturally significant fabric."[71] It also acknowledged adaptation–"…modifying a place to suit new functions without destroying cultural significance"–as an often-necessary evil.[72]

Still, the challenge of change remained: The 1999 Burra Charter prescribed that "…[c]hanges which reduce cultural significance should be reversible, and be reversed when circumstances permit."[73] This introduced anachronous reversibility to deal with the inevitability of change. The later iterations of the Burra Charter, both 1999 and 2013 versions, however have grown closer to acknowledging the inevitability of change. It now advises to change as much as is necessary to ensure continuation of values, but to ensure that such change is limited to the essential minimum.[74]

The built legacy of the twentieth-century is seen as presenting very specific challenges in both preservation and adaptation,[75] not only because of the application of new construction technologies and techniques, but because buildings are mostly still very much in use and "…still changing and evolving."[76] They are also noted as often being highly energy inefficient, providing low levels of comfort to boot![77] To further complicate matters, this legacy was often experimental by design, structure and materials and included prefabrication. Technical conservation responses and theoretical philosophical positions have not yet been fully developed for this heritage.[78]

The turn of the millennium brought an international realignment of the conservation movement's aims with sustainable development. The 2001 4th US/ICOMOS International Symposium marked a new approach to conservation with its title *Managing Change: Sustainable approaches to the conservation of the built environment*.[79] Yet, the technically tricky issue of energy renovations of inhabited built heritage is absent from its proceedings, which refer rather to the cultural landscape and urban spatial planning, economic issues, traditional vernacular

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71 (ICOMOS Australia, 1979, Article 20).

72 (ICOMOS Australia, 1979, Article 1).

73 (ICOMOS Australia, 1999, Article 10).

74 (ICOMOS Australia, 1999, Preamble).

75 (Prudon, 2008, p. 166); (Kuipers & De Jonge, 2017, p. 16).

76 (Orbasli, 2008, p. 31). This can be said for the majority of buildings though, with the rare exception not changing due to changing needs and technological advancements, or through new restorations.

77 (Bierman & Van Emstede, 2010, p. 5).

78 (Orbasli, 2008, p. 31–2); (Henket, 1990).

79 (Teutonico & Matero, 2001).

practices and knowledge systems and community engagement. The English Heritage (now Historic England) 2008 document *Conservation Principles, Policies and Guidance*, likewise embraces the "sustainable development of the historic environment" in its subtitle.[80] It positions built heritage as a shared resource, which is presented as inherently energy efficient[81] and is to be managed in such a manner that *heritage values* are safeguarded for the future.[82] However, the challenge of change brought by energy-reduction upgrades–think of retrofitted insulation and new heating services–remained, with the guidance opting for reversibility, i.e. making an intervention in such a way that it can be undone, as a point of departure, already introduced in the 1999 Burra Charter.[83]

Fifteen years later, this anachronous notion as a feasible conservation approach was falling from grace. Council of the European Union in 2014 concluded that "…cultural heritage resources …are of great value to society from a cultural, environmental, social and economical point of view and thus their sustainable management constitutes a strategic choice for the 21st century."[84] Sustainable management of heritage resources presupposes that they should accommodate change. Change is no longer seen as a threat, but as a tactical decision to address other challenges.[85] The adaptive reuse of built heritage has become a main-stream architectural endeavour. Recent publications have gone as far as calling it, somewhat contentiously, a 'new' discipline,[86] and argued that remodelling (or reuse) of buildings is both beneficial to societal and environmental health.

1.5.2 Change in the Netherlands

In the Netherlands, the challenge of maintenance of values of especially historically valuable housing neighbourhoods in the face of change, was raised even before the conclusion of the MIP/MSP could highlight it. The *Vierde Nota over de Ruimtelijke Ordening Nota* (Fourth Policy on spatial planning, VINO), published in 1988, explicitly based its assessment of quality on the so-called Vitruvian triad: *firmitas, utilitas,* and

80 (English Heritage, Drury, & McPherson, 2006).

81 (English Heritage et al., 2006, Par. 97).

82 (English Heritage et al., 2006, p. 7).

83 (English Heritage et al., 2006, Par. 100); (ICOMOS Australia, 1999).

84 (Council of the European Union, 2014, p. 1).

85 (Cantacuzino, 1989); (Meurs & Steenhuis, 2020).

86 (Bie Plevoets & Van Cleempoel, 2019).

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venustas and the continued maintenance of these principles.[87] VINO brought the issue of housing quality to the national agenda.[88]

Controversial housing heritage renovation projects highlighted the challenges of maintaining historical fabric (or Ruskin's 'truth') while ensuring 'currency' (new and useful). The total demolition and reconstruction of JJP Oud's internationally famous 1925–30 Kiefhoek housing complex in 1988–89, or one of HP Berlage's 1925 Mercatorplein housing blocks ten years later, both under guidance of architect Wytze Patijn and with the stated ambition of bringing the dwellings up to the then current performance norms, are well-known Dutch examples.[89]

Unable to overcome building-scale challenges of change, attempts to theoretically mitigate conservation and change, increasingly sought out larger scale levels. The 1992 report *Bij de tijd,*[90]–commissioned by the RDMZ to provide guidance on achieving currency without destroying cultural historic value–embraced both gradual and periodic change on the neighbourhood scale, presenting policy guidance to ensure long-term conservation-through-maintenance of these neighbourhoods. It advised that keeping housing up to date would require financial stimulation of both preventative maintenance and *drastic* improvements by landlords.[91]

Continuing on the up-and-up, the 1999 *Nota Belvédère* national spatial policy memorandum sought to address the conflict between conservation and change on the scale of the cultural landscape.[92] Adopting the concept of *conservation through development* as maxim, it embraced change as vehicle for conservation of heritage in the Netherlands. Its ambition was to align cultural heritage with spatial planning in a general sense through positioning cultural heritage as inspiration for the development of the larger Dutch landscape.[93] All of these, be they the *integrated approach, Belvédère,* or approaches on neighbourhood scale were a transposition of adaptive reuse principles onto the urban morphological and landscape scale. A common strategy for post-War neighbourhoods emerged:

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87 (Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer, 1991).

88 (Ekkers, 2002, p. 171).

89 (Geurtsen & Van Rooy, 1991).

90 The title translates roughly to 'up to date' (Aussems & Partners, 1992).

91 Ingrijpende verbetering door verhuurders. (Aussems & Partners, 1992, p. 140).

92 (Ministerie van Onderwijs Cultuur en Wetenschappen (OCW), Ministerie van Landbouw Natuurbeheer en Visserij (LNV), Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer (VROM), & Ministerie van Verkeer en Waterstaat (VenW), 1999).

93 (Clarke, 2016, p. 62).

presenting their value to lie in their urban morphology, and not focusing on their built fabric.[94]

1.5.3 Reflections on the change challenge

The challenge of change has been strongly felt amongst scholars and conservators of the Modern Movement heritage.[95] The Dutch working party of *Docomomo*–the International Committee for Documentation and Conservation of Buildings, Sites and Neighbourhoods of the Modern Movement–chose as theme for its 2008 international conference the title *The Challenge of change, dealing with the legacy of the Modern Movement*.[96] The opening ceremony of the *Challenge of change* conference took place in the then recently adaptively reused *Rode Scheikunde* (1918–23) building; reused as home for the Faculty of Architecture of the Delft University of Technology after the 1970 faculty building was destroyed by fire earlier that year. The conference was also partly hosted in the adaptively reused Van Nelle Factory in Rotterdam. In reflecting on the 2008 *Challenge of change* conference, architectural historian Natalia Dushkina identified four contemporary paradoxes in conservation. One of these was the ongoing change of time parameters, meaning that the faster pace of change has highlighted the asynchronisms in the built environment.[97] If we accept Witold Rybczynski's assessment that "…the acute awareness of tradition is a modern phenomenon that reflects a desire for custom and routine in a world characterised by constant change and innovation",[98] the paradox that Dushkina identifies is due to our nostalgia being out of sync with reality.

But rates of change are neither constant nor do they take place at an equal level. The authors of *Adaptable Architecture,* architect and structural engineer Schmitt & Austin, note the distinction between *sharp and striking (radical)* and *incremental change*, in buildings. They conclude that a current increase in the pace of change in buildings calls for the inclusion of time to: "…envision a building not as a static object in space, but as a part of a dynamic interplay between form (building) and context (users and environment)".[99]

94 (Clarke, 2016).

95 See (Henket & Heynen, 2002) & (Prudon, 2008).

96 (Van den Heuvel et al., 2008).

97 (Dushkina, 2008, p. 199).

98 (Rybczynski, 1986, p. 9).

99 (Schmidt & Austin, 2016, p. 47).

This is in essence an ecosystemic approach, where systems, each consisting of sub-systems, are nested within each other as essential parts of a larger supra-system.[100] In opposition to the scientific method which isolates elements in order to study them, systemic thinking, studies the resultant web of interaction of actors of the 'ecosystem' in context.

Schmitt & Austin also effectively echo Brand, who, calling for an approach to the built environment similar to Darwin's theory of evolution, laments the lack of data on how buildings behave. Brand notes, that without corrective feedback–learning–"a building can't thrive".[101] Learning from what we are doing is essential to further engage change as a strategic choice in the sustainable management of heritage as a resource. This is why it is important to try to understand *how heritage learns.*

1.6 Herbestemming, renoveren and verduurzaming in the Netherlands

1.6.1 Herbestemming and renoveren

The importance of renovation and adaptive reuse as a field of study in architecture in the Netherlands is evidenced by the transition of the Chair of Restoration at the TU Delft, to the section of ®MIT–the international research centre for the modification, intervention and transformation in the built environment–in 2004. It is today the section Heritage & Architecture. One of its three chairs, that of Heritage & Design focusses on: "…integrating values, technical conditions and spatial, programmatic and technological challenges in the architectural design for preservation and adaptive reuse of built heritage."[102]

100 (Fisher & Clarke, 2011, p. 12).

101 (Brand, 1994, p. 213–14).

102 (Heritage & Architecture, 2018).

The Dutch word *herbestemming,* translates directly to 're-purposing', but refers to the practice of Adaptive reuse. Adaptive reuse is different from renovation, in one essential detail: the former includes a change of use, and therefore presupposes a more drastic intervention than the latter.

These concepts have an international base: the 1964 ICOMOS Charter of Venice makes specific reference to conservation and restoration. The 1979 Burra Charter has a wider range: in it a distinction is made between *preservation* ("…maintaining a place in its existing state and retarding deterioration"), which requires *conservation* ("…all the processes of looking after a place so as to retain its cultural significance") through *maintenance* ("the continuous protective care of a place, and its setting").[103]

The Burra Charter does not make a distinction between renovation and adaptive reuse. Rather *adaption* is defined as: "…changing a place to suit the existing use of a proposed use."[104]

This distinction is made in the Dutch context. Through the more than 50 years of repurposing and renovation of heritage under legal protection, the Dutch conservation movement has developed a distinct approach that is typically pragmatic, and does not eschew the challenge of change. It embraces renovations and adaptive reuse of built heritage, continuously seeks social relevance and, in general, takes a long-term view.

The renovation and adaptive reuse practice landscape in the Netherlands is very dynamic. It has become an essential part of the Dutch approach on integrated conservation, which is exported internationally.[105] As one of the more important actors in the conservation field in the Netherlands, the RCE has for many years embraced adaptive reuse as a valid approach to conservation. It was key contributor to the 2009–15 *Nationale Agenda Herbestemming* (national agenda for adaptive reuse), and currently runs different programmes on adaptive reuse of religious heritage at a regional scale.

The economic potential and benefit of building reuse have since the mid-1990s emerged as a new field of study internationally,[106] with recent publications on

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103 (ICOMOS Australia, 2013, Articles 1.6; 1.4 & 1.5).

104 (ICOMOS Australia, 2013) Article 1.9.

105 See for instance: (Clarke, 2015); (Meurs & Steenhuis, 2020).

106 (Lichfield & International Council on Monuments Sites, 1993); (Rypkema & National Trust for Historic Preservation in the United States, 1994).

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the Dutch context specifically.[107] The RCE today has a dedicated programme on focussing on adaptive reuse, which it defines simply as "…giving an existing building a different function".[108] Adaptive reuse is actively stimulated through national subsidies. It is also positioned as an important pillar of the Dutch creative industry.[109]

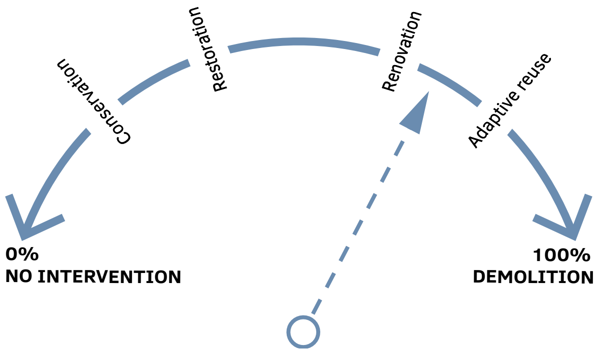

FIG. 1.3 The range of change from no intervention to maximum impact.

Constructional interventions in extant housing to continue the use as housing is, however, not seen as adapt1ive. It is rather seen as *renoveren* (renovation).

An important national sectoral player in the adaptive reuse and renovation arena is the *Nationale Renovatie Platform* (national renovation platform). It was established in 2011 to promote the sustainable use of the existing built environment through renovation and transformation. Today it has a membership of over 100 businesses and organisations, including housing corporations, banks, property developers, architects, contractors and technical and knowledge institutions. Unlike the RCE, the NRP makes no distinction between adaptive reuse and renovation: its annual award, the *Gulden Fenix*, can be awarded to both renovation and adaptive-reuse projects and has become a national barometer conservation practice.

Built heritage is generally characterised by being place-bound. The Dutch approach to dealing with built heritage in situ can be summarised as a change scale meter that can swing from no intervention to demolition, with the first presupposing the least change, and the latter, the most.

107 (Gelinck & Strolenberg, 2015).

108 "Herbestemming betekent dat een bestaand pand een andere functie krijgt." (Rijksdienst voor het Cultureel Erfgoed, 2021).

109 (Meurs & Steenhuis, 2020, p. 8).

1.6.2 Verduurzaming

A further peculiarity of the Dutch context requires a short explanation: the use of the noun *duurzaamheid*. It is a derivative of the verb *verduurzamem. Duurzaamheid* translates both to sustainable and durable, and *verduurzamen* to the act making something either more sustainable or durable, or both. However, the word *verduurzaming* in general use refers to the process of alterations to a building to achieve a reduction in energy use, such as insulation, installation of double glazing, or replacement of gas-fired heating installations with heat pump installations.

The RCE took first steps towards addressing sustainable development in relation to built heritage in 2001.[110] Energy use reduction took centre stage early on. In 2002, the book *Duurzaam Huisvesten / Buildings that last* already predicted that office buildings would use 95% less energy in 2040 than at the end of the twentieth century.[111] Then, in the same year as the publication of the Historic England 2008 *Guidance*, the RCE and the National Buildings Service published a *Handboek Duurzame Monumentenzorg* (handbook sustainable monuments care) attempted to embrace the benefits that adaptation and new technologies bring. It presents a computational model which balances financial costs and gain against a potential loss of cultural values.[112] Such is the local acceptance of the sustainability imperative amongst scholars and conservators of the Modern Movement that *Docomomo* Netherlands in 2010 concluded that "…the need for sustainability is undisputed."[113] Since then, many publications supported by the RCE have stressed that interventions aimed at *duurzaamheid* are essential components of conservation practice. The 2011 book *Duurzaam erfgoed : Duurzaamheid, energiebesparing en Monumenten*, produced by the RCE, focussed specifically on energy use reduction.[114] The RCE series of ten building-type themed guidance documents *Een toekomst voor…* advocated creative adaptation of buildings.[115] Other RCE documents address technical considerations in combination with monumental qualities. The approach of *preservation through development*[116] is today broadly advocated by the Dutch national monuments service. Typically for such RCE guidance documents, the *Groene gids, Zonne-energie en uw monument. Wegwijzer voor eigenaren en huurders* (Green

110 (Van de Ven et al., 2011, p. 8).

111 (Van Kasteren, 2002).

112 (Nusselder, 2008).

113 "De noodzaak van verduurzaming is onomstreden." (Bierman & Van Emstede, 2010, p. 4).

114 (Van de Ven et al., 2011).

115 (Rijksdienst voor het Cultureel Erfgoed & Bureau Overland, 2011–18).

116 (Strolenberg, 2017).

guide: Solar energy and your monument. A guide for owner and tenants), presents an ambition to bridge the divide between maintenance of heritage value and change in service of use needs:

"For monuments and within protected city or townscapes, a solar energy installation requires special attention. Not only because of the cultural-historical value of the building or area, but also to choose the right system and install it properly."[117]

1.7 Energy, economy and comfort

The Housing Act of 1901 provided the base for an extensive central system of subsidy for housing production and quality improvement, creation of regulations and norms and standards and directing the market through the creation of expansion plans and public housing development. Hygiene, heating and lighting improvements were fundamental ambitions of public housing production.[118]

It would not be an erroneous observation to conclude that today the challenge of hygiene in public housing in the Netherlands has been successfully met, but it has now been replaced with that of energy use reduction.

The EU directive on energy performance in buildings mandates its members to set

"… system requirements in respect of the overall energy performance, the proper installation, and the appropriate dimensioning, adjustment and control of the technical building systems which are installed in existing buildings…"[119]

…to reach the energy-reduction ambitions, even going so far as to provide definitions for them.

117 "Bij monumenten en binnen beschermde stads- of dorpsgezichten vraagt een zonne-energie installatie speciale aandacht. Niet alleen vanwege de cultuurhistorische waarde van het gebouw of gebied, maar ook om het juiste systeem te kiezen en dit goed te installeren." (Van de Ven & Westerman, 2020).

118 (Prak, 1991, pp. 174–75).

119 (European Parliament and Council, 2010, Article 8).

Contemporary renovation projects are driven by the sustainable development paradigm. With regards to adaptation to fabric, the choice of technologies applied and their manner of integration with the extant fabric can have different impacts on the heritage value in aesthetic, technological, use, space planning, robustness, representativity, uniqueness and other aspects. Adaptation, in turn, takes into account various factors in varying degrees: economy (including payback period), reliability, ease of implementation, visual and fabric impacts and potential gains in energy use and comfort norms prescribed, are all factors that could influence the decision process.

While heritage structures are now acknowledged as having a net-positive environmental balance, due to their already embodied energy,[120] the balance of operational environmental impacts, financial costs and user comfort inform decisions. This stimulates the inclusion of technologies that aim at:

- decreased energy use for improved environmental performance; which will
- lead to economic savings; and
- increases in comfort.

2E+Co
(Energy use reduction + Economy + Comfort)

The retrospective implementation of 2E+Co technologies in heritage housing brings about changes to building fabric with potential to impact those cultural historical values that led to the original valorisation thereof.

1.8 Rival regimes

The 2010 EU directive on energy performance in buildings acknowledges the potential conflict of addressing its environmental and social imperatives with the cultural imperative of heritage conservation. It gives its member states the option to disapply the directive requirements to buildings that form part of a protected environment or are protected because of their architectural, historical value or

120 (English Heritage et al., 2006); (The Preservation Green Lab, 2011) & (Young, 2012).

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religious use when compliance with the minimum standards for energy performance would "…unacceptably alter their character or appearance",[121] or in other words lead to unacceptable change.

Today, despite the past and recent theoretical attempts to aligning conservation and development at different scale levels, a consensus view on change remains that: "…conservation is the process of managing change while development is the mechanism that delivers change."[122] An unconventional perspective sees change in buildings as essential. Taken from the viewpoint of time, architect and educator Hielkje Zijlstra has determined that: "[c]hange and durability appear to be intimately linked to guarantee a degree of continuity of our built environment."[123]

The potential benefits of the application of technology have become accepted as holding the promise of sustainable development and deliver durable environments. The two themes of decarbonisation and technological progress are omni-present in the debate around the adaptation of the extant building stock to limit energy use and waste taking place in housing internationally. This figurative stage is populated by actors positioned on continuously shifting levels of scale, forming rival regimes of change versus continuity:

- old vs. new (preservation vs. renewal),
- heritage value vs. present day requirements and norms (use),
- safety vs. maintenance of authenticity
- cost (of investments) vs. benefit (economy of living),
- energy use vs. comfort,
- reality vs. ambition.

All of these require constant mediation in the ecosystem of the building throughout its lifespan, potentially being revisited time and again when extending its lifespan for another period.

121 (European Parliament and Council, 2010, Article 4 (2–3)).

122 (Orbasli, 2008, p. 6).

123 (Zijlstra, 2006a, p. 152).

1.9 Gaps identified

"In the end conservation is about vitality, and serving life as it is lived is the oxygen of building survival." – John Allan[124]

Change in the fabric of heritage buildings is seen as acceptable under varying conditions. But each intervention can have long-term consequences that are not always envisioned at the decision-making moment. This is especially true for the inevitable introduction of new technologies into extant homes that have been valourised as having heritage value. Housing as heritage presents a significant conservation and maintenance challenge as homes are made for living in and are consequently constantly adapted to the owner's ambitions or to the occupant's preferences and needs, while keeping the same function. Yet, because adaptive reuse has been defined as using an existing, often vacant building for a new use through a change in function by means of an architectural intervention,[125] the often-drastic changes made in heritage housing renovation, to keep habitation as far as possible in line with contemporary norms, are not described as such. Radical interventions in heritage housing remain approached and described as adaptation, and not as adaptive reuse, because of a very narrow interpretation of function as relating only to the activities people or processes will typically perform inside a building and how this relates to form.

In the study of buildings, it is only in the Ruskinian building-archaeological approach to building-histories that describe the evolution of historical built fabric where the residue of each intervention over time is identified and studied as an essential part of the building as evolving organism. Commentary on reuse–for instance in relation to industrial or commercial heritage such as vacant office buildings–falls into four schools of thought: the typological (relating to the original function), technical, programmatic and strategic.[126] None of these places the single building central and none tracks the evolution of the building, including the consequences of decisions for intervention over time. This mirrors the predominance in architectural histories for either the oeuvres of architects, the historical development of typologies, style periods and development of theoretical positions, all of which take the building at its genesis as the singular and often only relevant expression of itself.

124 (Allan, 2002, p. 21).

125 (Schmidt & Austin, 2016, p. 44).

126 (Chatzi Rodopoulou, 2020, p. 28), referring to (Plevoets & Van Cleempoel, 2013).

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Yet buildings are *complex and layered organisms.*[127] The word *organism* has its roots in the Greek, (όργανισμός [organismos], from όργανον, [organon] which means instrument, tool, implement or organ of sense or apprehension). It comes to us via the Latin *organum*, which too referred to an instrument or tool. An organism is that which is created (comes to life) when tools are brought in useful interrelationship which each other. A building is nothing less than this.

Zijlstra has already noted the self-evident analogous parallel of buildings with humans, citing John and Inger Exner's 1984 description of the Danish Koldinghus Castle: "Buildings are like human beings. They are born and develop; they become ill and are cured; they grow old, waste away and die. They show the influence of events, people and adversities. They change from the freshness of youth maturity, sometimes attaining beauty in their old age. Thus, their identity is not only the one that was given to them at birth by the architects and artists who created them; it also reflects all the changes, additions and influences that they have experienced during their life."[128]

Building-archaeological biographies of pre-twentieth century buildings are common, but for the recent built environment artefacts they are rare, and where they exist, they focus on high-level iconic architectural interventions. The integration of installations for warming, watering, wiring, and the wireless web as integral part of the adaptation and restoration of buildings remain underrepresented, with just a few exceptions.[129]

The development of Dutch construction technologies, such as *in-situ* cast and prefabricated concrete construction systems have been well-researched.[130] The repair and replacement of building stone have also received attention,[131] with some mention of their integration into buildings.[132] Some have focussed on indoor climate installations in a specific period, such as building historian Meindert Stokroos' *Verwarmen en verlichten in de negendiende eeuw*,[133] which deals with the nineteenth

127 (Van Hees, Naldini, & Roos, 2014, p. 13).

128 Quoted in (Zijlstra, 2006a, p. 9).

129 Notable exceptions the extensive presentation of the choices for and technologies by Hubert-Jan Henket and Wessel de Jonge applied in the restoration of the Zonnestraal Sanatorium in (Meurs & Van Thoor, 2010) and by Joris Molenaar in the restoration of House Sonneveld in (Adriaansz et al., 2019).

130 For instance (Van Elk & Priemus, 1971); (Kuipers, 1987); (Van Elk & Priemus, 1971), (Messchaert, 2004); (Stephanie Van de Voorde, 2011); (Heinemann, 2013) & (Quist, Zijlstra, & Spoormans, 2017).

131 (Quist, 2011).

132 See for instance (Prudon, 2008).

133 (Stokroos, 2001)

century specifically, or technology historian Pieter van Overbeeke's *Kachels, geisers en fornuizen*[134] which explores historic energy-technologies for heating, hot water and cooking in the period 1920–75. Other studies have focused on technological products such as electricity,[135] or the history of institutions for water provision to cities.

Yet even this limited study of technical systems in buildings overshadows the number of studies that have placed buildings centrally and tracked the evolution of the building-organism, including the upgrade or replacement of technologies, simply because there are none. We do not know which actors and factors are decisive in the evolution of buildings and the choice of technologies and have failed to assess their effects over time.

Why do we re-organise buildings and what are the consequences? To do so would require a time-based method of assessment. Zijlstra's *ABCD-time* method is one of the few analysis methods that accommodates change in buildings, but it is mainly meant as a tool to assess possibilities for durable interventions. However, Zijlstra's method utilises a stop-motion lens in which three periods–past, present and possible future–are analysed. Seeing the ever-present conflict of use and value, with its subsequent financial, social, environmental and cultural-historical implications of intervening in housing heritage, undertaking such a deep assessment of the heritage building learning in context, would be a useful exercise, adding a new perspective.

Stewart Brand effectively undertook an evolutionary study of the buildings as organisms in *How buildings learn*, but he focussed on the building and less so on the actors and factors that acted as drivers and informants for change in the building. Heritage buildings exist and change in a complex context that includes, in the parlance of Brand, cultural historical values as 'dictators' in a complex ecosystem. Schmidt & Austin have advocated an ecosystemic approach to the study of buildings.[136] Bringing together time-based evolutionary and context-based ecosystemic approaches to the study of executed intentional interventions in valourised heritage housing, could provide new insights into the roles of actors, factors and environmental aspects that motivate for the changes made. An analogical model based on biological evolution that frames the building as organism learning in a complex ecosystem may provide a useful vehicle for discovering *how heritage learns.*

134 (Van Overbeeke, 2001).

135 See for instance: (De Rijk, 1998); (Libbenga, 2020).

136 (Schmidt & Austin, 2016, p. 47).

1.10 Research aims, questions and methods

With the prospect of greater integration of ever-improved energy, economy and comfort technologies into built heritage fabric, tracing past decisions, conditions and the effects for **Energy use reduction + Economy + Comfort = 2E+Co** is highly relevant and core to this thesis. This research aims to investigate how heritage learns through the retrospective analysis of planned interventions, which in turn can be utilised to illustrate the wide-ranging extended after-life of the choices for, and impacts of, the successive interventions.

This generates the main questions for this research:

- Which factors informed decisions for the inclusion of 2E+Co technologies in practice during the renovation of heritage protected public housing complexes in the Netherlands?
- What is the consequential after-life effect of technology upgrades for 2E+Co on the survival and robustness of twentieth-century century lived in large scale valourised residential heritage fabric in the Netherlands?
- Can the application of ecosystemic evolutionary thinking to the field of heritage value-based management bring new insights to the process of how heritage learns in the face of the challenge of chance?

These together will address the main ambition of this thesis, to get to know if *public housing heritage in the Netherlands can learn, and if so, how?*

- *by what mechanism/s?*
- *under what circumstances?*

Case study analysis will form a vehicle of this research. The selection of case studies in itself requires a method, following which theoretical perspectives on learning and on time are required in order to assess *how heritage learns.* This necessitates an interdisciplinary approach. Developing a conceptual analysis structure for the case study analysis that places the case study building centrally and incorporates both learning and time, will be a first outcome of this project.

Therefore, a sub-question needs to be composed to provide a method for conducting the case study analysis of this research:

- What is an appropriate model that allows for integrated and deep examination of the influence of actors, factors and environmental aspects as agents in the evolution of public housing complexes protected for their historical values, highlighting the continuous learning, or lack thereof, that takes place in this process?

This question presupposes that such a model will need to:

- be based in a theoretical understanding of interdisciplinarity and use,
- accommodate the continuous passage of time,
- allow for a flexible but integrated field-of-play of integration between the building and its physical, social, and policy-environment: an ecosystem
- be iterative to allow for reflection on learning as analogous to the change in buildings.

Establishing such a model will be the first task at hand, following which case study research can be undertaken:

- To do so criteria for the selection of case studies will need to be defined.
- Each case study will:
  - research each case individually, through informed in-person observation, interviews and research into archival and published material.
  - undertake qualitative analysis presented as a structured narrative research results,
  - leading to conclusions and recommendations.

Combining the lessons learnt from the individual cases will lead to general conclusions on *how heritage learns.* The study is based on seven hypotheses, namely that:

- change in buildings can be described and analysed through the analogous application of the theory of biological evolution as cognitive metaphor to provide new insights into continuity and change in heritage buildings. This point of departure also takes its cue from Brand: that buildings can be understood as analogous to organisms, or more specifically to species, that evolve over time in response to their ecosystems. Taken from this perspective, buildings have characteristics that change in response to their environments – they learn by adapting;
- like for organisms, the building's genotype expresses itself as a phenotype in response to the specifics of the environment in which it exists;

- to understand *how buildings learn* requires an ecosystemic approach. A multi-disciplinary ecosystemic position can transcend the traditional realms of architecture and heritage and provide new modalities for presentation of the analysis;
- the application of an ecosystemic approach to assess the consequences of interventions in valourised heritage buildings can provide new insights into the actors, factors, environmental aspects that motive for this change as well as consequent effects of this change;
- change in heritage buildings have long-term consequences that are not envisioned at the time of decision-making as point of departure;
- Energy, Economy and Comfort (2E+Co) are important drivers for change. These were not only important historic drivers during the genesis of twentieth century Dutch public housing heritage (along with hygiene) and the historic development of the buildings studied, but are identified as key ambitions for the future as especially relevant to housing maintenance, upgrade and replacement in the face of the current environmental imperative; 2E+Co is a universal ambition on an ever-receding horizon;
- heritage protected public housing in the Netherlands provides an ideal vehicle for investigation of the above.

1.11 Relevance and location

Both the practice of adaptive-reuse of buildings and the action of demolition and replacement are, however, as old as humans creating shelter. But as Brand points out, noting that change is universal does not help us understand either the agency of change or the consequences of change.[137]

Even though heritage buildings can be exempted from rules and legislation regarding energy and comfort norms, economy, fashion and societal expectations lead to the voluntary application of these norms to buildings that are deemed of value to society at large, often as exemplary projects.

137 (Brand, 1994, p. 7).

Numerous Dutch monumental complexes have been adapted to address **2E+Co**,[138] some of which have even undergone a second round of change to this aim. These past adaptation cases can, through retrospective analysis, provide guidance to future adaptation through the, now standard, toolbox of technologies and strategies available for economic, resource efficiency and comfort upgrades of heritage protected Dutch housing.

The study takes the Netherlands as geographic source due to:

- the large number of valourised housing complexes in heritage registers, due to a notably productive public housing programme during the twentieth century (in response to the 1901 Housing Act),
- the experimental housing tradition (wide range of typologies, materials and technologies) which accompanied the above programme of housing provision,
- an urgent local current drive towards sustainability and the adaptation of extant housing to suit new requirements existing,
- a strong tradition of heritage management and well-regarded heritage management system with good record keeping, which allows for retrospective case study analysis,
- a large number of housing projects in ownership of housing corporations being managed through maintenance and upgrade projects, which lead to large-scale approaches to housing upgrades.

The protection of heritage values through legislation has as principle the understanding that cultural values belong to all of society and therefor needs protection against disfigurement, demolition or the decay brought by passing of time as well as thoughtful curating. For practitioners in the field as well as to society at large, the development and testing of a novel approach with which to evaluate the long-term impact of proposed change in buildings on cultural value before it is affected, is highly relevant, especially seen in the light of the energy-upgrade challenge that lies before us in response to the current climate crisis. The application of an ecosystemic evolutionary approach might also provide new perspectives to conservation professionals, adding, so to speak, an arrow to their quiver.

138 (Nusselder, 2008); (Van de Ven et al., 2011)& (Bierman & Van Emstede, 2010), etc.

1.12 Outline

This chapter has:

- shown the urgency for the study of interventions in Dutch housing heritage of the twentieth century,
- highlighted the inherent conflict that exists between the cultural imperative (conservation) and the social and environmental imperatives (contemporary use)
- shown the urgency of the energy reduction revolution with its still unpredicted long-term effects on heritage housing, and
- identified what research is required and how it will be undertaken.

Further exploration of *how heritage learns* continues with an overview of the development of twentieth century Dutch public housing heritage (Chapter 2). This is followed by the development of a theoretical framework as an *ecology of ideas* to inform both analysis paradigm and method (Chapter 3). Then the criteria for selection of cases are presented (Chapter 4) before undertaking three in-depth case studies (Chapters 5–7). Finally, conclusions are presented (Chapter 8).

The Rotterdam Berpolderflat, designed by W van Tijen with Brinkman & Van der Vlucht, completed in 1934 (c.1934; SAR: NL-RtSA_4029_PBK-8057-01).

TOC

2 Twentieth century Dutch public housing heritage

Origins, reception, remodelling and protection

2.1 Introduction

The Dutch heritage landscape, like its housing landscape is continuously in motion. When this study commenced, only twentieth century public housing complexes dating from 1900–65 had already received heritage protection, with later periods receiving attention only after cases had been selected. As heritage protected Dutch public housing complexes are the vehicle for investigating *how heritage learns,* a short general overview of the development of housing during the period 1900–65 is needed in order to develop a framework for selection of case studies.

Today, only 4% of all housing in the Netherlands date to before 1905; 84% dates to the period 1905–2005. Of this, 14% dates to before 1942; 15% to the period 1945–65; and the bulk (54%) dating to the period 1965–2005. A further 12% of the existing housing dates to after 2005.[1] In total 27% of extant Dutch housing dates to the period 1905–65 (Figure 2.2).

1 CBS Statline (2021).

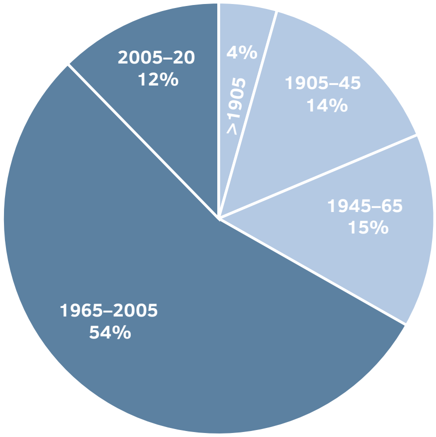

FIG. 2.1 The age of the current Dutch housing stock with. The volume of extant Dutch housing housing predating 1965 [in light blue] equates to 23% of the total current stock (configured from CBS Statline 2020b).

Public housing remains a ubiquitous part of the Dutch housing landscape, despite recent decades of neo-liberal economic policy aimed at public divestment from housing and stimulating private ownership. In 1989, 44% of all housing in the Netherlands was owned either by central and local government or by housing associations.[2] This was exceptional compared to neighbouring countries. In 1992, France and Denmark both had a public housing stock of 17% of the national total; England 24%; Belgium 7% and the former West Germany, 16%.[3] Today 29% of all Dutch housing is public housing; of which 70% is privately owned (of which 12% being privately owned rental stock).[4]

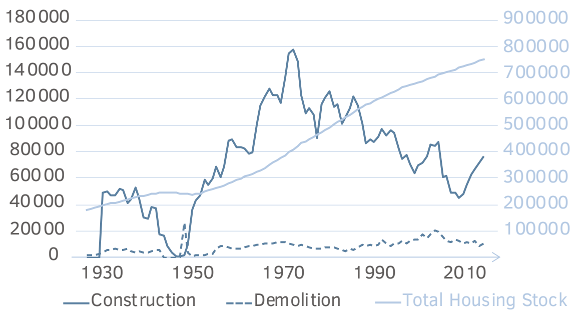

FIG. 2.2 The development of the Dutch housing stock: construction, demolition and total during 1921–2019 (configured from CBS Statline, 2020b).

2 (Boelhouwer & Van der Heijden, 1992, p. 47).

3 Reported in (De Vreeze, 1993, p. 13).

4 (CBS Statline, 2020c).

The twentieth century not only saw a considerable housing construction programme. It also witnessed large-scale war-time destruction as well as peace-time demolition and the reconstruction of neighbourhoods. In total, over 805 000 dwelling units were demolished during the period 1920–2019, which equates to just over 10% of the total current stock of roughly 7,9 million homes. Various ambitions drove construction, demolition, and more recently, renovation of housing. The periods of high numbers of demolition were the mid-1950s, late 1960's and, more recently–the highest peace-time peak–in 2008 when 20 664 housing units were demolished, primarily for replacement with new housing (Figure 2.3). In fact, any five years between 1995 and 2015 saw more houses being demolished than had been destroyed during the five-year long WWII.

This recent demolition derby was met by opposition from residents as well as conservationists,[5] leading to intensified attempts to identify, study, asessess and protect the housing legacy of the twentieth century.

2.2 The Dutch Housing Act of 1901s

Twentieth century Dutch housing production was directed by the Housing Act of 1901, which was meant to stimulate housing production, guarantee a minimum level of hygiene and homes at affordable rent for the labourers' and middle classes. The Housing Act also had an aesthetic ambition: on building and neighbourhood scale. Its implementation has rightly been called the pivotal point in the design of housing in the Netherlands.[6]

When implemented in 1902, the Act gave central and local government a leading role in combatting the ever-present shortage of affordable housing of sufficient quality. A key aim of the Housing Act, encapsulated in its first article, was to empower local authorities to promulgate building bylaws. It also mandated municipalities with over 10 000 inhabitants to develop expansion plans, thereby ensuring that land was available for greenfield housing construction.[7] During its first 40 years, the

5 See (Tellinga, 2004); (De Back, Coenen, Kuipers, & Röling, 2004).

6 (Jurgenhake, 2016, p. 23).

7 (Article 36, these plans were to be revaluated every 10 years).

number of dwellings in the country doubled in less than half a century. In 1901 the Netherlands counted roughly 1,1 million homes for just over 5 million inhabitants.[8] By 1940 the country had over 2,2 million homes for a population of 8,8 million.[9]

The Housing Act made it possible to provide subsidies and loans from the public pocket to non-profit housing associations and construction companies, conditional that the construction workers' housing being their sole activity. The consequence of the 1901 Housing Act and its subsequent revisions on the creation of the notable twentieth century public housing heritage of the Netherlands cannot be overestimated. Socialist alderman and director of the Amsterdam *Woningdienst* (Housing Service) noted as early as 1925 that: "…implementation of the Housing Act… has proven that with the Housing Act 1901 very important, very extensive work can be done for housing improvement in the Netherlands."[10]

The 1901 version of the Act, amended in 1919–22,[11] remained in force until 1965, when it was replaced by the Housing Act of 1962, which in turn was subsequently updated. Its later amendments in 1991 and 2008 were instituted to deregulate the public housing sector in the Netherlands. This led to another amendment in 2015 to re-establish some central governmental control over the sector, as the boundaries of financial and managerial propriety were quickly overstepped.

Over more than a century, the influence of the 1901 Housing Act, today the Housing Act of 1991, proved to be an important and nimble instrument in creating an important twentieth century Dutch legacy: its public housing heritage.

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8 (De Vreeze & Berkelbach, 2001, p. 11).

9 (CBS Statline 2020c).

10 De praktijk van de Woningwet… heeft bewezen, dat met de Woningwet 1901 zeer belangrijk, zeer omvangrijk werk voor de woningverbetering in Nederland kan worden gedaan. (Keppler & Wibaut, 1925, p. 17).

11 (Keppler & Wibaut, 1925, p. 17).

2.3 Reflections on early-twentieth century Dutch public housing

The quality of twentieth century public housing in the Netherlands was acclaimed locally and internationally from an early age and often presented as a legacy of the 1901 Housing Act. Locally, the *Tijdschrift voor volkshuisvesting en stedebouw* (Journal for public housing and urban planning) was established by the two-year old left-leaning *Nederlands Instituut voor Volkshuivesting en Stedebouw* (NIVS; Dutch Institute for Public Housing and Urban Planning; later the Dutch Institute for Spatial Planning and Public Housing; NIROV) to present advances and debate in this field. Commemorations of the 12,5-, 50-, 70- and 75-year anniversaries and the centenary of the 1901 Housing Act prompted retrospective publications that highlighted architectural achievements, housing volumes and rental costs.[12]

In England, architect Howard Robertson presented Dutch public housing to the Anglophone world in a series of articles on *Modern Dutch Architecture* in Volumes 52 (1922) and 54 (1923) of the *Architectural Review*, in which he presented the work of JJP Oud in Rotterdam and praised Michel de Klerk's *Het Schip* housing block in Amsterdam.[13] A year later, Amsterdam hosted the Urban Internationale international conference on housing and town planning in 1924. The roughly 500 attendees from 28 countries not only debated pressing urban issues specifically regional development, they also inspected the Dutch developments through thematic field visits.[14] The congress took place in the same year that Italian architect Gaetano Minnucci published an article on Modern architecture in the Netherlands, which included public housing blocks such as *Het Schip*.[15] Two years later he compiled an overview of Dutch public housing specifically, published in 1926.[16]

12 (Nederlandsch Instituut voor Volkshuisvesting en Stedebouw, 1930); (Centrale Directie van de Wederopbouw en de Volkshuisvesting & Nederlands Instituut voor Volkshuisvesting en Stedebouw, 1952); (Nycolaas, Geurtsen, & Prak, 1972); (Prak, 1972); (De Vreeze & Berkelbach, 2001) & (Keesom & Stedelijke Woningdienst Amsterdam, 2000).

13 (Robertson, 1922) & (Robertson, 1923).

14 (Schram & Doevendans, 2018, p. 105).

15 (Minnucci, 1924).

16 (Minnucci, 1926).

Other visiting architects were equally impressed. As far afield as South Africa, locally eminent AA-educated architect Gerard Moerdyk reported on a visit to the Netherlands in 1929 and noted that the "…keynote [to the Dutch approach] was efficiency… and good planning." Moerdyk concluded that it was time to follow the Dutch example and prepare "hygienic, comfortable and economically possible schemes for housing."[17]

International acclaim for the work of Oud as a pioneer of the Modern Movement brought further attention to the Dutch branch of the Modern Movement, *Het Nieuwe Bouwen,* in its wake. In 1931, architectural historian Henry-Russell Hitchcock published a first monograph on the work of Oud.[18] A year later architect and publicist Philip Johnson included Oud's work in his now legendary exhibition *The International Style: Architecture since 1922* at the Museum of Modern Art in New York.[19]

Local appreciation often also focussed on matters of style. Architect JB (Han) van Loghem published an exposé of the Het Nieuwe Bouwen in 1932 in English, Dutch, French and German.[20] The publication included a large housing component. After WWII, when housing production was coordinated by the central government, the Ministry of Housing and Physical Planning publicised its successes in defeating the housing shortage internationally. In its publications, it often focussed on policy and production.[21] Other publications focussed on Dutch housing as type. A notable publication is architects Meischke & Zantkuijl's 1969 study of Dutch houses between 1300 and 1800.[22] Initial steps were taken by the late 1970s to establish an overview of the development of later Dutch housing types.[23] The work of Meischke & Zantkuijl was definitively complimented by architect Niels Prak, whose type-study extended the years investigated to 1800-1940, was only published in 1991.[24]

By the 1970s the architectural legacy of the first half of the twentieth century and with it, the success of the Housing Act, was being reappraised. The 1971 exhibition at the Van Abbe Museum in Eindhoven *Bouwen '20-'40, de Nederlandse Bijdrage*

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17 (Moerdyk, 1929).

18 (Hitchcock, 1931).

19 (Taverne et al., 2001, p. 34).

20 (Van Loghem, 1932).

21 For instance, the series *Housing associations in the Netherlands* published by the Ministry of Ministry of Reconstruction and Housing between 1949 and 1954 and the series *Housing in the Netherlands,* published by the Ministry of Housing and Physical Planning between 1964–6.

22 (Meischke & Zantkuijl, 1969).

23 (Tas, 1978).

24 (Prak, 1991).

aan het Nieuwe Bouwen (the Dutch contribution to the Modern Movement)[25] initiated a period of thirty years of retrospective reassessment of Dutch twentieth century architecture, mostly with a focus on the Modern Movement. In 1975 the Netherlands Documentation Centre for architecture (*Documentatiecentrum voor de Bouwkunst*), the Amsterdam Stedelijk Museum, The Hague's Gemeente Museum and the Rijksmuseum Kröller-Müller at Otterlo presented four exhibitions on the architecture of the Netherlands from 1890 under the general title *Nederlandse architectuur.*[26]

Due to interest generated by the 1975 exhibition, the participating museums immediately conceptualised a new project to study and exhibit the Dutch architectural equivalent of the Modern Movement, *Het Nieuwe Bouwen*, covering 1920–60.[27]

The unicity of early twentieth century Dutch architecture was now receiving international attention.[28] Like most of their Dutch contemporaries, the international commentators all concluded their overviews in 1940. Donald Grinberg in 1977 provided a first English-language and still authoritative overview of *Housing in the Netherlands, 1900-1940,* to accompany an exhibition with the same title*;* the result of research undertaken at the Delft University of Technology.[29] Two years later Casciato, Panzini & Polano published an overview of Dutch public housing in Italian as *Funzione e Senso, Architettura Casa Citta, Olanda 1870-1940*,[30] translated a year later in 1980 into Dutch as *Architectuur en volkshuisvesting. Nederland 1870-1940.*[31]

The year 1982 was important for the re-evaluation of Dutch early twentieth century built heritage. A double-exhibition on the Dutch avant gardist design and art movement, *De Stijl* was staged at the Amsterdam Stedelijk Museum (period 1917–22) and the Rijksmuseum Kröller-Müller (period 1923–31) in 1982 to celebrate 200 years of diplomatic Dutch-US diplomatic ties.[32] It was produced by

25 (Bremer et al., 1971).

26 The Documentatiecentrum voor de Bouwkunst is one of the precursors of the Het Nieuwe Instituut. The 1975 exhibitions were titled *Americana 1880–1930*; *Amsterdam School 1910–1930*; *Architectura 1893–1918* and *Berlage 1856–1934*.

27 (Beeren et al., 1982, p. 4).

28 (Sharp, 1972); (Sherwood, 1974), focusing on projects by J Duiker & JG Wiebenga and JH van den Broek & JB Bakema.

29 (Grinberg, 1977).

30 (Casciato, Panzini, & Polano, 1979).

31 (Casciato, Panzini, & Polano, 1980).

32 (Schippers, 1982).

the Walker Art Museum in Minneapolis and also staged at the Hirshhorn Museum in Washington as single exhibition on the period 1917–31, before being shipped to the Netherlands. The accompanying publication: *De Stijl : Visions of Utopia*, established De Stijl's international reputation.[33] The Dutch exhibitions together drew a bumper of 145 000 visitors,[34] establishing De Stijl and its architectural manifestations, as important art movement in the Dutch collective mind. In the same year the museums that had originally collectively developed the 1975 exhibitions, now joined by the Rotterdam Booymans-Van Beuningen Museum, kicked off their series of exhibitions on the *Het Nieuwe Bouwen* movement. The five exhibitions were accompanied by five bilingual Dutch-English books published by the Delft University Press. The Kröller-Müller Museum exhibition focussed on the international presence of the Dutch architects in the avant garde groupings De Stijl and the functionalist *Congrès Internationaux d'Architecture Moderne* (CIAM), and their influence on housing and town planning.[35]

The unicity of the social housing heritage of Amsterdam was specifically celebrated in 1985 by the city's *Gemeentelijke Dienst Volkshuisvesting* (Public Housing Service) with a publication celebrating 125 years of public housing in the capital, while highlighting the failures of contemporary national housing policy.[36] Architect and architectural historian Maristella Casciato followed up on her earlier research with a book celebrating the *Amsterdam School in 1986*, which, as a result of its subject spanning 1910–30, presented many public housing projects. Of course, seventeenth- and eighteenth-century Dutch housing remained well-regarded and studied. In his seminal 1986 *Home. A Short History of an Idea*, architect and writer Witold Rybczynski's reserved a special place for the Dutch invention of *homeliness,* which he attributes to the near-total control of women over domestic matters during the Dutch Golden Age.[37]

Continued interest in *De Stijl,* brought an international rediscovery of its local context and highlighted its manifestation in architecture. Art historian Michael White's 2009 *De Stijl and Dutch Modernism,* features on its cover a perspective drawing by Theo van Doesburg and Cornelis van Eesteren of their design for a never-built housing block with shops and café-restaurant from 1924.[38] While architects

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33 (Bock & Friedman, 1982).

34 ("Tentoonstelling De Stijl ; 1917–1931").

35 (Beeren et al., 1982); (Beeren, et al., 1982); (Van der Woud & Rijkmuseum Kröller-Müller, 1983); (Bosma & Andela, 1983) & (Boekraad, Bool, & Henkels, 1983).

36 (Ottens, 1985).

37 (Rybczynski, 1986).

38 (White, 2009).

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such as Gerrit Rietveld, Johannes Oud and Cornelis van Eesteren were already well-regarded due to their role in the CIAM, these and similar publications further thrust Dutch public housing as agent of the Modern Movement in architecture onto the international stage.

FIG. 2.3 The flyer for the 2001 *Kom thuis in Rotterdam* exhibition of 24 iconic Rotterdam home interiors (own collection).

In preparation of the 2001 centenary of the Housing Act, a National Committee for celebrating this milestone was established in 1999. Its centenary exhibition *6,5 miljoen woningen* (6,5 million homes) was presented as part of the city of Rotterdam's 2001 tenure as European Capital of Culture in the adaptively-reused Las Palmas warehouse.[39] It presented the city as "the most modern Dutch city in the 1920's and 1930s";[40] a nostalgic window to what the city was before the destruction wrought by the May 1940 bombing by Nazi Germany. Twenty-four Rotterdam homes, including museum dwellings in iconic public housing complexes throughout Rotterdam, were opened to visitors as a collective exhibition *Kom Thuis in Rotterdam* (Come at home in Rotterdam; Figure 2.4).[41]

39 (De Vreeze & Berkelbach, 2001, p. 10).

40 (Rotterdam Onderwijs en Cultuur, 2001, s.n.).

41 (Groenedijk & Camp, 2001).

Amsterdam likewise celebrated the Housing Act. Its *Stedelijke Woningdienst* (city housing service) exhibited its century of implementing the Housing Act in the famous Beurs van Berlage.[42]

The results of the MIP project [see chapter 1] were published from 2000 onwards as a series of books covering the built legacy of the period 1850–1940 (with small excursions up to 1945) of the Dutch provinces and major cities. This series, presenting a vast inventory of extant buildings and neighbourhoods, canonised 1940 as the end of an era in Dutch architectural history, and also pre-empted the classification of the post-WWII *Wederopbouw* (Reconstruction) period.

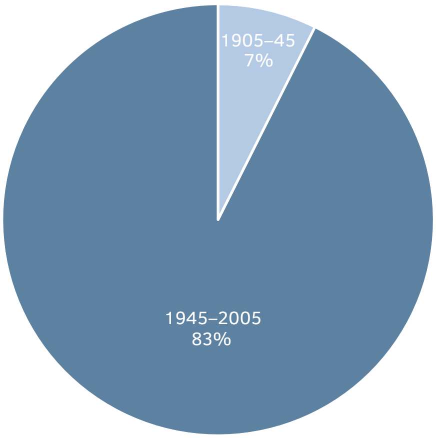

FIG. 2.4 Percentages of pre- and post-War Dutch housing 1905–2005 (configured from CBS Statline, 2020b).

Interest in the much larger legacy of post-War reconstruction grew from the mid-1990s onwards (Figure 2.5). This curiosity was closely linked to the 50-year commemorations of the end of WWII, but was also made possible by the passing of time that brought the post-War buildings into the ambit of the 50-year age limit then included in the Dutch Monuments Act for listing as architectural heritage. The 1993 exhibition and complimentary catalogue *Jonge architecten in de Wederopbouw*, also in Amsterdam's Berlage-designed former stock-exchange, awoke public curiosity for this more recent heritage.[43] Initial investigations focussed primarily on the urban designs for reconstruction of cities damaged during the war and post-war expansion.[44] The 1995 book *Een geruisloze doorbraak : de geschiedenis van architectuur en stedebouw tijdens de bezetting en de wederopbouw*

42 This exhibition ran from 23 December 2000–4 March 2001 (Keesom & Stedelijke Woningdienst Amsterdam, 2000, p. 212).

43 (Mulder & Schilt, 1993).

44 (Andela & Wagenaar, 1995); (Kuipers & Willinge, 2002).

van Nederland, brought together a team of 17 researchers who, in this monumental tome explored, amongst others, the political, economic and social aims and urban and architectural consequences of the reconstruction of war-damaged Netherlands. It uniquely addressed both the national level as well as specific regions and cities, both during and after the German occupation and liberation.[45]

In 2001 the *Rijksdienst voor de Monumentenzorg* (National Service for Monuments Care, RDMZ) initiated a programme to study this period and its built legacy, delimiting the Reconstruction to 1940–65.[46] The first notable product of this programme was an paragon catalogue, produced by the RDMZ and the Netherlands Architecture Institute, *Toonbeelden van de Wederopbouw,* which presented the built legacy of the Reconstruction along 10 themes.[47] Other early investigations–which coincided with first large-scale renovation projects, and proposals for large-scale demolition and replacement of whole neighbourhoods[48]–resulted in typological assessments of post-War expansion neighbourhoods.[49] Studies of non-housing types were also undertaken under the supervision of the RDMZ.[50] Over time the RDMZ and its successors, including the current Cultural Heritage Agency of the Netherlands (RCE), published 112 individual assessments, expositions and guides on the heritage of the Reconstruction Period, and listed just under 200 new National Monuments and 300 areas of national importance.[51] Aligned in spirit with this programme, Zijlstra's 2006 doctoral thesis *Building construction in the Netherlands 1940-1970 : continuity + changeability = durability* focussed on buildings from the Reconstruction, expanding the body of knowledge on construction technologies.[52]

Having completed its overview of the Reconstruction, the RCE in 2017 commenced with a subsequent programme to create an inventory of the Dutch post-1965 built environment, a programme which is ongoing at the time of writing.

45 (Bosma & Wagenaar, 1995).

46 (Rijksdienst voor het Cultureel Erfgoed, 2017, [s.n.]).

47 (Kuipers, 2002).

48 (Geurtsen & Van Rooy, 1991); (Bergvelt & Brons, 2004)& (Tellinga, 2004).

49 (Blom et al., 2004).

50 For instance (De Korte, 2004a) on provincial headquarters, (De Korte, 2004b) on sports halls, and (Wijdeveld, 2004) on churches in the province of North Brabant.

51 (Rijksdienst voor het Cultureel Erfgoed, [s.a.]a).

52 (Zijlstra, 2006).

2.4 Chronologising Dutch public housing of the twentieth century

The ebb and flow of construction, demolition and renovation of Dutch housing production in the twentieth century can be described in distinct thematic periods. We do, however, also need to create handles to understand the lives of these buildings throughout their evolutions. A number of scholars has attempted classifications: architect and housing specialist Noud de Vreeze's doctoral thesis, published in 1993, focusses on the issue of housing quality. He divides the period 1901–98 into three: 1901–40; 1940–68 and the period 1968–89. For De Vreeze, 1968 marks the transition from the ambition of fast-paced mass-produced housing production to a greater focus on quality and individuality.[53] Amsterdam's 2000 book *Wonen. Woning. Wet. Wij wonen - 100 jaar Woningwet* defines four distinct phases in the history of the Housing Act:

- Building Up (1901 - 1940): beneficial to health and productivity ("Opbouw (1901 - 1940): goed voor gezondheid en productiviteit").
- Reconstruction (1945 - 1973): catching up and creating wealth ("De wederopbouw (1945 - 1973): achterstand inhalen en welvaart bijbenen").
- Alteration (1973 - 1989): breaking trends–renovation–feasibility ("De verbouw (1973 - 1989): trendbreuk–renovatie–betaalbaarheid").
- Adaptation (1990 - 2001): transition towards a smaller scale and individual level ("De ombouw (1989 - 2001): naar kleinere schaal en individueel niveau").[54]

The *festschrift* accompanying the Rotterdam *6,5 miljoen woningnen* exhibition is structured by seven pivotal marker years:

- 1918: universal suffrage and year in which socialists broke through in local and national politics, resulting in increased public housing production;
- 1942: following the 1940 occupation by Nazi Germany, all construction permits are repealed in 1942, effectively bringing all construction to a halt;
- 1948: the Marshall Plan creates the financial basis for a large-scale housing programme;

53 (De Vreeze, 1993).

54 (Van Dieten, 2000, pp. 61–88).

- 1956: a milestone of 500 000-post-War houses completed; industrialization and mass-production are further stimulated;
- 1968: the peak of high-density mass-produced homes, but the housing programme is now the subject of criticism; the focus turns to producing more variation, housing improvement, and renewal of neglected urban areas;
- 1971: policy shifts mandate that central and local government begin a steady retreat from the housing landscape; budgets are cut, initiating a process that would create a new subsidy system by the early 1980s;
- 1989: formalized deregulation and liberalization of public housing commences.[55]

Since then, other commentors focussed on changes in housing policy to structure overviews. One of these, planner and housing specialist Paul Ekkers makes the distinction between pre- and post-War housing, punctuating specific changes in policy in each period.[56] Historian Cor Smit in 2006 likewise identifies four periods after the Housing Act was implemented: the period up to WWII; post-War reconstruction; a third transition-period where more attention was given to quality; urban renewal and the political emancipation of public housing tenants. Smit's fourth period commences in 1990 with the reformations brought by the introduction of a new direction in housing policy, which aimed at liberalization of the centrally steered housing production and management.[57]

Elsinga et al. focus on the development of the changes in the mission that Government aimed to fulfil, defining eight stages between 1901 and 2014/15. Their markers relate specifically to government involvement in housing production through legislation aimed at housing associations and later corporations.[58]

55 (De Vreeze & Berkelbach, 2001).

56 (Ekkers, 2002).

57 (Smit, 2006, pp. 10–11).

58 (Elsinga et al., 2014–15, pp. 23–24).

2.5 Characterising Dutch public housing heritage of the period 1901–65 through chronology and type

None of the above classifications, which all focus on the engagement with and consequent evolution of housing heritage and not on the implementation of the Housing Act of 1901 or the associated twists and turns in politics and policy, provide a useful structure for this study. Nor do they speak to the fabric and form of the buildings.

2.5.1 Type

The characteristics of Dutch public housing from the period 1901–65 can be quite diverse. This was a tumultuous historic period, which stimulated architectural innovation. For centuries Dutch cities were defined by their perimeter-block urban structure. By the end of the nineteenth century most mass housing took the form of terraced housing or tenement buildings. Journalist and utopian thinker Ebenezer Howard's Garden Cities model–first published in his 1898 book *To-morrow: a peaceful path to real reform* [59] and further disseminated in his 1902 revision of the same book, now with the somewhat more directed title *Garden cities of tomorrow*[60]– is often described as revolutionary. It should rather be seen as part of an emergent reassessment of European cities, which were fast becoming insalubrious slums. Dutch social reformers, often wealthy industrialists, had already broken with the traditional perimeter block as housing form. A notable example, Agnetapark in Delft, was constructed as a company town in 1882–85 by a cooperative, the NV Gemeenschappelijk Eigendom (Common Ownership Association) established by industrialist Jacques van Marken (Figure 2.6).[61] Agnetapark soon served as model for other developments that aimed to provide the working class with similar health and recreation benefits, the wealthy enjoyed living in large villas in satellite towns outside the city and connected to centers by an efficient public transport infrastructure.

59 (Howard, 1898).

60 (Howard, 1902).

61 (Prak, 1991, p. 127).

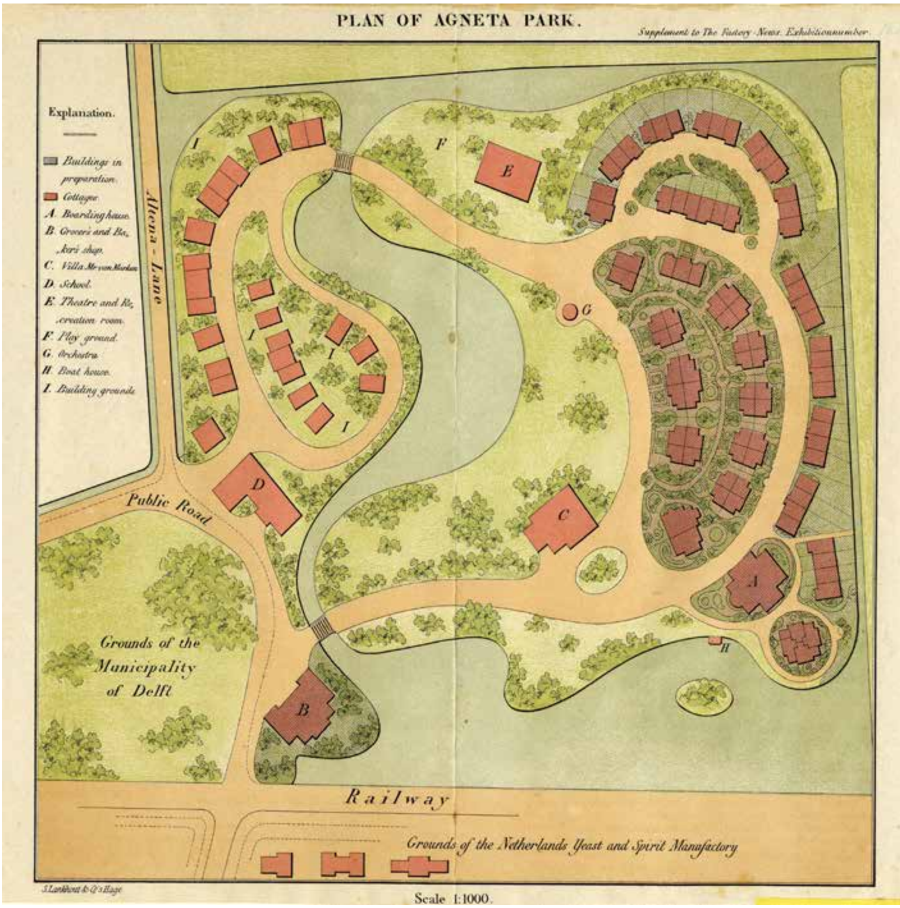

FIG. 2.5 Plan of Agetapark, Delft, designed by Louis Paul Zocher in 1884 (SAD: 1038).

Garden cities of tomorrow was translated into Dutch in 1906.[62] By the middle of the first half of the twentieth century every large Dutch city had its own *tuindorpen,* often as result of the social democratic impulse.[63]

The immense housing shortages of the end of the nineteenth century also stimulated innovation in high density housing, depending very much on how communal space and services can be arranged. The services are the arteries of a building, the access system (Dutch: *ontsluiting*) is the spine of mass housing complexes. This spine has

62 (Bruinwold Riedel, 1906).

63 (Oomen, 1978); (Korthals Altes, 1993) & (Korthals Altes, 2004).

to transport people from the public space–the street–to the private world that lies behind the front door. This has its own logic, with various configurations possible.

Dutch mass housing type can be categorized along five scale levels, each dependent on the previous:

1. The urban structure,
2. The configuration of the building block,
3. The access system and services organization,
4. The spatial configuration of the home,
5. Decorative elements: the carriers of style.[64]

During the period of interest, all of these underwent their own evolution. The Garden Cities movement and later the CIAM architects of the Modern Movement sought to break from the perimeter block model. But that does not mean that it was immediately abandoned, and perimeter block housing development remained the mainstay of mass housing production in the Netherlands up to WWII. The CIAM ambition was to break open the perimeter block with unsavoury inner yards, reconfiguring it to their *zeilenbau* model where there was no front and back. Also referred to as *strokenbouw* in the Netherlands (strip-building), this new urban scale type brought the promise of a new urban order where 'licht, lucht en zon' (light, air and sun) could be achieved cost effectively at medium to high densities. The first zeilenbau projects, constructed from the 1930s onwards, received a mixed reception.

Howard's Garden City model inspired the ground-breaking expansion plan for the city of Amsterdam, the *Algemeene Uitbreidingsplan* (AUP, General Expansion Plan) developed by its *Afdeling Stadsontwikkeling* (Town Planning Division) during the 1930s was officially sanctioned by the Crown in 1939 (Figure 2.7). Amongst others, it projected *Tuinsteden* (garden cities) as new expansion areas to the west and south of the city. The traditional terraced housing type was reconfigured into *hoven* (yards) to give a spatial hierarchy in the vast new park-like urban *tuinstad* expansion areas. A benefit of these hoven was that it eliminated costly shared access systems. Later, during the 1960s, increased national wealth and industrialisation of housing production led zeilenbau to become the norm for high-rise public housing.

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64 (Leupen & Mooi, op. cit. pp. 48–9); (Argan, 2007).

FIG. 2.6 The *Amsterdam Algemeene Uitbreidingsplan*, developed by the ***Afdeling Stadsontwikkeling*** during the 1930s and published in 1935 (SAA: 010095000002).

These changes depended on innovation in the access systems. The shared stairwell (*trappenhuis*) as access system was problematic: it limited the number of apartments that could be accessed, and was often unkempt, dark and deemed dangerous. The technical development of the elevator during the latter half of the ninetieth century and later extended the reach of the stairwell as vertical access system, but this was in many instances too costly for mass public housing. Local byelaws stipulated that elevators were required if a building exceeded four storeys and this effectively limited the height of housing blocks. Extending the reach of the shared stair could increase its efficiency. The aerial gallery was introduced as secondary aerial street to link a larger number of housing units to the stairwell. The first Dutch example, albeit a hesitant application of the gallery, was constructed in Rotterdam in 1888–9 to the design of architect JC Meyers.[65]

65 (Prak, 1972, p. 141).

Allmost all of the possible combinations of urban structure, the configuration of the building block and the access system, was applied in the Netherlands over the course of the twentieth century (Figure 2.8), wiht some combinations taking preference over others during specific periods.

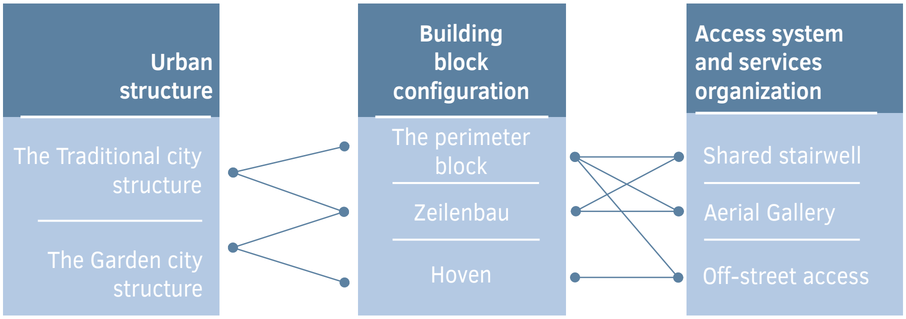

FIG. 2.7 Common combinations of urban structure, building block configuration and access system in Dutch mass housing during 1901–65.

2.5.2 Chronologising Dutch public housing heritage of the period 1901–65

The types emerged over time, but they cohabited the same physical and chronological landscape. A specific categorisation needs to be constructed to frame the life of valourised Housing Act buildings-in-context covering:

- the context and history of their creation
- subsequent life, renovations and alterations,
- appreciation, valourised, and
- conservation and restoration.

Such a categorisation should by definition be chronological, as the lives of buildings are chronological.

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2.5.2.1 Genesis

The terms *Interbellum* and *Wederopbouw* have become established in architectural histories to describe the periods between the two world wars (1918–40) and the period thereafter directly dealing with its consequences (1940–65). These are historical terms, not intended as style-descriptions, although *Wederopbouw* has also taken on a stylistic significance. They are not directly aligned with housing production.

We also need to define the stages of reappraisal and renovation that housing has gone through, before and after valourisation as monument. The question remains: Which thematic descriptions best describe the periods from the perspective of the buildings that 'lived' these years?

Dutch twentieth century housing heritage valourised when this study commenced, can be best described in three periods of genesis, followed by three subsequent periods of policy relating to their renewal or renovation:

1902–21: Gradually Gearing Up

It took some time for the Housing Act to influence the production of affordable housing. Some authors identify a liberally-dominated zeitgeist, which saw housing production as a provenance of commercial parties. Another factor often mentioned is that the Act made it possible for municipalities to subsidized housing development through low-interest loans, but this also laid the financial risk for housing development with municipalities.[66] Housing Associations needed to be vetted before becoming eligible for subsidies under the Act, for which they needed to prove that they had adequate capital reserves. It was only in 1904 that the first housing association was approved for Housing Act subsidy.[67]

An early success of the Housing Act came when the municipality of Amsterdam became the first to adopt its own building bylaws (for housing) in 1905.[68] Yet, housing production remained small-scale and commercial. Public housing was stimulated by the deprivations brought by the First World War (WWI, 1914–1918). Even though the Netherlands remained neutral during the War, many men were

66 (Gerrichhauzen, 1990, pp. 22–23); (Elsinga et al., 2014–15, p. 25).

67 The Vereeniging tot Bevordering van den bouw van Werkmanswoningen in Leiden. (Gerrichhauzen, 1990, p. 21).

68 (Van Damme, 2008, p. 88).

mobilized and the economy suffered severely from blockades, and the maritime combat, with the subsequent reduction of shipping. This effectively brought speculative housing production to a stand-still.[69]

Under the direction of Social-Democrat Floor Wibaut, elected as alderman in Amsterdam in 1914, the city instrumentalised the Housing Act as subsidy-tool for public housing construction by housing associations. Others followed and the number of housing associations skyrocketed. Cities also established their own housing services (e.g., Amsterdam, 1915; Rotterdam, 1916). Municipalities and housing associations experimented with new housing construction methods and access systems in an attempt to keep housing affordable.[70]As a result, housing production boomed. Most of the new construction was bespoke-designed, morphologically traditional in the form of perimeter blocks, but a significant number of so-called *tuindorpen* (garden-villages) was also developed. The value of subsidies awarded to housing associations by the national government and municipalities for public workers' housing production grew from ƒ17 million to ƒ150 million between 1916 and 1921, during which period 55,5% of all new housing was constructed by housing associations.[71]

1

2

3

FIG. 2.8 Examples of subsidised housing constucted in Amsterdam over the period 1902–65: [1] The Castorplein public hosuing experimental concrete housing designed by JH Mulder (1920–1) (1920; SAA: 5293FO003349); [2] HT Wijdeveld's facades for the Plan West housing along the Hoofdweg (1920-23) (1927; SAA 5293FO002824); [3] Aerial view over Sloterhof, a post-WWII expansion area (1960; SAA: 10009A000868).

69 (Ekkers, 2002); (Aussems & Partners, 1992, p. 17).

70 (Kuipers, 1987).

71 (Gerrichhauzen, 1990, p. 25).

1921–40: Inter-War Housing

The return of economic prosperity also saw the return of commercial housing production and a return to conservative market-economics. In 1921, the national government announced that no further national subsidies or loans would be awarded to housing associations. Already during the War, especially left-leaning housing practitioners were searching for ways to improve workers' housing production and quality through mass-production, but they were often opposed by architects who feared an imposition on their design independence.[72] The global economic depression following the 1929 Wall Street Crash, severely reduced commercial and public housing production. But towards the end of the 1930s, the first urban experiments with the CIAM-aligned *zeilenbau* were undertaken in response to the traditional perimeter block and early twentieth century garden village types.

Key concerns in this period were affordability to tenants (home economy/efficiency), and provision for specific cultural sub-groupings.[73] After 1940, the year the Netherlands were invaded by Nazi Germany, public housing production declined even further and finally came to a near-complete standstill in 1942.[74] During the 1940–45 occupation of the Netherlands, 26 600 of the total 2 million pre-War houses were completely destroyed, turning what was a scarce necessity before the War, into an acute national housing crisis.

1940–65: Post-War Reconstruction Public Housing

After WWII (1940–1945) the Netherlands embarked on a centrally directed reconstruction programme in 1945. Marshall Aid funding (1948–52) gave extra impetus to the reconstruction programme. Where initially the focus of the *Wederopbouw* (Reconstruction) was repairing the damage wrought to the Dutch cities by war-time neglect and direct destruction, it soon shifted to a centralised green-field mass-produced housing construction.[75] After WWII, the *tuinstad*

72 Refer for instance to architect HP Berlage's response to the *Preadvies : Maatregelen waardoor de bouw in massa bevorderd wordt. Normalisatie in de uitvoering, in het bizonder wat betreft de te verwerken onderdeelen* (Measures to promote mass construction. Standardization in the execution, in particular with regard to the components to be processed), presented to the 1918 *Woning-congres* (Housing Congress) in Amsterdam by the director of the Amsterdam Construction and Housing Supervision, J van der Waerden in 1918 (Berlage, 1918).

73 For an analysis on the influence of ideology on Dutch housing production, with specific reference to Amsterdam during 1900–1920, see (Stieber, 1998).

74 (Siraa, 1989, p. 27).

75 (Clarke, 2016, p. 54).

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model dominated urban expansion. Each of these *tuinsteden*, was approached as a separate, but interdependent, unit in a functionally apportioned city. Each *tuinstad* was planned with its own–often high- and low-rise–housing, schools, churches, shopping areas, etc.

The Reconstruction was a triumph of centralised governance, planning, fiscal policy, standardisation, and normalisation, steered by the *Ministerie voor Publieke Werken* (Ministry for Public Works), established in 1945.[76] It was renamed in the same year with the addition of "…en Wederopbouw" (…and Reconstruction). Its role and mandate continually evolved. By 1947 it was called the *Ministerie voor Wederopbouw en Volkshuisvesting* (Ministry for Reconstruction and Public Housing): its key task to coordinate the war against the "volksvijand nummer één" (national enemy number one): the housing shortage.[77]

The Reconstruction period was typified by the triumph of industrial concrete-based construction systems to produce mass-housing. Production volumes and construction efficiency and economy trumped quality.[78] Cities expanded. Housing was no longer designed to the ideology of smaller groupings but to a national idea of equality, optimism and renewal.[79] Rent control was instituted in the mid-1940s. Faced with a national housing shortage, slums were initially tolerated. From 1948, grants were given for home improvements of dilapidated homes.[80] By 1954, the central government was subsidising the demolition of dilapidated homes, by paying out 130% of the value of a home if demolished to make way for new houses, and a year later, the Ministry for Reconstruction and Public Housing announced that it would again grant permission and give financial support to large-scale slum raising and rebuilding.[81]

Energy use was only of concern with regards to home economy, but after the discovery of the Groningen Gas Fields in 1959, space heating became generally affordable to the masses, heralding new possibilities for comfort. Home economy was initially of concern, but with a fast-growing economy, this faded into the background and comfort became an ideal. The millionth post-War home was completed in November 1962, 10 months after the first *Beschikking krotopruimingspremie*

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76 (Siraa, 1989, p. 41).

77 Refer to (Hellinga, 1995) for more on this topic.

78 (Smit, 2006, p. 11).

79 (Blom, Stegmeijer, Buchner, Baarveld, & Pekaar, 2017, p. 8).

80 (Siraa, 1989, p. 91).

81 (Siraa, 1989, p. 118).

(slum clearance subsidy programme) was introduced, which assisted municipalities financially to relocated inhabitants, and demolish declared slums. [82] The 1962 *Wet Ruimetlijke Ordening* (Law on Spatial planning) was implemented in 1965, marking the end of the Reconstruction era.[83] The Ministry for Public Works and Reconstruction now focussed solely on urban expansion and inner-city urban renewals.

2.6 Further Evolution of Dutch housing neighbourhoods dating to the period 1901–65

The lived history of the housing of the period 1901–65 was closely linked to government policy and societal trends.

2.6.1 1965–80: Urban Renewal

New towns (*groeikernen*) were created outside of cities, some of them on newly-won land, such as the Flevo Polder on which in the cities of Lelystad and Almere were founded in 1967 and 1976 respectively. These new towns–often dormitory towns for big cities and made possible by improved transport infrastructure and private vehicle ownership–promised high quality living away from the congested city centres. Focussed on comfortable single-family living, the designs of town extensions and new towns were some in instances, utopian. After years of neglect, attention turned to the rehabilitation of city centres that had been neglected since the lean years of the 1930s.[84] Inner-city slum clearances brought demolition and new-build. Building upgrades were also increasingly undertaken to eradicate social problem areas, improve the general urban appearance through building modernisation and

82 (Siraa, 1989, p. 125, 137).

83 (Kuipers, 2002; Siraa, 1989, p. 9).

84 (Siraa, 1989, p. 91); (Clarke, 2016, p. 54).

so-called city-forming.[85] Municipalities were now able to subsidise up to 80% of the cost of replacement of dwellings located in so-called *vernieuwingswijken* (renewal neighbourhoods). The 1969 *Besluit bijdragen reconstructie- en saneringsplannen* (Subsidy Scheme for Redevelopment and Reconstruction Plans) and the subsidy scheme of the Ministry of Transport to encourage upgrade of urban traffic and transport facilities stimulated urban reconfiguration.[86]

From the 1970s onwards, individual rental subsidies were implemented to keep housing affordable. Concurrently, demolition and new-build were met with opposition from inhabitants and conservationists. Urban regeneration was reinvented. After years of protest against centralised top-down urban renewal polices, residents were given a say in how their neighbourhoods would be renovated through the *Bouwen voor de Buurt* (Building for the Neighbourhood) approach. The 1973 *Nota Volkshuisvesting* (Policy Paper on Public Housing) gave priority to urban renewal.[87] Existing public housing was insulated and enlarged to improve comfort, without excessive impacts on home economy, especially after the 1977 *Interim Saldo Regeling* (Interim Balance Scheme). The 1975 Declaration of Amsterdam, the culmination of the European Architectural Heritage Year, marked the growing urban conservation movement, in part a response to the dramatic effects of large-scale urban renewals projects.

2.6.2 1980–89: Economy and comfort

The oil crises of 1973 and 1979 instigated the movement towards home energy use reduction. Awareness of the environmental cost of human activity grew. Since the introduction of the 1979 *Huurprijzenwet woonruimte* (rental price act for homes), prices for public housing had been determined through a points system, that included qualitative and comfort indicators. This was stimulated by national and local subsidies to further reduce energy use for heating and lighting.

Especailly inter-war housing, which had often been built without in-house washing facilities and very limited heating equipment, was adapted. The renovation focus shifted from the pre-twentieth century city centres to the housing production of the first half of the twentieth century, while at the same time first attempts at their

85 (Van Es & Voerman, 2018, p. 5).

86 (Priemus & Metselaar, 1992, p. 60).

87 (Van Es & Voerman, 2018, p. 14).

valourisation were made. Renovation projects enlarged square meters, upgraded sanitary facilities and kitchens. Cosmetic interventions for beautification, were combined with added insulation and heating systems upgrades to offset rental increases. Energy use remained a home economic issue, but now the need to reduce energy use was amplified by the need to reduce greenhouse gas emissions, while improving comfort.

To improve the durability of these buildings and reduce maintenance costs, renovations made use of so-called ‘low maintenance’ materials. Architectural decorative features deemed to be superfluous were often obliterated.

2.6.3 1989–today: Conservation / durability & sustainability

The year 1989 was pivotal in the history of housing in the Netherlands and should be seen as a rupture with the social imperative encapsulated by the public housing history of the Netherlands. It marked the start of a process of decentralisation of housing production and management, and initiated the privatisation of housing corporations and their stock. Social housing associations became autonomous actors in the housing market. They need to turn a profit to fund for maintenance and investment. They engaged in speculative development and the sale of public housing stock. The volume of public housing decreased.

The MIP, initiated in 1987, was followed by the MSP, leading to a notable increase in the number of public housing complexes from the first half of the twentieth century protected as heritage. The 1991 Housing Act, still in force today, made special allowance for the introduction and implementation of technical regulations specifically aimed at *duurzaam bouwen,* (sustainable building) for both new and existing housing,[88] including those protected as monuments. The negative aesthetic effects of energy-saving alterations was soon noted, resulting in subsidy programmes to rectify these mistakes. By 1997, Post-War Reconstruction neighbourhoods were placed in the spotlight with the *Nota Stedelijke Verniewing* (Urban Renewal Policy Paper) reflecting a general view that neighbourhoods from this era were “[m]onofunctional, impoverished areas with poor walk-up or gallery flats, where a normal person no longer goes out in the evening.”[89]

88 (Koninkrijk der Nederlanden, 1991 (updated August 2020), Article 7).

89 (Blom, Jansen, & Van der Heiden, 2004, p. 3).

A period of demolition and reconstruction and renovation followed. The period between 1995–2015 has been labelled the *Golden Period of Renovation and Gentrification*. This was a period of so-called drastic deep-renovation of public housing, aiming to redress urban decay, increase the occupant diversity (by selling off apartments to private investors), improve comfort by for instance merging apartments, improving technical and climate installations, thus increasing the real estate value of the housing corporation-owned stock in specific neighbourhoods.[90] In 2000 the *Nota Wonen: Mensen, wensen, wonen* placed quality and choice central, resulting in a policy shift from *volkshuisvesting* (public housing) to *wonen* (quality of living).[91]

The Energy Label grading system was introduced in 2008. The global economic crisis of the late 2010s further stimulated creative approaches to adaptative reuse, while an increasing societal awareness of the climate emergency further encouraged energy-upgrades. The effects of the 2015 Paris Accord and subsequent climate-related policies are expected to have great influence on the way in which twentieth century public housing heritage will evolve.

2.7 Conclusion

The 1901 Housing Act stimulated residential housing volumes and significantly contributed to the architectural legacy of the Dutch twentieth century housing. This legacy has national and international presence. In general, much attention was given to public housing heritage only when it came under pressure from plans to upgrade or replace it. From 1965, urban renewal policies altered the already extant twentieth century Dutch neighbourhoods. This period of urban renewal initially brought demolition-and-replacement of public housing to neighbourhoods dating to before WWII, but from the mid-1970s onwards, it transitioned to upgrades to improve *quality*.[92] The first and second oil crises, and growing awareness of the negative consequences of large-scale single-minded renovation led to a transition in thinking

90 (Oorschot & De Jonge, 2019).

91 (Ministerie van Volkhuisvesting Ruimtelijke Ordening en Milieubeheer, 2000).

92 (Clarke, 2016).

and application of policy to a new era where conservation became closely aligned with the concepts of durability and sustainability that continues to this day.

Three distinct periods can be identified in the chronology of Dutch public housing heritage of the period 1901–65: 1901–21; 1921–40; 1945–65, marked by crucial decisions and implementation of housing provisions by the Dutch central government. Three phases after 1965 also mark the after-lives of the previously realised Dutch housing schemes.

Post-WWII walk-up apartments in Amsterdam's Burgemeester Fock Street, designed by JF Berghoef and built in 1953 using the NEMAVO-Airey prefabricated concrete construction system (SAA: 5293FO009042).

3 Creating a case study analysis structure

An ecology of ideas

"What sort of a thing is this, which we call "organism plus environment"? Let us go back to the original statement for which Korzybski is most famous—the statement that the map is not the territory. This statement came out of a very wide range of philosophic thinking, going back to Greece and wriggling through the history of European thought over the last 2000 years.

It all starts, I suppose, with the Pythagoreans versus their predecessors and the argument took the shape of "Do you ask what it's made of—earth, fire, water, etc?" Or do you ask, "What is its pattern?" Pythagoras stood for inquiry into pattern rather than inquiry into substance." - Geoffrey Bateson[1]

3.1 The logic of the house

To understand *how heritage learns*, which is the purpose of this study, calls for a method through which to identify and assess the drivers that influence decisions for intervention in built heritage as well as the processes that influence learning. As those drivers cannot all be found in only the realm of architectural design, the analysis of case studies of learning heritage complexes requires a novel framework for evaluation,

1 (Bateson, 1972, p. 455).

which in turn presupposes an epistemic positioning. This chapter will explore the ideas on which the learning analysis will be based. In doing so, I will refer to

- the tradition of Western Architecture–as basis for understanding architectural decisions;
- the biological sciences–which may provide us with an analogous model for understanding the reactions of buildings to internal and external stimuli through their existences;
- an exploration into the developmental sciences, to identify a theoretic model thought by which to describe theory; to arrive at a model for the analysis of how heritage learns;
- looking towards a change in management to understand the mechanisms involved in addressing the challenge of change.

The built environment is a palimpsest of the results of complex processes that take place during the passing of time and developing by inter-dependent and reciprocal relationships. We cannot, for instance, understand the genesis of buildings, nor fully describe them free from their economic and socio-cultural environment, or *ecology*.[2]

Can we speak of a 'built environment ecology'? A standard definition of 'ecology' is:

"Ecology: "the branch of biology that deals with the relations of organisms to one another and their physical surroundings" - Origin Late 19th cent. (originally as oecology) from Greek oikos 'house' + LOGY."3

The link with the built environment is quickly made: the word ecology has at its core the Greek word for 'house'. When we speak of an ecosystem, "a biologic community of interacting organisms and their physical environment",[4] this has at its roots the 'logic of a house' and its associated systems.[5] To paraphrase: the natural world is understood as analogous to the interrelationship of actors in the framing context of the 'house', which provides the rules and territory of engagement. Similarly, the word *oikonomia* (economy) analogises the flow of goods and other currency to the *nemein* (management) of the *oïkos* (house).

2 Even architectural stylistic umbrella terms, such as Baroque, Gothic and Modern are coded to contain socio-cultural meaning, alongside typical forms and details.

3 (Pearsall, 1998, p. 633).

4 (Pearsall, 1998, p. 586).

5 Incidentally Brand (1994, p. 210) defines sustainability as 'meaning "ecologically correct,"' a narrow definition, but apt in the original meaning of the word 'ecology' from the perspective of the built environment.

3.2 Analogy and metaphor in scientific enquiry

The use of analogy in scientific thinking has a long history in Western thinking. Greek philosopher Plato, in his *Theaetetus* dialogue (c.368 BCE) tells us, for example, that Socrates described himself as a midwife who brings forth.

Analogy is, in effect, the process of taking a system of relations from one domain and using the structural relations thereof to make enquiries in another.[6] Computer scientist/psychologist duo Dedre Gerner and Michael Jeziorski note that the use of analogy discards object descriptions and rather maps relational structures.[7] They further state that the use of analogy should convey a "system of connected knowledge" and not only present independent facts.[8]

Educationalists Aubusson et al. note a general philosophical acceptance of the use of metaphor and analogy in discourse since the middle of the twentieth century. They also take the position that the use of both is fundamental to human thought.[9]

Their conclusion is that analogies are useful tools for learning, but also note that analogies can better be "…described as a thinking tool… because analogy does not qualify as empirical knowledge" for scientific enquiry. They continue that analogy remains a "…powerful way to think, construct ideas and test new knowledge"[10] and is the driving mechanism in human thinking; through reflection on what we perceive against the analogy of prior experiences, a conclusion shared by cognitive scientists David Hofstadter and Emmanuel Sander.[11]

The cognitive metaphor states comparison in a direct manner. Following Henry Ford, time is 'money' that can be 'wasted', computer programmes have an 'architecture' and apps can be 'built', electricity 'flows' like water and molecules are the 'building

6 (Gertner & Jeziorski, 1987, p. 3).
7 (Gertner & Jeziorski, 1987, p. 4).
8 (Gertner & Jeziorski, 1987, p. 5).
9 (Aubusson & Treagust, 2006, p. 1).
10 (Aubusson & Treagust, 2006, p. 22).
11 (Hofstadter & Sander, 2013).

blocks' of life.[12] These are what linguist George Lakhoff and philosopher Mark Johnson termed "structural metaphors", where one concept provides the structure for our undertaking of another.[13] These metaphors do not present total similarity (the one *is* not the other) but rather an understanding that the one is understood in terms of the other.[14]

3.3 Interdisciplinarity

Architectural research, according to architect and researcher Linda Groat, is by definition interdisciplinary.[15] Architectural academic Ray Lucas refers to architectural research as often being cross-disciplinary, (which can include trans- and interdisciplinary working); the power of which lies in the application of analogy or metaphor.[16]

Interdisciplinarity knows many forms, but unfortunately for those wanting to compose an overview, does not use a conform terminology. The kind of research undertaken defines the character of the interdisciplinarity, which in turn influences both the terminology used and the research output. It is, therefore, useful to delineate the interdisciplinary quality of this dissertation in order to understand the opportunities and risks faced in its execution. Margaret Boden, cognitive scientist, defines six different modes of interdisciplinarity, ranging from the least interdisciplinary to the most as:

1. Encyclopaedic: an enterprise covering many, or even all disciplines within a wide range, but with no need for communication between them;
2. Contextualising: an enterprise in which one takes some account of other disciplines in teaching and/or setting one's research-goals, but without active research co-operation with those disciplines;

12 For instance, the Dutch Research Council, NWO, at the time of writing runs a research programme titled 'Building Blocks of Life' aimed at understanding the molecular basis of life (NWO, 2016).

13 (Lakoff & Johnson, 2006, p. 14).

14 (Lakoff & Johnson, 2006, p. 13.

15 (Groat & Wang, 2013, p. xi).

16 (Lucas, 2016, p. 10, 69).

3. Shared: an enterprise in which different aspects of a complex problem are tackled by different groups with complementary skills. Results are communicated and overall progress monitored. But day-to-day co-operation does not occur;
4. Co-operative: an enterprise in which several groups with complementary skills work towards a common goal, actively co-operating on the way;
5. Generalising: an enterprise in which a single theoretical perspective is applied to a wide range of previously distinct disciplines;
6. Integrated: an enterprise in which some of the concepts and insights of one discipline contribute to the problems and theories of another.[17]

Boden considers the last, to be the "only true interdisciplinarity".[18]

Boden notes the danger that Integrated Interdisciplinarity can be seen by purist specialists as leading to superficiality and she cautions that the researcher "… requires the courage to risk falling between two stools."[19] She further notes two requirements for Integrated Interdisciplinarity:

- a holistic perspective, which she describes as the ability to see the wood, not just the trees; and
- a healthy scepticism for subject boundaries.[20]

Integrated Interdisciplinarity is ideally a two-way street (to use a common analogy) that enriches (a metaphor) all disciplines engaged in the research. This is not necessarily the case for general interdisciplinarity, but rather a general view based on the appreciation that teamwork is often required to solve complex and social problems,[21] usually understood as transdisciplinary.

This thesis is not collaborative in nature, but rather searches for an integrated approach to understanding various processes in an integrated way. The specific process of collaborative communication is, therefore, not immediately relevant. It can, rather, be framed as Integrated Interdisciplinary research. Because this thesis

17 (Boden, 1999, p. 13, pp. 14–19).
18 (Boden, p. 20).
19 (Boden, 1999, p. 21).
20 (Boden, 1999, p. 21).
21 (Klein, 2007, p. 44).

is undertaken by only one researcher, the researcher needs to aspire to be an interdisciplinary generalist.

Business information scientist Heiner Müller-Merbach provides clues to what qualities the interdisciplinary generalist researcher should aspire to:

1. "be familiar with the basic content of the single disciplines,
2. be able to apply his/her knowledge and
3. have some passion for the disciplines…"[22]

3.4 An ecology of ideas

To bring the perspectives of different disciplines into relation with each other to be a lens for an integrated interdisciplinary enquiry, requires assimilation into a single consistent structure. This can be seen as an *ecology of ideas*. An ecology of ideas? The term was established by social systems scientist Sir Geoffrey Vickers in his 1968 book *Value systems and social progress.*[23] Vickers offers the following simile/analogy of the realm of ideas as mirror of the real word:

"Like the life forms of the physical world, the dreams of men spread and colonize their inner world, clash, excite, modify and destroy each other, or preserve their stability by making strange accommodations with their rivals… So I regard it as legitimate analogy. Though, not of course an exact one, to speak of our interpretative system - I call it our appreciative system - as an ecological system, even though the laws which order and develop a population of ideas (conflicting, competing and mutually supporting) in communicating minds are different from those which order and develop a population of monkeys in a rain forest or of insects under a paving stone".[24]

22 (Müller-Merbach, 2009, p. 495).

23 (1968, London: Tavistock).

24 (Vickers, 1968/2013, p. ix).

Vickers uses subsequently the idea as umbrella for a trilogy of essays that relate to thinking in the Western world.

Multidisciplinary scientist Gregory Bateson developed the notion of ecologies of ideas further, seeing an ecology of ideas as an interconnected system of ideas that transcends the life of the originator's individual mind.[25] The concept of an ecology of ideas, which exists due to the interaction between minds, is an essential basis for scientific enquiry through interdisciplinarity.

Ecologies of ideas are understood to be related to a field of enquiry or a specific understanding, but for integrated interdisciplinary research an ecology of ideas that transcends discipline boundaries needs to be created. For this research into *how heritage learns* the ecology of ideas will be built from ideas from the disciplines of architecture, heritage, evolutionary biology, the ecosystemic developmental sciences and experiential learning theory.

3.4.1 Architecture

"…architects who have aimed at acquiring manual skill without scholarship have never been able to reach a position of authority to correspond to their pains, while those who relied only upon theories and scholarship were obviously hunting the shadow, not the substance. But those who have a thorough knowledge of both, like men armed at all points, have the sooner attained their object and carried authority with them."[26] – Marcus Vitruvius Pollio

Architecture is a traditive profession, building on the experience and residue of previous generations–which are transferred as an ecology of ideas–coupled with acquired skill.

"Whoever reads treatises on architecture will be confronted with a name which nearly all modern architectural writers cite or have at the back of their minds: Vitruvius..."[27] says architectural theoretician Christof Thoenes in the introduction to his 2003 anthology *Architectural theory : From the Renaissance to the present.*[28]

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25 (Bateson, 1972, p. 467).

26 (Morgan, 2012, p. 21).

27 (Thoenes, 2003, p. 8).

28 (Taschen).

The tradition of Western architectural thinking has been underpinned by the Vitruvian Triad *Firmitas*, *Utilitas* and *Venustas* (hereafter 'Triad') at least since the re-publication of Marcus Vitruvius Pollio's[29] *De architectura* (translated to English as *Ten books on architecture*) in Leon Battista Alberti's *De re aedificatoria*.[30] The texts were familiar to Medieval scholars[31] but it was only in the Renaissance that the divides between theory and praxis were bridged and the Triad entered the realm of design as a foundational concept in Western architectural thinking.

The three virtues of *Firmitas*, *Utilitas* and *Venustas* have become a broadly accepted general structure to frame the way in which architects see buildings since the Renaissance.

The Triad is not the central thesis of Vitruvius' work, but certainly is the work's most enduring legacy. It lies buried in the second paragraph of Book 1 Chapter 3 of Vitruvius' *Ten Books on Architecture* under the heading *The Divisions of Architecture*.[32] Art historian and classicist Ingrid Rowland translates the entry as follows:

> "All these works [these works being architecture] should be executed so that they exhibit the principles of **soundness**, **utility** and **attractiveness**. The principle of **soundness** will be observed if the foundations have been laid firmly and if, whatever the building materials may be, they have been chosen with care but not with excessive frugality. The principle of **utility** will be observed if the design allows faultless, unimpeded use through the deposition of the spaces and the allocation of each type of space is properly orientated, appropriate and comfortable. That the **attractiveness** will be upheld when the appearance of the work is pleasing and elegant and the proportions of its elements have properly developed principles of symmetry.[33]

A definitive translation of the intention of the text of the Latin original into English however remains problematic. Architectural historian Adrian Forty, in *Words and buildings : a vocabulary of Modern Architecture*,[34] for instance accepts the word

29 *c.80–70 BCE–†c.15 CE.

30 ca. 1450 CE.

31 (Thoenes, 2003, p. 190).

32 (Rowland & Howe, 1999, p. 26).

33 (Rowland & Howe, 1999, p. 26) [Original emphasis].

34 (1990. New York: Thames and Hudson).

‘commodity’ as a representative concept for *Utilitas*[35] whereas Harry Mallgrave, in his *Architectural theory. Volume 1 : an anthology from Vitruvius to 1870*, accepts the word ‘convenience’.[36] Mallgrave presents *Venustas* as ‘beauty’ and *Firmitas* as ‘durability’.[37]

In its common architectural interpretation, *Utilitas* (utility or convenience) lies very close to the concept of ‘function’, which Forty describes as taking on the meaning of the “sense that the building fulfilled, in a mechanical sense, the requirements of the society within which it was produced” in Modern Architecture.[38] This presents an expansion on the Vitruvian definition of *Utilitas* to include the environment of a building in its wider sense, including the social and physical context,[39] both of which exist in time, which as geographer David Lowenthal confirms, is “…to be sure, linear and directional.”[40]

If we accept Forty’s interpretation of the meaning of ‘function’, environmental appropriateness (or sustainability) can form part of the ‘function’ of a work of architecture. Vitruvius in any case originally included ‘orientation’ and ‘comfort’ as key concepts to *Utilitas*.[41] These are today key concepts in discussions around the energy performance of buildings when dealing with solar orientation and climatic comfort.

The concept *Venustas* is especially dependent on external appreciation, where *Firmitas* and *Utilitas* can, to a degree, be measured against pre-defined norms, standards and expectations. All three components of the Triad represent virtues on which a value judgement on implicit expectation regarding performance can be based. This has made their translation and interpretation flexible. Engineer and academic Andy van den Dobbelsteen for instance translates the Vitruvian Triad into a value-based assessment of “future value, use value and experience value” of a building.[42] Van den Dobbelsteen's translation of the Triad echoes the 1991 Dutch policy document *Ruimte voor architectuur* (Space for Architecture) co-published by the then ministries for *Welzijn, Volksgezondheid en Cultuur* (Welfare, Health and

35 (Forty, 2000, p. 190).
36 (Mallgrave, 2006, p. 6).
37 (Mallgrave, 2006, p. 6).
38 (Forty, 2000, p. 190).
39 (Forty, 2000, p. 190).
40 (Lowenthal, 2011, p. 220).
41 (Rowland & Howe, 1999).
42 (Van den Dobbelsteen, 2004, p. 176).

Culture) and *Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer* (Public Housing Spatial Planning and Environmental Management), which was lauded as the first national policy on architecture globally. *Ruimte voor architectuur* looked to Vitruvius in defining architectural quality. It presented a triad of values: use value, future value and cultural value as measures of architectural quality.[43]

Soundness, utility and attractiveness / Durability, convenience, beauty. Without reference to Vitruvius the former State Architect of the Netherlands, Tjeerd Dijkstra uses the concepts 'form', 'function' and 'construction' as measures for architectural quality in his 2016 essay *Architectural quality : A note on architecture policy*. Dijkstra clearly tries to avoid the maligned term 'aesthetics' (or even more derided 'beauty'), substituting it with the modernist equivalent 'form'.[44]

Whatever the translation, the core principles remain: architectural thinking in the West has built on the supposition that an architectural work can be evaluated through the lens of a unification of these three concepts, albeit with differing nuances in the weighting of each value, depending on circumstances. The Triad remains useful for the unpacking of buildings' performance qualities and can be utilised as a 'triple bottom line' for evaluation of architectural production from the perspective of the architect.

The Triad needs to be contested as it presupposes a building as a static product of a professional process. The inverse interpretation of the Triad of prerequisite qualities for evaluating success of architecture as the art of building, leads to the conclusion that when a built structure does not contain, or loses one of these three characteristics, it loses its architectural merit, even if it still contains some other values. This potential change in state from concurrently containing soundness, utility and attractiveness, (durability, convenience and beauty/future value, use value and experience value), to a state lacking one or more is dependent on the passing of time, unless the building was conceived and constructed in a deficient manner.

Christopher Alexander, architect and influential design theorist, noted in his 1979 *The timeless way of building* that vernacular buildings often achieve a beauty–what he refers to as the *quality without a name,* because they are formed and moulded over time.[45] The latter, he says, can be due to weathering, daily changes in use pattern, interventions by inhabitants and owner and continuous loving curation.

43 (Minsterie voor Welzijn Volksgezondheid en Cultuur & Ministerie voor Volkshuisvesting, 1991).

44 (Dijkstra, 2016, p. 13).

45 (Alexander, 1979).

Architects and educators Mohsen Mostafavi and David Leatherbarrow have already exposed how 'weathering' (the action of its environment on a building) extend the construction process of a building infinitely.[46] In their view lives of buildings start at construction, which seamlessly transitions to maintenance, repair, replacement and upgrade. Taken from this point of view, buildings are continuously being built.

Following in their footsteps, architect and academic Edward Hollis in *The secret lives of buildings* exposed buildings as shape-shifters, responding to both time and the wishes of man.[47] He notes that for the Notre Dame in Paris, "[t]ime never stopped being the architect of the Notre Dame…" His analysis echo's the sentiment of Dutch restoration and adaptation architect Job Roos, for whom, "[t]ime is the great architect".[48] Architect and facilities management expert Frank Duffy stated that: "time is the essence of the real design problem."[49] In other instances, the building cannot fulfil the prophesies of what it was expected to achieve or do–or in the words of Hollis: "the timeless dreams of architects…"[50]–that brought them into being. If they can't shape-shift, they expire.

The process of change to find 'fit' in an ever-changing environment can be seen as an evolutionary process, a process in which the building, albeit a seemingly static object, is constantly learning to cope with its changing environment, or failing to do so it faces eventual extinction.

3.4.2 Learning buildings

"We learn by living."[51] – Patrick Geddes

Hollis' compelling description of the lives of buildings in the context of their genesis and subsequent lives is exemplary for a slow realisation that there is merit in studying the lives of buildings analogous to the way in which biologist study the biophysical world. The undoubted father of this young and still-emergent paradigm

46 (Mostafavi & Leatherbarrow, 2001).

47 (Hollis, 2010, back cover).

48 (Roos, 2014).

49 Quoted in (Brand, 1994, p. 13).

50 (Hollis, 2010, p. 245).

51 (Geddes, 1915, p. 317).

is Stewart Brand. Brand's 1994 book *How Buildings Learn*[52] brought an ecology of ideas from an external discipline–evolutionary biology–as analogy into the built environment. Evolutionary biologist Brand effectively presented the ecosystemic paradigm as a model to understand how and why buildings change. Brand offered the first widely accepted and arguably most influential perspective on change in buildings to date. Brand brought the idea of 'actively learning buildings' to architecture and presented how the character of a building will define the potential interactions and reactions of a building due to pressure from its environment over time as a systemic interplay in an ecology.

The core of Brand's message is contained in an appendix of his book. Brand noted here that where biological science had naturalist Charles Darwin's Theory of Evolution, the disciplines aligned to the built environment lacked a unifying concept. He concluded metaphorically that for the building sciences "…[t]he missing link is time."[53]

Brand built on the work of Francis Duffy. Duffy published a model for analysing a building along its Shell, Services, Scenery and Set as building layers in a short article, originally delivered as a keynote speech.[54] Duffy lamented the fact that the "…records of buildings are utterly synchronic: a page of photographs and plans, a specification - nothing about the on-going reality of building use."[55] He identified moments of intervention, 50 years for the replacement of the shell of a building, 15-year cycles for services and a 5-year replacement time for the scenery, the interior fittings of a building.[56] Brand not only credited Duffy with creating first a shearing layer model consisting of four so-called 'S's, but also with being the leading, if not only, theorist of rates of change in buildings at the time.[57]

Nearly twenty years later facility manager and engineer Laurie Gilmore, says that buildings have personality and that: "…[g]etting to know our buildings and embedding ourselves in their personalities is essential for improving building and system performance. Only by doing so can managers identify opportunities for improvement." Gilmore tells us that while more information on the energy use performance (in this case institutional and commercial, not residential) buildings was available – the key question was what to do with it. Evoking the Latin proverb

52 London: Penguin Books.

53 (Brand, 1994, p. 210).

54 Delivered as keynote address to the Facilities Management International Conference held at Glasgow on 10 April 1990 (Duffy, 1990, p. 20).

55 (Duffy, 1990, p. 17).

56 (Duffy, 1990, p. 17).

57 (Brand, 1994, p. 12).

Saxa loquuntur, famously used by psychoanalyst Sigmund Freud to describe his work as likened to that of the archaeologist, Gilmer advises her reader to listen to a building in order to improve its performance. [58]

Brand developed his well-known model of six shearing layers, each of which relate to a physical scale level at which change takes place at different tempo's and for differing reasons. These are identified as, from the slowest to fastest rate of change: Site, Structure, Skin, Services, Space Plan and Stuff (Figure 1.1). Brand defines three drivers, or engines, for change in buildings: technology, fashion and money.[59] He also postulates that a seventh layer could be added to his sheering-layer model: "human Souls at the very end of the hierarchy, servants to our Stuff."[60] In doing so he establishes use and usefulness and the interaction between user and building as an essential component of a building.

Brand's shearing layers model ignited a slow but steady paradigm shift in our understanding of how to engage with the fact that buildings are not stagnant. They change in response to external pressures and internal processes. In Brand's analogous world, change that extends the lifespan of a building is equal to learning. Since Brand first published *How buildings learn,* learning has, for instance, also been applied as analogy to cities as well.[61]

Apart from people, entropy, economy, technological advances, fashion and policy all continuously alter the characteristics of buildings. This rate of change is variable, but continuous and no building is the same from one day to the next.Duffy and Gilmer's concern with building performance indicates that they often do not meet the performance they were constructed to achieve, or in the case of a building upgrade, the prophecy of better performance that underlies, for instance, new climate installations. Their conclusions, however, relate to their work in the field of facilities management and do not take the accretion of cultural value over time into account. Likewise, Brand's shearing layers model does not allow for the distillation of the impact of built heritage values in a monumentalized structure, many of which are not tangible. While it allows for the impact of time, it does not allow for the evaluation of the role of actors and factors in the wider context or ecosystem of the building on the evolution of the building, or what these do to the building as heritage.

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58 (Gilmer, 2018).

59 (Brand, 1994).

60 (Brand, 1994, p. 13).

61 In, for instance, the 2008 book *De lerende stad : het laboratorium Rotterdam* (The learning city: the laboratory Rotterdam), Rotterdam is presented as learning through the evolution of its social sector (Notten, 2008).

3.4.3 Built Heritage

The Vitruvian values of beauty, solidity and usefulness of a built structure are not the only criteria for the appreciation of buildings (as distinct from architecture). The pragmatic Vitruvian perspective lacks an appreciation of the ascribed value that is gained through time: built heritage values. The economic value, for instance, can be positioned as being part of the usefulness of a building; a building can be a useful container of financial currency, which can later be exchanged for other goods, services or currency. The economic value of a building is in turn determined by many factors such as location,[62] construction or replacement cost of the construction and how fit for purpose they are, how much demand there is in relationship to supply, as well as the perceived value among potential buyers.

Built heritage values, however pose a problem when we try to locate them in the framework of the Vitruvian Triad. When testing contemporary built heritage values, against the virtues Utilitas, Firmitas, and Venustas it is obvious that they do not fully convey those qualities that make a heritage building.

Built heritage values, such as those defined in the Dutch Monuments Act are difficult to ascribe to the Triad because they relate more generally to the intangible or emergent qualities of objects or sites with heritage value than specifically to the physical qualities of buildings. These could be included in a range in scales from cultural landscapes and historic cityscapes through to archaeological finds.

A recognizable appreciated aesthetic (Venustas) or use (Utilitas) does not in itself lead to an immediate or inevitable heritage appreciation. Many structures have been valourised due to the presence of other values while not being highly appreciated for their beauty or having any appreciated use.[63]

The evaluation of extant built structures with built heritage values therefor requires an augmentation of the Triad to ensure that not only the requirements of firmness, beauty and utility are met but that the inherent heritage quality is maintained. This calls for a qualification of an additional category of requirement as all continued use, be it through conservation, restoration or any other of the range of interventions all

62 In heritage management, location is often not a factor that can be modulated except by modulating the environment around a heritage property to increase the appreciation of the geographical location of a heritage property. (In very few cases can buildings be re-located and this in itself is often only done in the last resort as the divorcing of a building with its setting is seen as very destructive to its values and associations).

63 See (Meerloo, 1939); (Ter Kuile, 1952) & (Kuipers, 2012).

the way to demolition, will not only change the character of the use, firmness and beauty of a structure, it will also impact on heritage values. It is important to make a distinction between heritage and history. David Lowenthal in his essay *Fabricating heritage* stated that:

"Heritage should not be confused with history. History seeks to convince by truth and succumbs to falsehood. Heritage exaggerates and omits, candidly invents and frankly forgets, and thrives on ignorance and error."[64]

According to Lowenthal: "Heritage uses historical traces and tells historical tales."[65] Lowenthal, however, refers here to heritage in its broadest sense and not the built heritage specifically, the former which is defined by the *Cambridge academic content dictionary* as: "heritage (noun), singular : features belonging to the culture of a particular society, such as traditions, languages, or buildings, which come from the past and are still important.[66]

Architectural historian Marieke Kuipers, augmented Lowenthal in 2008 by proposing that a similar distinction was necessary between *heritage* and *architecture*: "… because monuments are more than just a (recognisably) executed design or a new architectural task. They also have a cultural-historical dimension which should be and remain legible in one way or another, for example through their location, a particular place-bound function or special decoration."[67]

At the time, the 1988 Dutch *Monumentenwet* (Monuments Act) defined monuments as: "manufactured objects of general interest on account of their beauty, their significance for science or their cultural-historical value."[68]

Dutch heritage legislation today takes a wider view, seeing *cultureel erfgoed* (cultural heritage*)* as *bronnen* (sources), be they material or immaterial, "…created over time by man or resulting from the interaction between man and his environment, which people, irrespective of their ownership, identify as reflecting and expressing

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64 (Lowenthal, 1998, p. 7).

65 (Lowenthal, 1998, p. 7).

66 (Cambridge University, 2009) [United States Edition].

67 "want monumenten zijn meer dan alleen een (herkenbaar) uitgevoerd ontwerp of een nieuwe architectonische opgave). Zij hebben ook een cultuurhistorische dimensie die op de een of andere wijze afleesbaar dient te zijn en te blijven, bijvoorbeeld door de situering, een bepaalde plaats-gebonden functie of bijzondere versiering." (Kuipers, 2008, p. 160).

68 "vervaardigde zaken welke van algemeen belang zijn wegens hun schoonheid, hun betekenis voor de wetenschap of hun cultuurhistorische waarde" (Koninkrijk der Nederlanden, 1988).

continuously evolving values, beliefs, knowledge and traditions, and which provide a frame of reference for them and future generations." This act defines a 'monument' as simply being: "…immovable property forming part of the cultural heritage".[69]

These legal definitions provide only very limited guidance to the identification of built heritage, and even less direction to how to deal with the challenge of change, providing only mechanisms for the gate-keepers role that national and municipal authorities are expected to fulfil. This proved a historical challenge to inventorying projects, like the MIP/MSP programme to identify and protect 'younger' monuments from the period 1850–1940. Five key values were identified for the MSP programme, published in the MSP handbook of 1991:

1. Cultural historic value;
2. Architectural value;
3. Ensemble value;
4. Integrity/Recognisability; and
5. Rarity, which could be typified along architectural-historical, building-technological, typological and function rarity; all of which could be linked to a particular age.[70]

This set of valuation criteria has now been augmented by the Cultural Heritage Agency for general use as valuation criteria for all building works. These built heritage values serve as selection criteria for buildings to be protected as built heritage (*monument*) specifically in the Dutch context.

An exhaustive survey of potential cultural values in the built environment internationally was conducted by built heritage academic Ana Roders. She analysed sources ranging from primary documents such as art critic and theorist John Ruskin's 1849 essay, *The Seven lamps of architecture* and art historian Alois Riegl's 1903 *Der moderne Denkmalkultus, sein Wesen und seine Entstehung*[71] to doctrinal and guidance texts for heritage conservation, management and continuation, published by UNESCO, ICOMOS and the Council of Europe.[72] Roders distilled eight values, which she describes as

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69 "…in de loop van de tijd tot stand gebracht door de mens of ontstaan uit de wisselwerking tussen mens en omgeving, die mensen, onafhankelijk van het bezit ervan, identificeren als een weerspiegeling en uitdrukking van zich voortdurend ontwikkelende waarden, overtuigingen, kennis en tradities, en die aan hen en toekomstige generaties een referentiekader bieden"; "onroerende zaak die deel uitmaakt van cultureel erfgoed." (Koninkrijk der Nederlanden, 2015b, Article 1.1).

70 (Rijksdienst voor de Monumentenzorg, 1991, p. 32); (Rijksdienst voor het Cultureel Erfgoed, 2019)

71 Translated by Karin Bruckner and Karen Williams as "The modern cult of monuments : its essence and its development" in (Riegl, 1903/1996, p. 69).

72 (Roders, 2007, p. 72).

‘cultural’: scientific; historic; aesthetical; social; economic; political; ecological; age; and other (primary values),[73] …which indicates that the list is not neccessarily definitive.

Aesthetic value itself already presents a dialectic and a dilemma. The dilemma is that it is dependent on changes in fashion, or inversely, a familiarization which brings an appreciation of ascribed values through use and events and association.

Riegl in 1903 already pointed out the difference between historic beauty, which talks to age and contemporary appreciation of beauty, which requires newness to exist. This resonates with Alexander’s later *quality without a name* and Dutch art historian Wilhelm Martin’s term *herleefde schoonheid* (re-lived beauty),[74] closely associated with his appreciation of the *doorleefde emotie,* (lived through emotion) that he valued in paintings from the Dutch seventeenth century.[75] Aesthetic value, often directly represented by the Vitruvian virtue Venustas, can have multiple opposing interpretations.

Riegls’ dialectic set of values originated in his view of the continuation of values of heritage buildings in their entirety within the actual debate between *restaurieren* and *konservieren* of his time. Today architects tend to interpret Use value as the potential of a building to be adapted to new functional requirements, and therefore having economic use.[76]

Economical value can be partly associated with the utility (Utilitas), although the economic value of a building might be due to tourism and not at all due to the occupation use capacity of a building. It could even be argued that the scientific and historic value could be part of the utility of a building, if its fabric deemed a container of knowledge, though this can be tenuous. More convincingly, ecological values could be seen as forming part of the utility, *Utilitas* of a building within a paradigm giving more attention to the role of the built environment than to the maintenance of the biophysical status quo.

In conclusion, built heritage values don’t resonate well with Vitruvian thinking, with exception of those constructed specifically to commemorate important past events or an idea. These are erected consciously as monuments and their function is to

73 (Roders, 2007, pp. 72–76).

74 (Martin, 1935b).

75 (Martin, 1935a, p. 241).

76 (Clarke & Kuipers, 2017, pp. 211–12).

contain and foster memory.[77] In the case of the latter, what Riegl calls 'deliberate monuments' such as commemorative obelisks, these are constructed to become markers of already existing cultural historical values. Heritage is not architecture, but architecture can be heritage. The same goes for buildings, which despite all having a history, not all are necessarily heritage.

Heritage deals with patrimony, history and culture and is therefore emergent through time. Built heritage values emerge and evolve over time.[78]

3.4.4 Analogous models: Evolutionary biology and architectural DNA

If we accept Brand's cognitive metaphor[79] that buildings can learn in response to environmental pressures, then we acknowledge that their fabric and internal relationships allow for a certain set of responses in a specific contextual condition, as analogously does the DNA of an organism.

The difference between buildings–which exist in the abiotic realm–and the biotic realms, is that in the case of buildings, the fabric responses are actualized by external actors and forces. These include the forces of nature and living organisms (including people, architects, contractors, building owners and inhabitants (who respond within a framework of policy and knowledge, however deep it might be, of fabric of a structure). The building itself does not act but is changed by external factors. The change is however highly dependent on the nature of the building, its components and materials and their relationships. The components of a building have internal resilience to time and weathering impacts in a manner that is pre-determined by the qualities of the fabric.

77 What Alois Riegl refers to as the original definition of a "monument" as a: "…work of man for the specific purpose of keeping particular human deeds or destinies (or a complex accumulation thereof) alive and present in the consciousness of future generations." (Riegl, 1903/1996, p. 69).

78 For purpose-built memorials their 'time' commences long before they are constructed, as they commemorate past events and encapsulate the already existing interpretation of a historical narrative, for example the very many WWI memorials designed by Edwin Luytens for the British Imperial War Graves Commission. (Geurst, 2010), provides a visually appealing overview.

79 Cognitive metaphors allow us to conceptualize complex processes that we would have difficulty conceptualizing otherwise. It is a shortcut using the structure of external source domain within a target domain to explain characteristics of a target domain.

The analogous use of evolutionary biology in the built environment emerged shortly after the general acceptance of Darwinian theory. Biologist and urbanist Patrick Geddes brought his biologist and sociologist perspectives to bear in town planning and urban development in 1915 in *Cities in Evolution*. Geddes postulated that for the inhabitants of cities: "Healthy life is completeness of relation of organism, function and environment and all at their best. Stated, then, in social and civic terms, our life and progress involve the interaction and uplift of people with work and place, as well as of place and work with people. Cities in Evolution and People in Evolution must thus progress together."[80] For Geddes this went beyond mere analogy.

Evolution in biological terms is understood to take place when genes are passed on from parents to their offspring when reproducing and the genes change (for instance through mutation and recombination of genes from both parents) in the process. Through evolution, taxa (the lowest rank being 'species') emerge. This process, referred to as *phylogenesis*, is similar to the process that leads to the emergence of an architectural and building 'type'.

The analogous use of the term DNA, has entered the realm of architecture in recent years. Architectural theoretician Charles Jencks used the term DNA loosely in 2012, referring for instance to: "…the acknowledgement of architecture's DNA" as "… one -of the PM [Post Modern] agenda" and, on an urban level, that city fragments, such as prisons and hospitals, "…hold the germ of new urbanism in their DNA."[81] Other authors also refer to the DNA of buildings or complexes,[82] notably the Dutch research institute TNO, who developed an approach to energy-reduction renovation through contingencies, based on an analysis of what they refer to as the building's DNA.[83]

Architect-academic, engineer and poet, Richard Foqué however preferred to make a discipline-specific designation in applying this analogy to the 'information to be handled by the architect' in the process of design. Foqué argued that the model of DNA which in specific sequences constitute genes, can be repurposed analogously to architecture. His model presents architectural DNA (AR-DNA), consisting of a series of "knowledge pockets", which he defines as "data carriers which describe

80 "Healthy life is completeness of relation of organism, function and environment and all at their best. Stated, then, in social and civic terms, our life and progress involve the interaction and uplift of people with work and place, as well as of place and work with people. Cities in Evolution and People in Evolution must thus progress together." (Geddes, 1915, p. 392).

81 (Jencks, 2012).

82 See for instance (Benschop, 2019, p. 11), who refers to the "design DNA of the airport".

83 (Mulder et al., 2021, p. 4).

the building at its several levels and in its different states through time".[84] AR-DNA in specific sequences then form 'AR-genes', which like real genes, are the source of the physical manifestation/traits. This is structured as a triple helix, representing the domains of Form, Context and Function, which connected together create the AR-genome (Figure 3.2). Foqué conceptualises architectural research as multi-layered and building that builds on a complex body of knowledge[85]–an ecology of ideas. In this model he utilises the Virtuvian Triad where Firmitas equates to Science and the Mind, Venustas to Art and the Soul and Utilitas to Design and the Body (Figure 3.3).

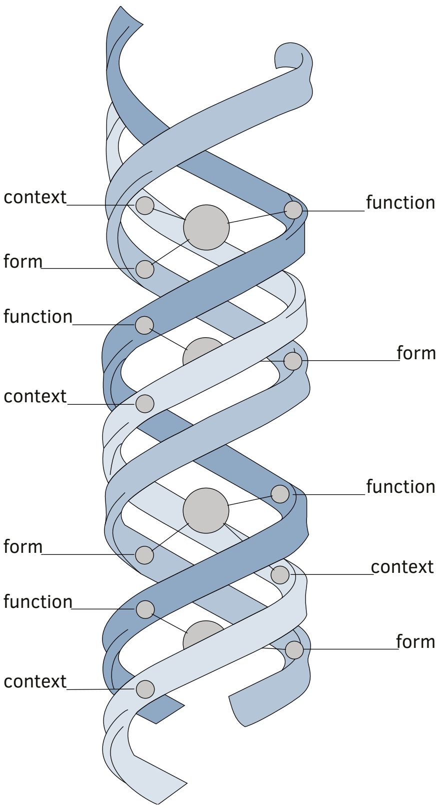

FIG. 3.1 Richard Foqué's conceptualisation of AR-genes emergent from the domains of Context, Function and Form (adapted from Foqué, 2010, p. 134).

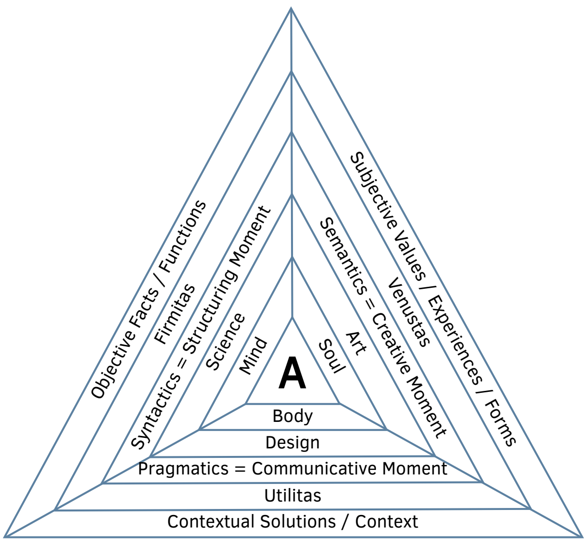

FIG. 3.2 Foqué's model for architectural research, building on the Vitruvian Triad (adapted from Foqué, 2010, p. 131)

84 (Foqué, 2010, pp. 132–33).

85 (Foqué, 2010, pp. 129–31).

TOC

Foqué extends his metaphor to the life of the building after construction, noting that "… at any given moment from the start of the project through to the total life cycle of the building, we can define the project state, indicate the status in the patterns of interaction between project information… The realisation of a project can be seen as an evolutionary process, where data undergo a metamorphosis from abstract ideas to concrete facts and pass from the virtual universe in to the real world."[86]

Following on from the biological analogy employed by Foqué for the architectural design process, myself and architect Vivian Wijburg have postulated that buildings, like living organisms, can present a phenotype that is different from the genotype.[87] Like genes–which can be similar in different organisms of the same species, or shared amongst species–building 'genes' can be common to specific types and also be shared across types[88] and over time. In biological terms, the genotype is a set of genes, a section of DNA, that contains all the information responsible for a particular trait, while the phenotype is the expression of the genotype modulated by its interaction with its environment. Analogously, in buildings this would mean that AR-genes (related to form, function and context at their genesis) can over time express differently due to interaction with its larger environment.

3.4.5 Modes of evolution

For architecture to express a phenotype, interaction with the environment or context is required after construction. However, in the case of individual buildings, genes are not transferred. Can we then speak of evolution or is this simply development?

Charles Darwin's theory for evolution presented in *On the Origin of Species*,[89] presupposed a uniform gradual evolution for change. Shortly put, the argument for gradualism was based on the presupposition that because at the time of the conceptualisation no cataclysmic natural phenomenon could be observed at the time that would create a punctuated mutation, that evolution takes place in the form of gradual genetic mutation and variation, with no sudden change observable, thereby creating a 'tree of life', and that the evidence hereof should be visible in the fossil record, if studiously examined.

86 (Foqué, 2010, p. 127).
87 (Clarke & Wijburg, 2017).
88 (Clarke & Wijburg, 2017, p. 44).
89 (Darwin, 1859).

As Darwin himself put it: "No complex instinct can possibly be produced through natural selection, except by the slow and gradual accumulation of numerous, slight, yet profitable, variations. Hence, as in the case of corporeal structures, we ought to find in nature, not the actual transitional gradations by which each complex instinct has been acquired—for these could be found only in the lineal ancestors of each species—but we ought to find in the collateral lines of descent some evidence of such gradations; or we ought at least to be able to show that gradations of some kind are possible; and this we certainly can do."[90]

Over the following century, mounting evidence from the fossil record–which, despite many years of search, did not lead to the anticipated "…discovery of all transitional forms linking an ancestor with its presumed descendent"[91]–led to a reappraisal of this model. Evolutionary biologists Niles Eldredge and Stephen Gould developed the theory of punctuated equilibrium: a model that allows for evolution to occur relatively slowly (gradually) and be punctuated by moments of rapid change (Figure 3.4).

Or as Eldredge and Gould stated in typically elegant metaphorical fashion: "The history of life is more adequately represented by a picture of "punctuated equilibria" than by the notion of phyletic gradualist. The history of evolution is not one of stately unfolding, but a story of homeostatic equilibria, disturbed only "rarely" (i.e., rather often in the fullness of time) by rapid and episodic events of speciation."[92]

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90 (Darwin, 1859, p 209–210).

91 (Eldredge & Gould, 1972, p. 87).

92 (Eldredge & Gould, 1972, p. 84).

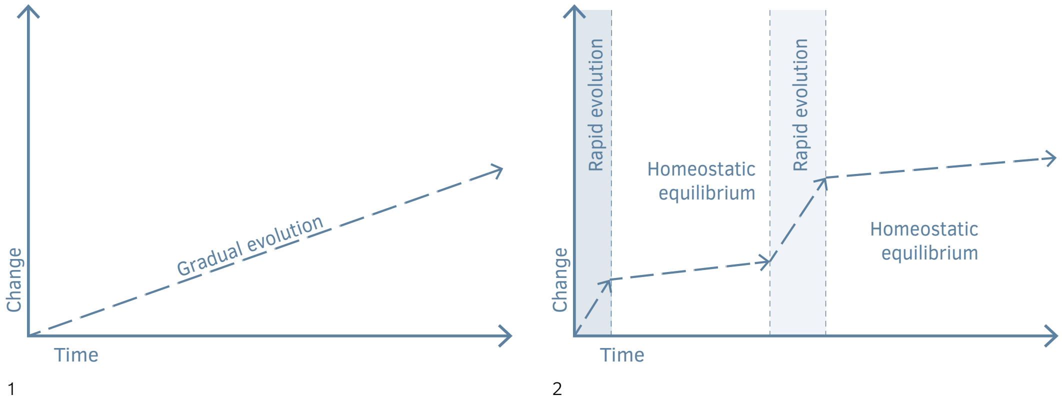

FIG. 3.3 Gradual evolution [1] and punctuated equilibrium [2] on the scales of time and change.

It should be added that homeostasis does not presuppose no change, but rather a period of relatively stable equilibrium between independent elements; or in the parlance of biology: the process by which an organism maintains a steady state of internal conditions, despite the slow change wrought by time.

Eldredge and Gould refer to two types of homeostasis:

1. developmental homeostasis in which the change remains within the norms of canalized development, and
2. genetic homeostasis in which evolution favours immediate rather than extreme phenotypes (expression of the genotype in interaction with its environment).[93]

Can we speak of evolving buildings? Biotic evolution takes place though the mechanism of genetic change and where these changes better fit their environment, natural selection allows for their multiplication and consequent survival of a species. In buildings the AR-genes change over time, mutating in response to environmental factors, become different than they previously were: evolution.

93 (Eldredge & Gould, 1972, p. 114).

3.4.6 Learning buildings?

Brand leans heavily on simile when he says that buildings can act like tetchy giants, borrowing both from the disciplines of medicine and fairy-tale fiction.[94]
Brand's notion that buildings can acquire knowledge by learning should be seen as analogy: rather, they change, or as Brand prefers, 'flow' over time in response to stimuli.

Buildings undergo change over time, undergoing 'experiences' that change their future possibilities and the way we perceive and use them. Brand established that buildings can in fact 'learn', that is, that they adapt to pressures from their environment. It would, however, be appropriate to have a model that explains the action needed for learning to understand how they learn. Once again, we need to look towards the life sciences for a model that can be appropriated as part of an analysis toolset.

3.4.7 Experiential Learning Theory

"The belief that all genuine education comes about through experience does not mean that all experiences are genuinely or equally educative. Experience and education cannot be directly equated to each other. For some experiences are mis-educative. Any experience is mis-educative that has the effect of arresting or distorting the growth of further experience. Any experience may be such as to engender callousness; it may produce lack of sensitivity and of responsiveness. Then the possibilities of having richer experience in the future are restricted."[95]
- John Dewey

Experiential Learning Theory (ELT), developed by educational theorist David Kolb and published in 1984, depends on two continuums:

1. that of active experimentation with reflective observation; linked to
2. abstract conceptualisation which leads to concrete experience.

94 (Brand, 1994, p. 36).

95 (Dewey, 1938/1998, p. 13).

It places "…experience central to the learning process"[96] and is based on an understanding that "…learning is an holistic process of adaptation to the world."[97] Kolb also sees learning taking place in all facets of human life as:

"…from schools to the workplace, from the research laboratory to the management board room, in personal relationships and the isles of the local grocery [store]. It encompasses all life stages, from childhood to adolescence to middle and old age."[98]

Kolb bases his model on a series of suppositions, including that:

- learning is best experienced as a process, not in terms of outcomes;
- learning is a continuous process grounded in experience;
- the process of learning requires a resolution of conflicts between dialectically opposed modes of adaptation to the world;
- learning is a holistic process of adaptation to the world; and that
- learning involves transactions between the person and the environment.[99]

The Experiential Theory model is appropriate to buildings in their environment because it focusses on change. It emphasizes "...the central role that experience plays in the learning process, an emphasis that distinguishes ELT from other learning theories. The term "experiential" is used therefore to differentiate ELT both from cognitive learning theories, which tend to emphasize cognition over affect and behavioural learning theories that deny any role for subjective experience in the learning process."[100]

Kolb developed his model through integration of two separate models. The first was psychologist Kurt Lewin's Lewin Cycle (Figure 3.5). The Lewin Cycle focusses on the here and now and posits that learning takes place when concrete experience is used to test and validate abstract experience. In short, we could say that doing tests and reflecting thereon validates planning.

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96 (Kolb, 1984, p. 20).

97 (Kolb, 1984, p. 31).

98 (Kolb, 1984, p. 32).

99 (Kolb, 1984, pp. 26–38).

100 (Kolb, et al., 2000, p. 2).

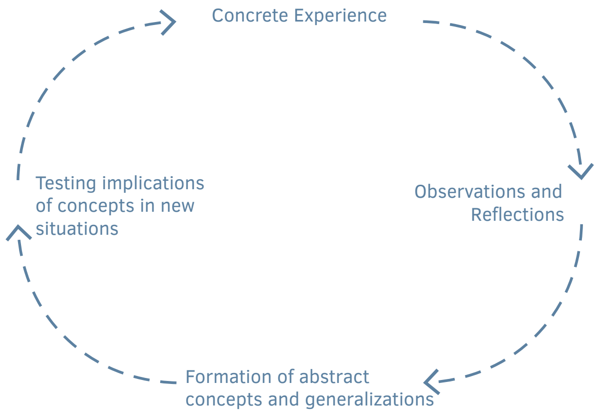

FIG. 3.4 The Lewin Cycle (adapted from Kolb,1984, p. 21).

In developing this cycle, Lewin looked to electronic engineering to provide an analogous model for feedback processes which allowed for both directed action and the evaluation of the resulting action which in turn would steer the following action towards the goal.[101]

Kolb noted that he developed his model by combining the Lewin Cycle with John Dewey's theory of 'learning by doing', which positions experience as unifying factor. Kolb describes educational reformer, philosopher and psychologist pragmatist and functionalist philosopher Dewey's theory as a circular-tropic process.

It is worth quoting Dewey's 1938 essay on the role of experience, as it explains this iterative process:

"The formation of purposes is, then, a rather complex intellectual operation. It involves: (1) observation of surrounding conditions; (2) knowledge of what has happened in similar situation in the past, a knowledge obtained partly by recollection and partly from the information, advice and warning of those who have had a wider experience; and (3) judgement, which puts together what is observed and what is recalled to see what they signify."[102]

Dewey's position resonates strongly with built environment processes. All construction, maintenance, renovation or adaptation projects need to take

101 (Kolb, 1984, p. 21).

102 (Dewey, 1938/1998, p. 69).

cognisance of surrounding conditions, precedent and the experience of professionals involved in a reactive process that relies heavily on the judgement of those involved directly, as well as those peripheral to the project.

Kolb's Experiential Learning Model, building on those of Lewin and Dewey,[103] is a cyclical model that reacts to personal experiences but does not exclude external input and processes, engaging experience, perception, cognition and behaviours (Figure 3.6).

The Experiential Learning model is useful as analytical tool as it resonates quite well with the processes of change buildings undergo. The process in humans can start at birth and resonates with the cyclical processes described by Brand, with the moment of first construction of a building being the 'birth'. It then allows for those moments of inertia when buildings tend to remain relatively stagnant responding within their capabilities to their environments. This is when the shearing layers are almost at rest, excepting for the slow but sure impact of time. This is the period of 'concrete experience'; when occupants and owners use the building, making minor modifications (mostly maintenance), but don't actively engage in the process of change planning.

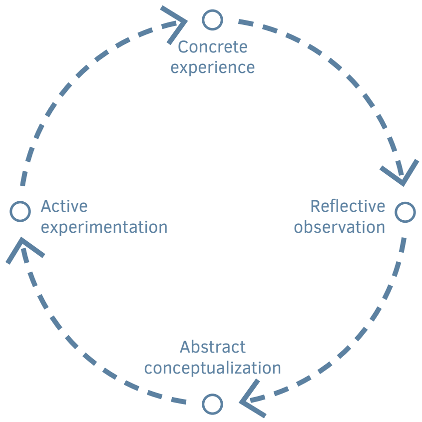

FIG. 3.5 A schematic representation of the Experiential Learning Model (after Kolb, 1984).

Processes further removed from the building also slowly continue. Policies change, economic conditions alter; in effect the world becomes a different place. Eventually

103 As well as the Development stage theory of developmental psychologist Jean Piaget. (Kolb, 1984, p. 21).

the tension between the building and the environmental pressure for improved or new performance is such that an intervention–in the parlance of Brand 'shearing'–becomes essential to ensure its continued use for purpose. The reasons for change could also include the ambitions of the occupant or owner, or society in general. A planning process is initiated and 'abstract conceptualisation' takes place, which in turn leads to 'active experimentation': a moment of punctuated change.

3.4.8 From Change Management to managing change

Lewin's influence in the field of Change Management is most manifest through his so-called Three-step Change Model, which states that change takes place through a process of unfreezing, moving, and freezing.[104] Lewin bases this on a model in which various 'driving' and 'resisting' forces impact on, in his parlance, an individual, which needs to overcome both individual resistance and group conformity. He describes the setting of the individual as a 'field' and it follows that 'force fields' exist which act on a group. If the 'driving forces' exceed the 'resisting forces' in power, change (or 'shearing' to paraphrase Brand) results.

In Lewin's 'field theory' the behaviour (or reaction, B) is a result of the person (P) engaging (f=function) with their environment (E):

$B=f(PE)$

Lewin further makes the distinction between change and 'quasi stationary' processes, which he equates, in reference to Greek Philosopher Heraclitus of Ephesus (c. 540BCE–480BCE), to "a river [which] continuously changes its element even if its velocity and direction remain the same."[105]

Other change equations exist and their mention here is to present possible categories for labelling vectors and forces in change. One such equation is commonly referred to as the Beckhard-Harris change formula, although they in turn credited management consultant David Gleicher with its development.[106] The Gleicher equation was developed as tool to present those factors required for organisational change to take place (with reference to organisations of people):

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104 (Lewin, 1947, p. 34).

105 (Lewin, 1947, p. 15).

106 (Beckhard & Harris, 1987) [erroneously cited as 1983] in (Cameron & Green, 2012, p. 267).

C=[A•B•D] > X

C=Change; A= Level of dissatisfaction with the status quo; B = Desirability of the proposed change or end state; D= Practicability of the change (minimal risk and disruption); X = 'Cost' of changing.[107]

In short, this equation predicts that change will only take place if and when the aggregate of the level of dissatisfaction along with the desire to change and the practicality of executing such a change exceed the cost of change.

Cost here does not only refer to the financial implication but to the sum of all possible perceived losses, both quantitative and qualitative, real and perceived.

The Beckhard-Harris change formula paraphrases Gleicher, in that change happens when:

D•V•F>R

D= **D**esirability for change; V=Clear and shared **V**ision; F = there is a roadmap/way/plan/**F**irst steps to achieve change; The product of these need to be larger than the **R**esistance to change before change will take place.[108]

This means that change, also in buildings and apart from natural degradation, cannot be implemented by people if any of 'desire', 'vision' or 'first steps' are absent. Conversely, in order to manage change we need to actively engender a useful desire, create a shared vision and take first steps.

3.4.9 Learning, Change and Punctuated Equilibrium

Some exploration has already been done as to the analogous applicability of the theories of Dewey, Kolb and the work of Lewin to change in buildings. These commonalities are worth highlighting:

The Lewin's 'quasi-stationary' processes are translatable to Kolb's moments of concrete experience and reflective observation; mirroring the periods of homeostatic equilibrium of Eldredge and Gould's model of Punctuated Equilibrium. Lewian change is comparable to the Kolb processes of abstract conceptualisation and active experimentation. The first represents change in the environment, where plans

107 This version as refined by Kathie Dannemiller (Cameron & Green, 2012, p. 267).

108 (Beckhard & Harris, 1987).

are made for change. The second is tantamount to the processes of adaptation for reuse through large-scale renovation. In both processes the manner in which a building adapts is a function of that building itself (its qualities, be it physical, such as the structure) and its environment (the political, architectural, fashion, social and legislative regimes). It is possible to transcribe Lewin's equation $B=f(PE)$ to the built environment through the way in which buildings change, as being a function (f) of the qualities of the building engaging with its environment:

$$C=f(Q\bullet E)$$

C=The resultant **C**hange; Q=**Q**ualities of the building; E=**E**nvironment of the building

This is both true for quasi-stationary periods as for periods of change. It is useful to note that the physical qualities and the environment (force fields) of a building can change in character at different moments and at different rates. These can be considered analogous to Lewin's driving and resisting forces and the roles that forces may switch from driving to resisting.

Change (separate from quasi-stationary conditions) is only actuated when (to paraphrase Gleicher's equation) the correct conditions exist (being that the level of dissatisfaction with the status quo coupled with the desirability of the proposed change or end state and the practicability of the change, exceed the predicted cost, which itself is flexible). The change that follows is a three-staged process of unfreezing, moving and freezing again (Lewin) and the resultant new state is a factor of the pre-existing conditions of the building, its physical qualities and characteristic and those environmental factors that are brought into play (Lewin's equation). Learning takes place through reflection on this process. If the qualities of the building cannot respond adequately to the environment by change, extinction is nigh. This continuous process of learning is a cyclic one, starting with the abstract conceptualisation (design of a construction project, which includes all the building trades and professions, politics, policy, economics etc.) leading to the construction of the building as an act of active experimentation followed by concrete experiences in the occupation of the building over time, during which reflective observation leads to the hatching of plans, abstract conceptualization.

The above are useful models for the process of learning and the variants influencing as well as the process of change. However, the driving and resisting forces described by Lewin still need to be located in terms of the learning process. These forces need to be located in context, in the (analogous) ecosystem of the building. We also require a model to position the forcefield: the actors and factors in scale and their influence on the learning process.

3.4.10 The organism plus environment: a home-system for building evolution

"… it is possible to write a history of the Egyptian, Greek or Roman arts, because these arts follow a path whose equal slope goes up to the apogee and down to decadence without deviation, but the life of a man would not be sufficient to describe the so rapid transformations of the arts of the Middle Ages, to seek the causes of these transformations, to count one by one all the links of this long chain so well riveted although composed of so diverse elements.

It is not that we want to blame a method which has been of immense service in that it has set out the salient points, put the studies in order and cleared the ground; but, we repeat, there is no such classification and we believe that the moment has come to study the art of the Middle Ages as one studies the development and life of a living being who from childhood comes to old age by a succession of insensitive transformations and without it being possible to say where childhood ends and old age begins."[109]
– Eugène Viollet-le-Duc.

Ecosystemic thinking is a specific application of general systems thinking, which has its origins in the early 1920s in the number of fields including the biological sciences and engineering. After South African statesman, lawyer and botanist Jan Smuts introduced the concept of 'holism' to the world in *Holism and evolution* in 1927,[110] his compatriot and colleague botanist John Philips presented the idea of the *Biotic Community* in 1931[111] as a model for understanding the interconnectedness of the living world. Botanist Arthur Tansley coined the term 'ecosystem' in 1935 in direct response to Phillips' term 'biotic community'. Tansley extended the biotic community to include:

109 "… on peut écrire une histoire des arts égyptien, grec ou romain, parce que ces arts suivent une voie dont la pente égale monte à l'apogée et descend à la décadence sans dévier, mais la vie d'un homme ne suffirait pas à décrire les transformations si rapides des arts du moyen âge, à chercher les causes de ces transformations, à compter un à un tous les chaînons de cette longue chaîne si bien rivée quoique composée d'éléments si divers. Ce n'est pas que nous voulions ici blâmer une méthodequi a rendu d'immense services, en ce qu'elle a posé des points saillants, qu'elle a mis lapremière de l'ordre dans les études, et qu'elle a permis de défricher le terrain ; mais, nous le répétons, cette classification n'existe pas, et nous croyons que lemoment est venu d'étudier l'art du moyen âge comme on étudie ledéveloppement et la vie d'un être animé qui de l'enfance arrive à la vieillesse parune suite de transformations insensibles, et sans qu'il soit possible de dire le jouroù cesse l'enfance et où commence la vieillesse." (Viollet-le-Duc, 1854, Vol 1. p. ix–x).

110 (Smuts, 1927).

111 (Philips, 1931).

"…the whole system (in the sense of physics), including not only the organism-complex, but also the whole complex of physical factors forming what we call the environment of the biome–the habitat factors in the widest sense…not only between the organisms but between the organic and the inorganic. …to describe the complex interaction between animate and inanimate matter."[112]

Tansley also noted that attempting to isolate individual ecosystems is: "… partly artificial, but is the only possible way in which we can proceed."[113]

Ecosystem thinking has had a late adaptation in architecture, possibly due to the Modernist perspective of architectural design being able to achieve a timeless whole and a lack of retrospective diachronic evaluation.[114] Again, the word ecosystem uses the analogy from the built environment (*oikos* [home] and *systema* [system]). The use of the term ecosystem has since its use in the biological realm, diversified as analogy into a number of fields, including, but not limited to 'brand ecosystems', 'corporate ecosystems' and 'manufacturing ecosystems'. This is due to the growing bio-ecological awareness but also to the growing awareness of the field of systems ecology and general systems theory.

Uri Bronfenbrenner was a developmental psychologist who studied the complex relationships that influence the development of a person within his or her environment. Bronfenbrenner postulated an ecosystem theory to describe the complex ecology influencing development that specifically children undergo. In essence his position is that the study of the development of a child is a result of interactions of actors in interrelated, nested systems, each operating on a scale level but with bi-directional influences.

Bronfenbrenner, with his colleague Stephen Ceci presented an evolution of the idea in *Nature-nurture reconceptualized in developmental perspective: a bioecological model*.[115] This model builds on the earlier work of Bronfenbrenner in which he established a bioecological paradigm as valid vehicle for the description of human development.[116] Based within a paradigm of systems ecology this sees the person as an actor acting on and being acted on by its complex environment

112 (Tansley, 1935), p. 299).

113 (Tansley, 1935, p. 300).

114 (Brand, 1994, p. 210).

115 (Bronfenbrenner & Ceci, 1994, pp. 568–86).

116 (Bronfenbrenner, 1979).

containing both biotic and abiotic actors.[117] These are located within nested systems of scale. They describe four levels or systems of scale on which proximal processes take place, staring at the individual and growing out into the environment:

- the Microsystem;
- the Mesosystem;
- the Exosystem; and
- the Macrosystem.

When he later expands this model with Pamela Morris as *The bioecological model for human development*, they make a very important addition by including the Chronosystem to present the passing of time and accommodate historic influences.[118]

Buildings as individuals act on and are acted on by their complex environment. As we are dealing with the complex interactions of different systems on a single entity, a building, the Bioecological Model could be useful to map these processes. In this model, systems define boundaries within the larger emergent Macrosystem in order to reduce the complexity to a level of representability. In the built environment, these are often reduced to spatial scales[119] with the building at the centre (Microscale), the streets and public system connecting buildings on the Mesoscale, neighbourhoods forming the Exosystem etc. This is a perspective only located in physical scale.

When dealing with more complex problems of interaction we need to revert to the original intention of the Bioecological Model, that of proximal processes. These proximal processes are the mechanisms that turn, in the words of Bronfenbrenner & Ceci, genotypes into phenotypes.[120]

We can paraphrase these scales within the context of development of heritage buildings, as those processes and mechanisms, actors, policies and requirements, that turn extant fabric and the embodied potentials (AR-genes) into future built fabric. In his very first presentation of the Bioecological Model in 1979,

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117 As these terms are not in common use common in the architectural idiom, they beg definition. The biotic realm encapsulates all living entities and abiotic, all non-living entities which make up nature. Culture and its residue are seen as a part of nature which, for the sake of clarity is seen as composed of the cultural and the biophysical.

118 (Bronfenbrenner & Morris, 2006).

119 (Van Bueren, 2012, p. 4).

120 (Bronfenbrenner & Ceci, 1994).

Bronfenbrenner sets pre-requisites for these proximal processes, the "engines of development" for a person[121] that they*:*

"…cannot structure, steer or sustain themselves. Their form, power, content and direction vary systematically as a joint function of the characteristics of the **developing person** and of the **environment** --- both immediate and more remote --- in which the processes are taking place; the **time** through the life course and the historical period during which the person has lived; and the nature of the **developmental outcome** under consideration."[122]

This is not exactly analogous to the driving and resisting forces described by Lewin. These proximal processes are rather the agency that allows for the interaction of the actors in the Exo- and Macro-system with those in the Microsystem, who in turn have a direct influence of the individual. These mechanisms do not act in pure isolation: they are informed by laws, policies, differing desires among individual people and existing potentials. This makes for a complex web of interactions.

Describing their system Bronfenbrenner & Ceci mention the emergence of the phenotype: "Underlying the bioecological model is a cardinal theoretical principle emerging from research on theories of genetic transmission, namely, that generic material does not produce finished traits but rather interacts with environmental experience in determining developmental outcomes."[123]

Bronfenbrenner & Morris go so far as to state that the 'person' (and here we can substitute the word 'building' analogously): "…actually appear[s] twice in the bioecological model --- first as one of the four elements influencing the form, content and direction of the proximal processes and then again as the "developmental outcome"; that is, a quality of the developing person that emerges at a later point in time as the result of the mutually influencing effects of the four principal elements of the bioecological model. In sum, in that theoretical model, the characteristics of the person function both as an indirect producer and as a product of development."[124]

121 (Bronfenbrenner, 1979).

122 (Bronfenbrenner, 1979), original emphasis.

123 (Bronfenbrenner & Ceci, 1994, p. 471).

124 (Bronfenbrenner & Morris, 2006 p. 798).

Application to buildings

At the core of the Bioecological systems model lies the concept of proximal processes, the mechanisms for change, defined as: "…enduring forms of interaction in the immediate environment".[125]

These processes operate over time and are seen as the primary processes that influence (human) development.[126] The influence of these proximal processes vary with regards to the period of time during which they operate, the characteristics of the person on which they impact and of the environment within which they operate.[127] It almost goes without saying that this holds equally true for the development of buildings over time. Proximal processes could include the impact of wind and rain, use by inhabitants, but also (if the inhabitants and by extension, the owners; the 'Souls' in Brand's thinking) engage plumbers, architects, banks, municipal decision-makers and other decision-makers. These actors translate factors from further away such as changes in zoning diagrammes, or political decisions in a municipal or national assembly to the individual building. During periods of homeostatic equilibrium, these changes impact the building only within the provisions of the building itself. In periods of punctuated evolution, they modulate the AR-genes. In both cases the characteristics of the building remain a factor in the eventualised change.

As already mentioned, these proximal processes take place in the Mesosystem, between the building and its environment, but they are the bridge to the Macro- and Exo-scales. However, in contrast to the ordinal context of the development of the Bioecological Systems model, the AR-genotypes of buildings, are not self-actualized. They do not themselves bring about change or development. Buildings only 'learn' in reaction to the environmental factors around them. Change takes place in relation to the characteristics of the building whether this is 'in' or 'out of' character.

Buildings are often seen as 'finished' once their initial construction is completed, once their building blocks (their AR-DNA) which sets up the spatial, functional, environmental and aesthetically qualities, have been positioned in their pre-destined places. But this is not a reflection of reality. Brand and Hollis, amongst others, have shown that buildings continue to change due to external pressures defined by the qualities of its fabric.

125 (Bronfenbrenner & Morris, 2006, p. 797).

126 (Bronfenbrenner & Morris, 2006, p. 795).

127 (Bronfenbrenner & Morris, 2006, p. 795).

Using the Bioecological Model to understand the agents of evolution the built environment presupposes that a building is not extrachronal, or unhinged in time. The use of the neologism extrachronal here denotes something that stands outside of time and is not influenced by the action of time as opposed to eternal, which carries the meaning of 'throughout all time' or 'eternity'.[128]

To rephrase Bronfenbrenner & Ceci as quoted above, we could state that building fabric does not produce finished traits but rather interacts with environmental experience in determining developmental outcomes. Bronfenbrenner & Morris tell us that the main aim of the Bioecological Model is to define "…continuity and change in the biopsychological characteristics of human beings."[129] By applying it analogously to the built environment, we can investigate… continuity and change in the physical characteristics of buildings.

The Building – In applying the Bioecological Model as analogous tool to assessing the evolution of a building, the building becomes analogous to the individual, which lies at the centre of complex interaction, in which it participates through proximal processes.

The development (or change) of the building as individual is influenced by actors and factors located in, and often moving between different systems over time:

- the Microsystem – Here is the project team for renovation/restoration. This is the level of the building team, architects, engineers etc;
- the Mesosystem – This is the medium through which the Exosystem influences the individual. This is the level at which the actors in the Microsystem interact with the Exosystem. This can take the shape of meetings municipal authorities, communications with banks, or meetings with specialist who the inform decision-making, etc;
- the Exosystem – The municipality, national government, banks etc are active at this level. Here are also typically communities of interest such as neighbourhood representatives and the heritage community;
- the Macrosystem – At the Macrosystem lie the ideologies and values of the world, including for instance, awareness and doctrines. Think of the awareness of society of human induced climate change, which influences policy-formation on the Exosystem and filter down to decisions on the Microsystem, with effects on the evolution of the building; and
- the Chronosystem – the life of the building through time (Figure 3.7).

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128 This word has its origin in Science Fiction, generally denoting a time-space where past present and future exist simultaneously or used as description for organisms that exist outside of time.

129 (Bronfenbrenner & Morris, 2006, p. 795).

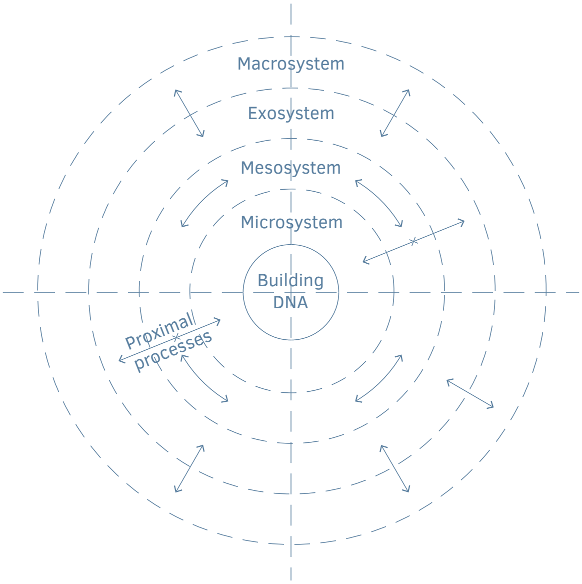

FIG. 3.6 The Bioecological Model, adapted to buildings (adapted from Bronfenbrenner & Morris, 2006).

3.5 Analysing How Heritage Learns – a simplified method

Translating these analogies into an analytic method to assess *how heritage learns*– more specifically Dutch twentieth century heritage protected public housing–requires simplification. According to John Maeda, "[t]he simplest way to achieve simplicity is through thoughtful reduction. When in doubt, just remove. But be careful of what you remove," to which should be added: "Simplicity is about subtracting the obvious and adding the meaningful."[130]

To simplify the ecology of ideas to a workable model for the assessment of case studies, key concepts are:

130 (Maeda, 2006, pp. 1, 89).

Time: Time is the constant in all the analogous models collected in the ecology of ideas presented in this chapter. Learning presupposes the passing of time. To understand how housing heritage learns we will therefore need to track evolution through time. The Eldredge and Gould's Punctuated Equilibrium model as analogous to the waves of high rate of change bought by renovation punctuating the slow change brought in all buildings by general maintenance, use and slow environmental change. This takes care of the Chronosystem (Figure 3.8).

The Learning building: The Punctuated Equilibrium model shows development, but does not provide a model for learning. Combining this with the Kolb Experiential Learning Model provides a model for analysis of learning through the evolution of buildings. The learning building stands central in the learning cycle. A chronological analysis of the evolution of the building generates the definition of the learning cycles. Buildings' lives can be framed as commencing at their birth: a long laborious architectural and constructional achievement birth. This genesis precedes their initial completion. Then start the years of decision-making of their management which slowly change them. Other than us morals, buildings can also be reborn; either through large renovations, often with the promise of improved performance, or by being listed as heritage. This rebirth as heritage is a vital moment in the life of a monument. To highlight the differences between housing and heritage. comparison with the state before and after a building is valourised as heritage is key. Therefore, the whole chronological evolution of the building needs to be tracked (Figure 3.9).

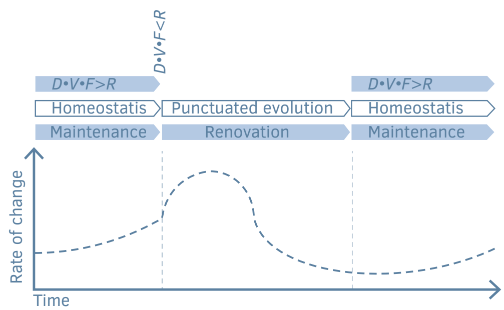

FIG. 3.7 Punctuated equilibrium on a scale of time and rate of change, compared to the process of general maintenance (including environmental impacts) and renovation of a building.

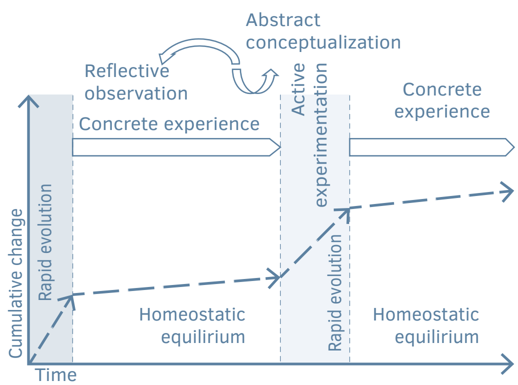

FIG. 3.8 Punctuated equilibrium on a scale of time and cumulative change, with the process of general maintenance, environmental impacts and renovation of a building, overlaid with ELT learning phases.

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Environment: The environment of its genesis is essential to understanding the formation of AR-DNA. Following from the adaption of the Lewian equation to the built environment: C=ƒ(Q•E) [C=Change; Q=Qualities of the building; E=Environment of the building], the environment remains a factor of importance through the process of evolution. Foqué defines this, what he calls the 'Contextual domain' as an area that: "…contains all the parameters that constitute the environment in which the building will exist. It refers to the complex of circumstances, objects and conditions—both in the physical and in the socio-cultural sense—that will determine the outcome of the designing-building process and act upon it when in use."[131]

To better grasp the all-encompassing 'Contextual domain', the analysis will focus on three environmental crucial aspects in the creation of buildings as postulated by me: Society, Economics and Technology: SET.

- **S**ociety: the general trends, norms and needs which form the building;
- **E**conomics: the financial means available to afford to address these trends, norms and needs;
- **T**echnology: the technological opportunities and innovations available to afford to address these trends, norms and needs.

The SET is of great influence on the other two domains defined by Foqué, the 'Functional' and 'Formal' domains,[132] the latter relating to architectural composition and aesthetics.

In reference to the Bioecological Model, SET should be understood as a description of the Exosystem (social ideologies and values of cultures and subculture) which inform the Macrosystem (System that influence the individual indirectly through the Microsystem) [**S**ociety] combined with the opportunity to affect the change [**E**conomics and **T**echnological innovation].

Combining Time, the Learning Building and SET (TLB•SET) into a model delivers the building analysis structure to be applied in the following case studies (Figure 3.10).

The TLB•SET method was assimilated through an interdisciplinary approach in which cognitive metaphors are used as tool to understand abstract ideas and process:

131 (Foqué, 2010, p. 133).

132 (Foqué, 2010, p. 132–33).

- ecosystemic developmental thinking (Bronfenbrenner & Ceci's Bioecological Developmental Model); combined with
- learning through time (Kolb's Experiential Learning Model),
- enriched with the evolutionary theory (time and change),
- in the context of Society, Economics and Technology (SET).

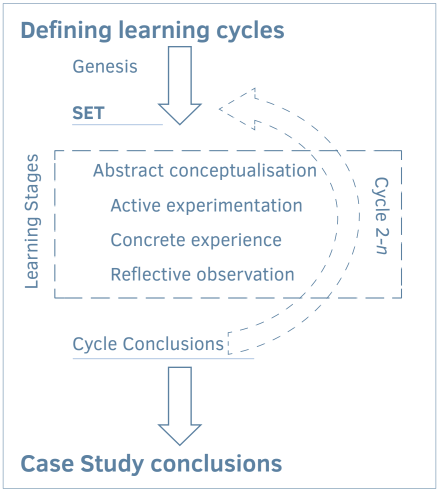

FIG. 3.9 Case study analysis structure.

To be able to identify *how heritage learns*, it is necessary to track the evolution of buildings from before their genesis, through their construction, lived lives and renovations, valourisation and subsequent renovations to provide material for comparison.

The next chapter will select iconic case studies, present their evolution using the TLB•SET method with specific focus on the evolution of their 2E+Co. Each of the case studies acted as a nested learning cycle, the conclusions of which informed the next.

Michel de Klerk's famous Het Schip housing block undergoing extensive renovation in 1979–80 (SAA: 5293FO016510).

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4 Case studies method and selection

In Chapter 2 the subject for this research was thematically delineated. Chapter 3 presented a theoretical basis for investigations. This chapter introduces case study research, presents the criteria for case study selection and introduces the cases for investigation, before presenting the case studies in detail.

4.1 Case study as tool

Brand's *How Buildings Learn* presents the synthesis of his case study-based research into selected buildings in the USA and the UK.[1] Case study was utilised by Brand as a tool "…to examine buildings as a whole–not just whole in space, but whole in time."[2] Brand's use of case studies is not equal to historiographies of individual buildings, but rather, the history of a building utilised as tool from which to draw conclusions. Case studies were the vehicle with which Brand could attempt to discover, according to his own somewhat disguised admission, a unifying concept for the "…disciplines, professions, and trades that have to do with buildings."[3]

Case studies can serve many purposes: in their book on *Architectural Research Methods,* Linda Groat and David Wang note that case study research should not be

1 (Brand, 1994).

2 (Brand, 1994, p. 2).

3 (Brand, 1994, p. 210).

seen as a research type, but rather a container to undertake research approaches.[4] These can include interpretive-historical research, such as that which was undertaken by Brand. Interpretive-historical research involves "investigations into social-physical phenomena within complex contexts, with a view toward explaining those phenomena in narrative forms and in a holistic fashion."[5]

Like Brand's, this research has been designed to be informed by case study research: tracking the lives of buildings within their ecosystems in a holistic manner, analysed on the base of a *hypothesis*. It resembles his interpretive-historical research for individual cases which are then combined to come to conclusions, with application to a larger group.

4.2 Case study as method

Social scientist and well-known case study scholar, Robert Yin, argues that case studies are an appropriate research method when used to broadly define topics which cover contextual conditions based on multiple sources of evidence.[6]

Groat & Wang build on Yin's definition for case study research. They position it as an empirical enquiry that investigates a phenomenon or setting "...within its real-life context, especially when the boundaries between the phenomenon and context are not clearly evident".[7]

Whether focussed on single or multiple cases, case studies:

- are inseparable from real life contexts;
- position a case within the complex dynamics of its existence within a specified period of time;
- have the capacity to explain causal links by focussing on descriptions and interpretations;

4 (Groat & Wang, 2013, p. 94).

5 (Groat & Wang, 2013, p. 136).

6 (Yin, 1994, p. xi).

7 (Groat & Wang, 2013, p. 346) paraphrasing (Yin, 1994).

- are importantly reliant on a theoretical development in the research design phase to provide a paradigm for the investigation;
- rely on multiple information sources, with importantly the need for data to converge in a triangulating fashion;
- provide a vehicle to generalise the conclusions back to theory.[8]

While according to Groat & Wang, single cases can already provide conclusions that can be generalised to theory, multiple cases studies clearly allow for triangulation of conclusions. Case study method specialist Peter Swanborn notes two approaches to case study research: extensive and intensive research. The former involves selecting and researching a large number of phenomena potentially taking the form of a survey, the latter one or a small number of the same. [9] How heritage learns has the ambition to assess individual case studies at a holistic level. A holistic approach does not presuppose an exhaustive description, but rather an approach in which the selection of variables is not prescribed at the outset of the study, "…as we simply do not yet know which variables are relevant… and which are not."[10]

This raises the question of the required number of cases to be studied required. The selection of the cases to be studied can be based on substantive criteria, which relate to the aims of the research. The most pragmatic criterium is possibly that information sources need to exist for case study research to be undertaken. These information sources need to be accessible, useful and relevant.

The subject for this exploration has already been presented: serial ensembles of originally subsidised affordable rented dwelling units (public housing) in the Netherlands with an origin in the twentieth century that has been protected or listed as a monument. However, the reasons for locating this research in the Netherlands need to be substantiated, especially as the protection that is afforded 'built heritage' is dependent on national legislation. Heritage legislation often provides for various categories of importance, in theory based on the cultural historical value of the built object protected as heritage. This is the key contextual criterium that delineates the subject of public housing heritage from public housing in general. Therefore, both location and level of control within a specific legislative regime are key substantive criteria in case study selection.

8 (Groat & Wang, 2013, p. 346–7); (Swanborn, 2010, p. 22).

9 (Swanborn, 2010, pp. 1–2; 23).

10 (Swanborn, 2010, p. 18).

4.3 Geographic location

The Netherlands ha been chosen as geographic location for this study due to:

- its progressive housing tradition during the twentieth century, which found expression in a wide range of typologies, materials and technologies applied to public housing,
- a large number of housing projects in ownership of housing corporations leading to the possibility of large-scale approaches to housing upgrades with supporting documentation well archived and publicly accessible,
- a well-established housing renovation culture combined with the current urgent drive towards energy use reduction and the adaptation of extant housing to suit new existing requirements,
- the annual climatic fluctuations that potentially require energy use during both winter and summer extremes to ensure internal thermal comfort;
- a strong heritage tradition and a national heritage management system with record keeping, which allows for retrospective case study analysis,
- the large number of valourised housing complexes in heritage registers, due to a notably productive housing provision programme during the twentieth century,
- an involved on-going debate by an active and extensive heritage community.

Due to the Netherlands' temperate climate with little regional variation. The country has since the late nineteenth century also had a technologically consistent construction industry. Therefore, geographic representativity of case studies is not deemed a prerequisite for case study selection for a study into Duthc public housing heritage.

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4.4 The legislative environment

To effectively evaluate how heritage learns in the Netherlands requires the selection of case studies that cover the range of heritage control regimes influencing the evolution of built public housing heritage in the Netherlands.

Dutch legislation on built heritage designation and management evolved over the last century into a three-tier system, reflecting the three levels of government.[11] Currently the control of built heritage is regulated in the 2015 *Erfgoedwet* (Heritage Act). Like its predecessors, the 1961 *Monumentenwet* (Monuments Act) and the 1988 Monuments Act, the 2015 Heritage Act mandates the Minister of Education, Culture and Science to designate a built artefact or archaeological site as legally protected at the national level, "…because of its beauty, scientific significance or cultural-historical value".[12] The act and its predecessors did not exclude provincial legislators and local government authorities to enact their own heritage ordinances [Articles 3.17 and 3.16 respectively in the 2015 Act does make this explicitly possible]. In practice, today only two provinces have enacted heritage ordinances, which means that protected public housing monuments are controlled at either municipal or national level.[13]

The Heritage Act and its predecessors is and were not the only mechanism for effective custodianship of the Dutch built environment. The Housing Act gives municipal authorities the power to steer the architectural quality of constructions. To ensure transparency in the evaluation of construction proposals by either an Aesthetics Commission or the City Architect, municipalities established *Welstandsnotas* [Aesthetic Policies] to guide development. When linked to other spatial planning tools such as zoning plans, these provisions establish mechanisms to promote the maintenance of historic urban morphology.

The Aesthetic Policy-mechanism effectively adds a layer of control to the built environment of the Netherlands. It is often used to buffer the urban landscape against radical interventions and effectively forms a fourth control tier for heritage in the built environment. Even though the Aesthetic Policy-mechanism will disappear as such after the introduction of the 2022 *Omgevingswet*

11 For an overview of the evolution of conservation in the Netherlands see: (Kuipers, 1997).

12 (Koninkrijk der Nederlanden, 2015b, Article 3.1).

13 Only the provinces of Drenthe and North Holland have adopted provincial monuments regulations.

[Environment Act], the Environment Act will mandate municipalities to adopt an *omgevingsvisie* [environmental vision] and *omgevingsplan* [environmental plan]. The 2016 *Ontwerpbesluit Leefomgeving* [draft decisions on living environments], directed that environmental plans must contain rules for the protection of cultural heritage.[14] This mechanism allows municipal authorities to continue and create new policies for the maintenance of characteristics, be they historical or otherwise, of precincts and neighbourhoods, effectively replicating the Aesthetic Policy-mechanism, albeit as part of a larger integral assessment framework. The Dutch heritage system effectively presents a four-tiered structure through which cultural historical values are curated (Table 4.1).

From a perspective of completeness, it would be preferable to select cases that could give insight into potential differences brought about by the levels of control afforded public housing heritage through the various legislative regimes. However, as the Provincial Monument mechanism is not fully employed in the country, this layer of control can be discarded as incidental. This establishes a three-level variable criterium for selection on the base of legislative control: National, Municipal and Aesthetics Policy protected built heritage.

TABLE 4.1 The Dutch conservation system as four-tier system.

Tier	Type	Designating authority	Legislation
1	National Monument/ Protected town and city-scape	Minister of Education, Culture and Science	Heritage Act of 2015; preceded by the Monuments acts of 1988 and 1961
2	Provincial Monument/ Protected town and city-scape	Provincial Assembly	Heritage Act of 2015; not excluded by the Monuments acts of 1988 and 1961
3	Municipal Monument/ Protected town and city-scape	Municipal Council	Heritage Act of 2015; not excluded by the Monuments acts of 1988 and 1961
4	Aesthetics Policy/ *Welstandsbeleid* – to be replaced with an Environmental Vision and Plan after 2022.	Municipal Council	Housing Act [2015 revision and its predecessors], linked to other spatial planning tools such as zoning plans, urban renewal policies etc. and [to be] integrated through the 2022 *Omgevingswet* (Environment Act).

14 (Dorp Stad en Land et al., 2017, p. 53).

4.5 Case study selection criteria

Undertaking a structured evaluation and selection of the ±31 728 housing objects protected as National Monuments, many more Municipal Monuments and Aesthetics Policy-protected public housing buildings and complexes in the Netherlands within a continuously changing renovation field is not possible. Cases are rather selected on pragmatic grounds.[15]

Even if the selection is pragmatic, selected cases need to conform to criteria, including chronological and typological spread. The substantive criteria to evaluate the suitability of cases ensure that they are representative across a range of important issues. These can be categorised as relating to the original of the case (Table 4.2) and the subsequent history, especially that of the most recent renovation (Table 4.3).

15 (Swanborn, 2010, p. 52).

TABLE 4.2 Fixed substantive criteria for case study selection based on their origin.

	Substantive criteria	Assumptions and motivation
CASE ORIGIN	1. Heritage serial ensembles of originally subsidised affordable rented dwelling units from the twentieth century in the Netherlands.	Addresses subject, chronological and geographic delimitation. The bulk of housing in the Netherlands is the inheritance of twentieth century.
	2. Representative for one of the predefined twentieth century periods of Dutch housing heritage (Chapter 2).	A chronological spread is required to include the technical changes in housing construction made during the twentieth century. Project originating from the each of the eras of 'Gearing up', Interbellum' and 'Post-War Reconstruction' would provide coverage of these changes.
	3. Notably innovative at the time of construction, especially with regards type, and acknowledged as important innovations in the historiography.	Selecting iconic projects to an extent guarantees a well-developed historiography and provides information on extra special cultural historical values.
	4. Constructed with clearly identified 2E+Co ambitions, with the approach and technologies identified and described in publications at the time of construction.	The subject of this research is what informs decision for inclusion 2E+Co technologies. Choosing complexes with an overtly stated 2E+Co ambition, enriches the analysis of the decision-making, as it raises the question as to what extent the original I2E+Co was seen as part of the cultural historical value.
	5. Be constructed of a technology representative of the period from which this case dates.	An underlying theme of twentieth century architecture is technology as aesthetic, integrated in to the integrated architectural whole.[16] Twentieth century construction technologies are often less flexible than traditional methods. Construction technologies are also associated with the predefined twentieth century periods of Dutch housing heritage, although this is not exclusively so.
	6. Taken together, be representative for typical Dutch urban and housing block configurations of the period 1901-65.	From the end of the 19th century, after the introduction of the Garden City model, various urban configurations were applied in the design of Dutch neighbourhoods. The urban structure dictates building block configuration, access systems, home configuration and decorative elements.
	7. Provide a spread of often applied access systems for Dutch mass-produced public housing in the twentieth century.	Dutch public housing can be, and is often classified by the access-system. The access system, *ontsluiting*, is the backbone of housing complex design. The *ontsluiting* not only dictates possibilities in terms of modulation, but also to an extent the service runs that 2E+Co technologies require.

16 (Prudon, 2008, p.76).

TABLE 4.3 Substantive criteria for case study selection based on their current heritage protection status, ownership, renovation history and renovation ambitions.

	Substantive criteria	Assumptions and motivation
CASE LEGISLATIVE STATUS, ONWESHIP, RENOVATION AMBITIONS , INFORMATION	1. Representing different levels of legislative heritage protection.	The multi-tiered nature of the Dutch heritage legislation provides for layers of control. The investigation relates to heritage values. These enter the adaptation discussion and become overt drivers of choice when a building is valourised a heritage. The decision-making process is expected to be well documented in these structures making a retrospective analysis viable.
	2. Have undergone repeat renovation cycles, including before and after heritage designation.	To assess learning through iteration, the case has to have undergone repeat cycles.
	3. Renovated under management of housing corporations.	Public housing complexes provide case studies integrated single-owner driven construction and renovations. Large-scale housing complexes require strategic intervention on a generalist level. [Privately owned individual houses often go through ad-hoc or specific tailor-made interventions.] The study includes both strategic large-scale interventions as well as continuous change. The renovation of entire complexes owned by organisations are expected to be well documented and provide good information sources.
	4. Having undergone a deep renovation after designation as monument or protected building/ ensemble which included high 2E+Co ambitions.	Further focusses the subject in relation to the research ambitions.
	5. The most recent renovation was experimental and ‘brave’ with an aim at innovation.	The study focuses on ‘brave’ interventions where innovation is sought for, either through implementation of new technologies, through innovative ways of applying the technologies, or in the expectation of what the technologies should deliver. It is expected that this will draw technology and heritage value into close proximity to each other being the debate and decision-making process during a renovation project.
	6. Of which sufficient data sources are available.	Adequate information for analysis and assessment is essential for case study research, which specifically important to research that will attempt to track change over time .

4.6 Information sources

The case study investigations are informed through site visits and observation, archival searches, published literature, including survey reports such as the series publication presenting the results of the MIP projects (see Chapter 1) in Dutch cities and provinces,[17] and to a lesser extent by oral interviews. Oral interviews are positioned as supportive to conclusions.

Archives with information sources of interest fall into six categories:

1. National and Municipal Monuments Registers;
2. General municipal archives for construction drawings and housing complex dossiers;
3. Owners' archives and tacit knowledge (Housing corporations/associations);
4. Project teams (e.g., original contract documentation obtained from renovation architects or other parties involved in renovation projects);
5. Monuments services archives (such as the RCE, Municipal monuments services);
6. Libraries and independent archival institutions (such as *Het Nieuwe Instituut*), including their digital repositories; particularly *Delpher.nl*: The National Library of the Netherlands' digital repository of Dutch newspapers, books and magazines.

4.7 Cases selected for analysis

Initially this research had as its focus National Monuments, for which an initial long-list of 66 Dutch National monuments was compiled from the National Monuments register.[18] However, during the process of the case study design, it became clear that the addition of other levels of heritage, especially Municipal Monuments, would add complexity to case study conclusions.

17 Published by Waanders Publishers and the Rijksdienst voor de Monumentenzorg, Zeist, between 1990 and 1996.

18 Rijksdienst voor het Cultureel Erfgoed, [s.a.]b).

Based on pragmatic reasons[19] and the ready availability information sources; three cases were subsequently selected for this study. These cases represent the range of legislatively control regimes currently extant in the Netherlands, with the exception of Provincial Monuments, because the latter possibility provided by the 2015 Heritage Act has not been implemented throughout the country. They were further selected based on the availability of data sources, further informed by the substantive criteria listed above.

The three cases also represent the first three phases in the development of twentieth century housing heritage in the Netherlands, and at the time of selection, covered all the periods from which housing had been protected as heritage. These cases have all undergone at least two renovation cycles. In all three cases, the last renovation had high 2E+Co ambitions. Tracking their evolution over time within their ecosystems will lift the veil on *how heritage learns.*

The cases are:

- The **Justus Quarter in Rotterdam**, a large housing block constructed in 1918-21. This case represents the perimeter block and traditional construction technologies based on load-bearing brick and timber construction, with a limited use of concrete. However, its construction importantly introduced the gallery access system in twentieth century housing in the Netherlands. It was constructed with high 2E+Co and hygiene ambitions, which included block heating: another first for public housing in the Netherlands. The complex was listed as National Monument in 1985; renovated 1981–85/9, and subsequently renovated again in 2010–12 with the ambition of becoming energy-neutral. This renovation project won the NRP Gulden Fenix Award for Renovation in 2013.

- The **Koningsvrouwen van Landlust** (King's Wives of Landlust) in Amsterdam, a public housing block constructed in 1936–38. It is part of an urban ensemble that became iconic as one of the first attempts in zeilenbau in the Netherlands. Its construction was innovative as it was the first application of such a load-bearing steel skeleton by a public housing association in the Netherlands.[20] This block too was heated with a block heating system, and included numerous comfort and economy-innovations. It

19 A valid approach according to (Swanborn, 2010, p. 52).

20 Earlier examples include the luxury 1932 12-Verdiepingenhuis (twelve storey house) apartment building in Amsterdam which made use of a composite concrete and steel bearing structure; the 1933 Parklaan luxury apartment block and the 1934 Bergpolderflat both in Rotterdam and both constructed by the private company, the N.V. Volkswoningbouw Rotterdam. The Bergpolderflat was built to serve as affordable accommodation for labourers.

was listed as Municipal Monument in 1983 and renovated twice, once in 1984, and then in 2010–12. This last renovation was awarded, amongst others, the 2012 NRP Gulden Fenix Award for Renovation in 2012. This renovation aimed to serve as test case for renovation approaches to deliver the reduction of energy use through the renovation of residential walk-up public housing blocks.

– The **Jeruzalem** public housing neighbourhood in Frankendaal, Amsterdam. This post-war ensemble was constructed to a master-planned design in 1949–51 using a prefabricated concrete construction system. Its energy system and comfort norms were a direct response to post-War shortages. Its urban design introduced the 'woonhof' type; a type that was replicated repeatedly during the next decade. Its identical blocks were transferred to three social housing proprietors, which led to a number of different renovations, especially during 1985–87. An experimental renovation of one unit of the six blocks protected as National Monument in 2010 was undertaken in that same year as first step towards a low-energy neighbourhood. This brave experiment failed due its prohibitive costs. The complex uniquely contains areas protected under national heritage legislation and local aesthetics policy control. The ownership of both categories is split over two housing associations, which brings complexity to its evolution. These were renovated to differing specifications and designs over the period 2014–8.[21]

21 The choice for this case study is also deliberate to re-assess the evolution of this building nearly twenty years after it was first selected as case study for the doctoral dissertation of Dr Hielkje Zijlstra in 2001 (Zijlstra, 2006a).

TABLE 4.4 Spread of characteristics as criteria, substantiating case study selection.

	ORIGIN				RECENT STATE	
CASE	Construction Period Representation	Construction Technology	Access type	Urban Structure	Levels of legislative heritage protection	Date of recent deep renovation
Justus Quarter; 1918-21; Load-bearing brick structure, combined with limited in-situ cast concrete and timber.	Gearing up	Traditional	Gallery-accessed	Perimeter block	National Monument (1985)	2010–12
Koningsvrouwen van Landlust; 1936–38; Steel skeleton combined with timber structural elements, brick infill on in-situ cast concrete basement.	Inter-War Public Housing	Transitional composite	Walk-up	Zeilenbau	Municipal Monument (1983)	2010–12
Jeruzalem, Frankendaal; 1949-51; Prefabricated concrete construction system.	Post-War Reconstruction	Non-traditional (prefabrication)	Walk-up	L-shaped semi-detached temporary duplex in *woonhof* layout	Partly demolished; National Monument component (2010); Remainder: Aesthetics Policy protected (2010)	2010; 2014–2018

Together these three cases represent projects from the three twentieth century housing eras that were represented in the protected built heritage landscape of the Netherlands at the time of selection of case studies; they are exemplary of construction technological innovations and access systems, which is directly linked to their urban structure and have all undergone recent deep renovations (Table 4.4).[22] Each of these cases will be extensively presented in chronological format in order of their date of construction. The analyses will utilise the TLB•SET method, developed in Chapter 3 to come to conclusions on how heritage protected public housing in the Netherlands learns in the face of the challenge of change.

22 Monuments care in the Netherlands is a dynamic field and housing from more recent periods has been added to National and Municipal monuments registers since this selection was made.

The Justus Quarter undergoing extensive renovation in 2011 (J Molenaar; Molenaar & Co Archive, Rotterdam).

TOC

5 Case study 1: Galerijbouw Spangen, the Justus Quarter in Rotterdam

The currency of newness

5.1 Introduction

The Justus Kwartier (Quarter) is a well-known architectural public housing monument in Rotterdam. It is the best-known design of its architect, Michiel Brinkman (1873–1925), and was constructed during 1921–22.

The complex was initially referred to as the *Gemeentelijke Wooningbouw Spangen (Centraalbouw)*[1] or simply as *Volkswoningen in den Spangensche-polder te Rotterdam*.[2] Its design was based on a strong social agenda to provide a response to the immediate lack of affordable housing in the harbour city Rotterdam. The lack of available and suitable accommodation was due to a late and rapid industrialization

1 Following the 1920s spelling of the word wooningbouw, today spelt as woningbouw (SAR: 1190, (6)).

2 Referred to as such on the architect's drawings (HNI: BRIN0011).

and speculative low-quality housing, compounded by side-effects of the Great War (WWI; 1914–18). Large unhygienic slums formed in many Dutch cities.

The project was part of the construction of the new neighbourhood called Spangen, developed by the city in the medieval Spangense Polder on the west-side of the Delfthavense Schie canal. It was constructed at the initiative of the *Gemeentelijke Woningdienst* (Municipal Housing Service, GWD) of Rotterdam, serving as an experiment in type. The complex included unique architectural and technological features applied for the first time to public housing in the Netherlands. Once constructed, the complex–officially named 'Block VI & VII',[3] also referred to as the *Galerijbouw Spangen* (gallery-type building in Spangen) or the *Brinkman-gebouw* (-building) after its completion–was hailed as a revolution. Its innovations, however, took a number of years to be replicated in other public housing developments.

FIG. 5.1 Justus van Effen just after completion c.1922 (Museum Boijmans van Beuningen: BVB 398).

3 Referring to the numbers of the street blocks on which it was constructed.

The Brinkman design consolidated two long rather narrow east-west-facing urban blocks into a single complex. The design bridged over the intermediate Justus van Effen Street, creating two gateways to an inner courtyard. This large courtyard was further split perpendicularly into two by a central wing located at the heart of the block. This central space contained a communal laundry, washing and bicycle storage facilities as well as a block heating installation. The four-storey project for 264 dwellings was a brick load-bearing structure with a flat timber roof. One of the unique features of the project was the wide concrete gallery running along the inner perimeter of the third storey. This aerial street effectively doubled the housing capacity of the two urban blocks, making a second layer (third and fourth floor) of ‘street-side’ housing possible.

On completion it was the first public housing complex in the Netherlands to incorporate block heating for the housing units, a built-in waste disposal system and mechanical persons’ lifts. The latter was for semi-public use, such as access to the gallery for deliveries or for women with prams. The Brinkman-design was widely published as an architectural and social achievement at the time.[4] It was, however, not universally appreciated.

Over its near 100-year existence the complex originally called Blocks VI & VII Spangen was subjected to two extensive renovations, the first–dramatic–renovation in the 1980s was followed by a second renovation, which commenced in 1999, after which it is now known as the Justus Quarter.

5.2 Case study themes

The complex, described by the architect Brinkman as an experiment, is the subject of the first case study analysis into ‘How Heritage Learns’ and the adaptation of the AR-DNA of the structure due to the drivers, or environmental forces, of Economy, Energy Use and Comfort (2E+Co).

4 Van Emstede (2011, p. 147) lists: Berlage 1921, Leliman 1924, Sibers [sic.] 1924, Sweijs 1924 and De Jonge van Ellemeet 1925.

In the century since its construction, the building has gone through two radical renovations. It presents an ideal case to study the impact of the various actors and factors in the set, or ecology of the building, being:

- the roles of the various actors, factors and SET in the evolution of the building;
- the consequential effect of the inclusion of technologies for 2E+Co;
- analyses of the role of finances and subsidy conditions.

5.3 Defining learning cycles

Three learning cycles can be defined for the Justus Quarter. The first cycle commenced even before Brinkman was commissioned to design Blocks VI & VII in 1918. After the completion of its construction in 1921–2, some small-scale alterations were undertaken, often to improve the comfort of the residents.

The first real moment of mutation came at the beginning of the 1980s, ending a 60-year cycle of gradual evolution. The planning of the large-scale renovation commenced in 1981 and was executed during 1983–85, during which the centrally located block heating and sanitary facilities were removed. The living units were re-planned and their size increased, which reduced their number from 264 to 164. The entire complex was actually gutted and the floor plans reconfigured.

The complex was provisionally protected as national monument during this time (so-called *voorbescherming*) and was finally registered in 1985 as national monument, the *Justus van Effencomplex*.[5]

With the renovation complete, the complex was fully occupied again from 1985 onwards. In 1989 the entire courtyard façade of the project was painted in white and grey tones in an attempt to further spruce the complex up. This interim measure did little to counter growing social problems in the complex and its larger neighbourhood.

5 Number 46868 (Rijksdienst voor het Cultureel Erfgoed, [s.a.]b).

Ten years later, in 1999, the second learning cycle commenced, leading to a sweeping renovation ten years later that reversed many interventions made during the first renovation. One of the aims of this second renovation was to reinstate the original appearance of the complex. This renovation also attempted to reengineer the social structure of Spangen, which by the late 1990s had become one of the Netherlands official no-go areas, as criminality there was seen to have reached epidemic proportions. At the same time the energy system of the complex was reinvented under the ambitious slogan '100% Monument 100% Nu!' (100 per cent monument, 100 per cent now!).

TABLE 5.1 The evolution of the building constructed as Blocks VI & VII, Spangen, through to the Justus van Effenstraat and to the Justus Quarter.

Learning Cycle	Dates	Designation	Phases
1	1918–81	Blocks VI & VII	– Genesis: Abstract conceptualisation and Active Experimentation: 1918-1922 (Planning and construction phase) – Concrete experience – Reflective observation
2	1981-1999	Justus van Effenblok	– Abstract conceptualisation – Active experimentation – Concrete experience – Reflective observation
3	1999–2012	Justus Kwartier	– Abstract conceptualisation – Active experimentation – Concrete Experience: 2012–>

5.4 Learning cycle 1

In 1977 architect Donald Grinberg published his study *Housing in the Netherlands, 1900–1940*. His description of the Brinkman Spangen block alludes to the obscure origins of the project's innovate ideas:

"Michiel Brinkman (1873-1925) designed a unique housing project for the municipality of Rotterdam which was completed in 1921... Here the traditional closed building block has been used as the context for an inversion between inside and outside. The basic housing module consists of two flats above each other, both with their entrances on the inside of the block. Above these are two duplex units, side by side, whose entries are off a continuous gallery. This gallery is connected by a number of stairways and freight elevators to the street two floors below. Most importantly, the gallery is on the inside of the block.

Despite the interest in this project in recent years, there has been no successful attempt to trace the source of the idea."[6]

Grinberg speculates that a 1907 article in the weekly journal *Bouwkundig Weekblad* by architect MP de Clercq in which the aerial gallery as device was suggested, may have been the source for this idea. De Clercq speaks of a "brede achtergalerij" or wide back gallery, running inside the perimeter of a closed building block as a possible solution to fire and ventilation problems that often occurred in urban housing at the time.[7]

Speculation aside, what is certain is that Blocks VI & VII, Spangen were constructed as an experiment, as "an attempt to alleviate the greatest disadvantages of city-living and bring the benefits (even if only marginal benefits) of single family dwellings to the necessity of constructing small housing units in long rows, four stories high, 264 units on not quite one hectare."[8] In short, the project presented a possible type for what was considered high-rise housing at the time.[9] Like today, harbour-city Rotterdam was a fast-growing, innovating city a century ago when Blocks VI & VII Spangen were designed and constructed. Rapid industrialisation, coupled with harbour development, attracted an influx of people, some with Rotterdam as destination, others en route through to the New World.[10] Available housing was at a premium and producing suitable and affordable housing in the city was not easy, in part due to the poor soil-conditions of the city.

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6 (Grinberg, 1977, p. 74).

7 (De Clercq, 1907, p. 66–67).

8 "Een poging om de grootste nadeelen van het in-de-stad-wonen te ontgaan en een weinig (zij het dan ook zeer weinig) van de voordeelen van het **ééngezinshuis** te doen samengaan met de noodzakelijkheid van in lange rijen, vier hoog, kleine woningen te moeten bouwen, 264 stuks op nauwelijks **één** hectare." (Brinkman, 1923, p. XLIII).

9 (Brinkman, 1920).

10 Special emigrant accommodation (*Landverhuizerslogementen*) was provided by commercial parties to house these so-called *Landsverhuizers* (emigrants). In 1912 the City of Rotterdam's *Gezondheidscommissie* (Health Commission) concluded that the national commission charged with supervising these migration hotels, was unable to ensure property supervision of the large number of these cheap lodgings leading unhealthy overcrowding accommodation. ('Gezondheidscommissie te Rotterdam, No. 16, 1912', SAR: [Archief van LJCJ van Ravestijn], 53-03, (29)).

5.4.1 S•E•T

5.4.1.1 Society

Rotterdam grew exponentially at the turn of the nineteenth century, mostly due to the success of its harbour transforming into a transition harbour by means of logistical improvements.[11] By 1903, 63% of shipping in the Netherlands took place through the city's various harbours, equalling 72% of country's shipped volume. The growth of the harbours stimulated immigration. From 1900, when the city counted almost 320 000 souls, Rotterdam grew by roughly 10 000 inhabitants per annum. The year 1913 brought a peak influx of approximately 12 000 permanent newcomers to the city and its population breach the half-million mark.[12]

FIG. 5.2 Rotterdam's main waterways, the Nieuwe Maas in c. 1915 (FH van Dijk, SAR: NL-RtSA_4117_2008-5109-01-01).

The outbreak of WWI in 1914 wrought havoc to the economic motor of Rotterdam. The Netherlands remained neutral during that war, but could not escape its regional consequences. Rotterdam's harbour was hard hit. Over the period of the War the number of ships entering the harbour shrunk to 10% of what it was before the War.[13]

11 Steered by the vision of the director of the city's *Gemeeentewerken* (public works), GJ de Jongh. See: (Meyer, 1996, pp. 301–85).

12 (L. J. C. J. Van Ravesteyn, 1948).

13 The number of ships docking in Rotterdam decreased from more than 10 000 in 1913 to a mere 1314 ships for the whole of 1918 (Van Ravesteyn, 1948).

Unemployment remained low though, mostly due to the large-scale mobilisation of manual labourers into the Dutch forces.

A number of housing associations had been created by private initiative to address the increasingly urgent shortage of affordable housing. The first attempts at this go back to the middle of the nineteenth century, but these initiatives only really became successful after the introduction of the highly influential Woningwet (Housing Act) of 1901 (implemented from 1 August 1902). The Woningwet made housing provision a national imperative, to be addressed by municipalities.[14] It made it possible for housing associations and project developers to construct public housing through government loans and mandated municipalities with populations larger than 10 000 souls, to develop urban expansion plans, which had to be revised every 10 years.

The constantly increasing overpopulation had social consequences and threatened the healthy functioning of the city. The city constituted a Health Commission (Gezondheidscommissie) in 1903[15] to monitor and address the threat of disease and ensure the good functioning of the city. Tuberculosis–a disease that prevailed mostly amongst the poor in their cramped, poorly ventilated living quarters where whole families slept in alcove-bedsteads, but was indiscriminate to wealth or status–was an ever-present danger. Then the so-called Spanish Flu reached the Netherlands in July 1918.[16] The epidemic reached its peak in November of that year. Because the disease affected mostly young people, schools and other public institutions were shut to try and stem the spread of the disease.[17] Plague upon plague hit the county and the city. The Spanish Flu epidemic was quickly followed by a typhoid outbreak. In the first months of 1919, 498 cases of typhoid fever had been diagnosed in Rotterdam; 91 inhabitants died.[18] The urban slums were a hotbed for the disease and it was here where their effect was most grievous in the city's 'small lodgings'; a euphemism for slum dwellings. Food and coal shortages in the winter at the end of 1918 further exacerbated the problem.[19]

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14 'De volkshuisvesting rijksktaak, doch gemeentelijke taak.' (Van der Drift, 1952, p. 223).

15 (Van Ravesteyn, 1948).

16 (s.n., 1918b).

17 (Verseput, 1959).

18 (Kramer, 1940).

19 The Rotterdam City Council established a central food distribution system, the Gemeetelijke Distrubutiebedrijf, which allocated food on the basis of coupons. The extremes of the situation led to the City planting 83 ha with brown beans and potatoes. (Verseput, 1959). The poorer population, under-nourished and huddled together against the cold, provided the ideal conditions for the spread of typhoid, of which it was well known at the time already that it was spread by human body lice (s.n., 1915).

The daily newspaper *Rotterdamsch Nieuwsblad* reported in 1919 that first cases of typhoid had been initially misdiagnosed as being instances of the Spanish Flu and concluded that cleanliness was the best countermeasure to the spread of typhoid fever.[20] Hoping to stem the tide, the City of Rotterdam handed out 15 000kg of soap to dwellers of these lodgings during February 1919[21] and unhygienic lodgings were disinfected or closed.

The over-crowding, poverty, malnourishment and consequent epidemics that plagued the slums of the city was a breeding ground for social discontent. The Russian Revolution of 1917 cast its shadow over Europe, emboldening the labour movement. Fears of a Socialist revolution in Europe were further stoked by the initial prospect of success of the 1918 German Revolution and the news of abdication of the German emperor, which reached the Netherlands on 9 November, where revolutionary plans were already being hatched. It all came to a head during what was later to become known as the *Roode Week* (Red Week) of 5–14 November 2018. On 11 November the national leader of the *Sociaal-Democratische Arbeiderspartij* (Social Democratic Workers Party, SDAP) PJ Troelstra in Rotterdam called for a proletariat revolution. He had misread the revolutionary fervour of the population and during the week that followed, his revolution quickly petered out.[22]

During and after WWI, the housing shortage in Rotterdam became even more acute. The production of affordable workers' housing had not been able to meet demands due to the growing population of the city before the outbreak of the War. It only declined further during the war years despite a still growing population. Over the years 1915–17 a total of 1 303 new affordable housing units were constructed, while the city's permanent population grew by over 15 000,[23] calculating to one home for each 11.5 newcomers! Realising that the problem could not be addressed effectively by reliance on private imitative only–which was seen by the dominant political parties in the Rotterdam City Council as the preferred method for housing production–the City of Rotterdam established its own municipal housing service, the GWD on 20 April 1916, with at its head, engineer Auguste Plate.[24]

20 "Reinheid is dus het beste verweermiddel er tegen." (s.n., 1919c).

21 (s.n., 1919a).

22 In hindsight, Toelstra's call to arms was premature and is now referred to as the *Vergissing van Troelstra* (Troelstra's blunder) (Wijne, 1999).

23 Van Ravesteyn (1948) lists the housing production as follows: 1913: 1 952 instead of the required 2 700; 1914: 1 804; 1915: 600; 1917: 375; 1918: 328 units.

24 (Van Ravesteyn, 1948, p. 281); (De Klerk, 1998, p. 112).

The creation of the GWD was only realised after a hard-won political battle fought out in the municipal council. The market-driven approach propagated by alderman Albertus de Jong for the Anti-Revolutionary Party and chair of the *Commissie voor Volkswoningbouw* (Public Housing Commission) was opposed by calls from the Social Democrats (SDAP) fronted by Hendrik Spiekman, who demanded that the city involve itself directly in housing production. Spiekman and the Socialists carried the day. The housing crisis forced the council to accept the proposal that the GWD's task should include the construction of "simple labourers' accommodation", but this concession was made conditional to the homes built by the GWD would be sold off once the housing crisis abated.[25] The GWD calculated that the city had a shortage of a staggering 8 928 housing units by the end of 1917.[26]

5.4.1.2 Economy

Construction Economy: Land, materials and labour

Rotterdam stands in the muddy delta of the Rhine River, which means that the soil conditions of land identified for construction often needs to be improved. The City Council of Rotterdam initially only paid lip-service to the requirement of Housing Act, that mandated municipalities to develop expansion plans. It healf-heartedly bundled pre-existing plans which it adopted as expansion plan in order to adhere to its new legal obligation. Simultaneously, the City depended on subsidising private developers to deliver housing and opted to take a passive role in the identification of land for public housing.[27] The housing shortage led to the number of housing associations and corporations active in the city increased, putting even more pressure on the land available for housing development, which in turn drove up prices.[28] For lack of better options, these associations were often forced to build on the opposite bank of the Maas River. This so-called left bank offered low land prices and soil conditions that did not require expensive piling if utilised for low-rise construction.[29]

25 (Beeren, Dettingmeijer, & Beuningen, 1982, p. 30).

26 ('Gemeentelijke Woningdienst No. 143, Rotterdam, 1 mei'; SAR: 1190, (74)).

27 (Van Ravesteyn, 1948, p. 259–60).

28 Including the Woonstichting Patrimonium, the Maatschappij voor Volkswoningen and the Coöperatieve Woningvereniging voor Gemeentepersoneel. (Van Ravesteyn, 1948, pp. 264–66).

29 (Van Ravesteyn, 1948, p. 282).

Land prices in the city's municipal boundaries soared, in cases doubling over a ten-year period.[30] Because of the reticence of the municipality to engage in proactive land acquisitions and preparations for building,[31] the scarcity of land on which building could immediately commence hampered all attempts to ameliorate plight of the fast-growing population. Especially portions of land with extant connections to the city and harbour were at a premium. The consequence to this was a haphazard and opportunistic development of Rotterdam during the early twentieth century. Because the city left the identification and preparation of buildable land to market forces the city map began to represent an incomplete puzzle.[32] Due to the free-market driven politics of the Rotterdam City Council, affordable housing provision was already not able to keep up with demand even before the disruptions brought by the WW1.

The War not only had economic consequence for the city when revenues dropped due to the decrease in shipping volumes, but it also impacted on the cost of construction in the Netherlands. The country was fully dependent on imports for its construction timber supplies. Due to the reduction in shipping a construction timber shortage was soon manifest,[33] jeopardising the rate of housing production. A report dated 2 May 1917, submitted to the *Commissie voor Volkshuisvesting* and undersigned by the Director of the *Bouwpolitie* (Building Inspectorate)[34] and the Deputy Director for Municipal Works, indicates that construction costs had escalated from *ƒ* 8,00/m^3 before the outbreak of World War I to *ƒ*16,50/m^3 in 1917.[35] This mandated the intervention of government to ensure further affordable rental housing production. Hoping to create a buffer against further price increases, the Rotterdam Municipality in 1917 started to stockpile building materials.[36]

The *Nationale Woningraad* (National Housing Board), founded in 1913, arranged a conference in Amsterdam in 1918 to address the urgent housing shortage in the Netherlands. At the opening, the Minister for Finances MWF (Willem) Treub, announced a 40% national subsidy for house construction up to a maximum of *ƒ*1 000 per house and promised that his ministry would intercede in the market,

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30 In the case of Nieuw-Mathenesse (Van Ravesteyn, 1948, p. 188).

31 Called *bouwrijp maken* in Dutch.

32 (Van Ravesteyn, 1948, p. 188).

33 Construction timber was at the time imported from Russia, Finland, Sweden and to a lesser extent Germany. During the War no deliveries from Russia or Germany were possible and Russia ceased to be a provider of timber after the War, while Germany took on a leading role.

34 CJ Struijk and HC Wesseling, respectively.

35 ('Ter verdere voldoenning aan de opdracht tot…'; SAR: 1190, (6/154)).

36 (Van Ravesteyn, 1948, p. 338).

particularly to reduce the market price of bricks and improve the import of timber from Sweden and Austria.[37] One of the so-called *preadviezen* (discussion documents) prepared for the meeting, was authored by the director of the *Amsterdam Bouw- en Woningtoezicht* (Construction and Housing Supervision Department) J van der Waerden. Van der Waerden argued for normalisation in housing production processes, specifically with regard to the building elements. His advice was later published as annex to a published lecture on normalisation by HP Berlage in the same year.[38]

Van der Waerden's advise to counter the housing shortage advanced the standardisation of building components, the streamlining of construction processes and development of housing types. He also addressed the manufacture and distribution of construction materials. His radical proposal to address the urgent shortage of the time was to centralise building material distribution on a national scale. In his vision, this *centrale gezag* (national authority) would distribute materials to local authorities dependent on housing need. It would also manage and issue loans and subsidies and would prescribe housing types. This authority would also need to intervene in the production of construction materials: "…designated industries and factories are [to be] mobilized and managed by the Central Authority in such a way that the requisites for constructing this type of housing are also in place within the time limits to be set."[39] But even before Van der Waerden could present his preadvies, the Minister of Finances in his opening remarks to the conference already stated that the government had no intention to take over small brick factories and thereby ensure a steady and affordable production. The only contribution for local authorities and architects would be to manage the construction of the dwellings and design the urban layouts of the new neighbourhoods.[40]

Van der Waerden's suggestion to create a national construction materials distribution system was not implemented. However, only a month after he made his proposals, the city of Rotterdam took the surprising lead to create the *Centrale Bouwmateriaalvoorziening N.V.* (Central Building Material Provisioning Company, CBV), a centralised building materials company in partnership with the municipalities of The Hague and Amsterdam. This centralised company, which soon attracted other municipalities and government institutions as shareholders, aimed to ensure

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37 (s.n., 1918a).

38 (Berlage, 1918).

39 "aangewezen industrieën en fabrieken door het Centraal gezag zoodanig worden gemobiliseerd en beheerscht, dat de benoodigdheden voor het oprichten dezer type-woningen er binnen de te stellen termijnen ook zijn." (Van der Waerden, 1918, p. 3).

40 (s.n., 1918a).

an affordable supply of materials for housing, street and sewerage construction. It had two means at its disposal to counter rising prices: bulk purchases and collective bargaining. The aim of this cartel was to eliminate competition for resources between the big municipalities, which had been driving up costs.[41] By 1920 the CBV had negotiated a minimum delivery of roof tiles for public housing and established its own timber-office in Amsterdam with a large timber stockpile. The cost of concrete production, however, remained volatile due to material costs, despite the best effort of the CVB. After armistice in November 1918, the cost of Portland cement initially decreased due to competition between German and English producers, but prices quickly increased again because of both domestic demand in England and a coal shortage in Germany in 1919. Belgian Portland Cement production was severely disrupted by the War, but by June 1919 production resumed and the CBV was able to negotiate a preferential delivery. It was able to supply its members at approximately 20 to 25% below the very high market prices.[42]

Rising brick prices was another source of national concern, leading to the national Director of Labour artificially driving down prices through subsidizing fuel for brick-making during 1918–19. The CBV was able to negotiate an even lower bulk delivery price in 1919 after this stimulation package ended, despite an increase in labour prices, demand and spiralling energy costs. The CBV negotiated a fixed price for 'Waal' bricks for the period 1 May 1919–31 December 1921. This hedged its members against an unforeseen price increase. Its membership of the CVBN provided Rotterdam with bricks at 25% below general market value during a period when as unseasonably high-water levels in the Dutch rivers led to a loss of yet unfired brick stock further driving up prices.

The CBV negotiated bulk purchases of all building materials, including window glass, screws, paint and ironmongery. Its price-busting tactics also included cost reduction through normalisation and bulk-buying. Normalisation, i.e., creating a set of size and use norms per building component or fitting, was one of the most important topics at the 1918 National Housing Board conference in Amsterdam. The CVB developed for example a normalised set of four lock-types, (front door-, interior door-, cupboard door- and latch locks), produced specifically for the CBV by Lips' Slotenfabriek lock factory in Dordrecht.[43] The CVB made these locks available at reduced prices to the various agencies of its members, including the Rotterdam GWD.

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41 (s.n., 1920a). The CBV decided to disband in 1922 when material priced had again returned to normal.

42 (s.n., 1920a).

43 (s.n., 1920a).

The collective bargaining power of the CBV helped to ease material costs, but could not buffer its members against increases in labour costs. The construction industry sector recorded the highest number of strikes in 1917,[44] in part as a response to the relatively high levels of unemployment amongst construction workers due to the prevalent material shortages. Due to industrial action, labour prices sky-rocketed.[45] Construction labour costs remained abnormally high during 1919–21.[46]

Spatial Efficiency: The alcove and local building codes

With high construction costs, private housing developers were either inactive or built smaller dwellings, especially for manual labour accommodation. The Housing Act of 1901 stimulated municipalities to enact local building regulations and by 1916 Rotterdam set minimum requirements for homes, which private developers had to meet in order to come into consideration for construction subsidies.[47]

The 1916 minimum standards included provisions for structural stability, aesthetics and interior layout, including a minimum free room height of 2.85m for all inhabitable rooms. Each dwelling was to have:

- a private outside space or balcony;
- at least two decent sleeping places;
- a cupboard for crockery and glass ware;
- a pantry cupboard;
- two clothes cupboards;
- its own water closet; and
- a tap and basin on each storey.[48]

The ‘sleeping places’ referred to did not necessary require separate bedrooms: the use of alcove bedsteads (space saving, avoiding the need for a separate room and at the same time a way of achieving some thermal comfort at night without external

44 76 individual strikes were called in that year alone (s.n., 1919b).

45 (Kuipers, 1987, p. 15).

46 (s.n., 1923a).

47 (Van Ravesteyn, 1948).

48 (Van Ravesteyn, 1948, p. 338, footnote 279).

heating sources) remained allowable and initially reasonably common in Rotterdam for workers and lower-middle class housing under rental control until 1937![49]

The economic conditions made searching for alternatives for spatial planning efficiency in subsidised housing an imperative for both private investors and the public Housing Service headed by Auguste Plate.

Home Economy: Rental and energy costs

Rental control was essential to ensure affordable housing for a broad spectrum of the population of the city. Because rental prices were in part influenced by construction costs, the city provided construction subsidies to developers while at the same time subsiding rental prices for housing constructed under the provisions of the Housing Act. Any potential increases in rental prices were continuously debated in the city council and all efforts were undertaken to limit living expenses.[50]

The already mentioned coal shortages due to the War, which contributed to the high brick and Portland cement prices, affected the entire population. The shortages were so severely felt that the term *brandstoffennood* (fuel crisis) became common usage.

FIG. 5.3 Advertisement for briquettes as fuel source from the Rotterdam newspaper *De Maasbode* of 14 August 1918. The advisements notes that “due to many enquiries speedy orders are advisable” (De Schiedamsche Brikettenfabriek, 1918).

A *Brandstoffencommissie* (fuel commission) was created in 1917 to regulate the trade in combustibles and set maximum prices for different combustibles.[51] The Rotterdam City Council was forced to take the initiative to mine turf for combustion during 1918 and 1919 as a cheap, albeit dirty, combustible.[52] Because of interruptions in coal deliveries, municipal gas from coal production at the municipal gas works decreased and the City was forced to implement a delivery schedule

49 (Van Ravesteyn, 1948, p. 284).

50 (De Jonge van Ellemeet, 1925, p. 315).

51 It was disbanded in 1921.

52 The polders Blijdorp, Bergpolder and Hoog Oudendijksche Polder were mined for combustible turf (Verseput, 1959, p. 228).

for gas.[53] With people huddling together for warmth, energy-poverty was a social phenomenon that contributed to the spread of disease such as tuberculosis and especially typhoid, by creating ideal conditions for human body lice. Decision-makers were aware that even a small energy price increase could tip the balance for many households, and ultimately ignite rebellion.

5.4.1.3 Technology

The industrial revolution that brought much newfound wealth to the Netherlands since the 1900s had not yet brought about a construction revolution in the Netherlands. In Rotterdam large new concrete industrial buildings were being constructed–notably the concrete Maassilo (1906), by JP Stok Wzn and the *Stoommeelfabriek de Maas* (steam-driven flour mill; commenced 1914) and the *Stoomrijstpellerij Van Sillevoldt* (steam driven rice husker, built in 1915), by Brinkman–but housing production remained traditionally conservative. It was only in 1920 that the first experiments in construction with concrete as a base-material were initiated. Under the influence of Plate and the socialist alderman AW Heijkoop, Rotterdam was the first municipality to engage with a concrete-based housing experiment.[54] Experiments were also undertaken to reduce total construction cost, tackle high bricklayers' wages, increase housing production and the number of dwellings per hectare without reducing the inhabitants access to fresh air.

Some progressive housing associations embraced the possibilities of new technology for improved hygiene. The Housing Association Patrimonium constructed a public housing complex (today called Patrimonium's Hof) on the Hillevliet in 1915, to the design of AK Kruithof, which included a communal bathhouse and, importantly, provided fully-fledged bedrooms, instead of alcove beds.

5.4.2 Abstract conceptualisation

Due to its history of haphazard land-policies, rising land prices and the need for fast affordable rental housing production, the city was eventually driven to identify cheap land already prepared for construction. The city council adopted a proposal

53 (Verseput, 1959, p. 228).

54 (Kuipers, 1987, p. 104).

to construct public housing in the polder Spangen in 1913 close to the neighbouring city Schiedam,[55] in part because it was not necessary to raise the level of the polder before construction, which would save both money and time. In the same year the urban plan designed by Pieter Verhagen, then in the employ of the City of Rotterdam, was adopted by the council.[56]

Spangen was located a kilometre away from the nearest urban edge of Rotterdam and on the other side of the Delfshavense Schie. Construction commenced here in 1920 even before the neighbourhood could be connected to the city. Cyclists, pedestrians and vehicular traffic would only be able to reach the polder from the city with ease in 1923 when the Mathenesser Bridge was completed.[57] Verhagen's design was composed to include the then prevalent *gesloten bouwblok* (perimeter block). It was accompanied by construction guidelines, including build-to lines, ridge heights lengths of building blocks and location of shops.[58] The GWD under director Plate took charge of the commissioning of the housing developments for Spangen.

The Centraalbouw prototype

Plate's service used the development of Spangen to further affordable housing design through conceptualising an experimental approach. *Centraalbouw*, housing accessed from a communal access system, offered opportunity for space and cost-saving and a prototype was developed by the GWD.

Plate's department developed this scheme for centraalbouw stacked housing at three storeys height, based on the Verhagen-designed urban plan and the urban guidelines for Spangen. The housing units were to be located on the *rooilijn* (build-to line), ensuring a large inner-courtyard (conforming to bylaws).

The courtyard would be accessible to vehicles through two gateways, set centrally in the short ends of the blocks, with a street hugging the inner-periphery of the block. A third entrance was located in the middle of one of the longitudinal wings, accessible to pedestrians and cyclists.

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55 Purchasing it for a then already high price of *ƒ*1,60/m^2 (Van Ravesteyn, 1948, p. 188).

56 (s.n., 1950a); Verhagen's plan replaced an earlier plan by the director of the Rotterdam *Dienst Plaatselijke Werken* (Public Works Department) GJ de Jongh, partly adopted in 1906 (Steenhuis, 2003, pp. 8–9).

57 (Van Ravesteyn, 1948, p. 188).

58 (Steenhuis Stedenbouw/landschap I Urban fabric, 2009, p. 10).

This communal access system was already unorthodox for its time. More unorthodox was the aerial street, or gallery located on each floor along the inside of the block: a concrete walkway, carried at regular intervals by brick-built arched piers. The gallery was designed to be accessed by way of six sets of stairs.

Central washing and drying facilities were proposed, in part because the dwellings would not have attics where washing could be aired. The block would be provided with two bathhouses located over the gateways. A three-storied laundry and drying facility (accessible on-level from all housing units via the ground floor or the double-decker gallery), with hot water installation on the ground floor, was positioned in the middle of the longitudinal wings adjacent to third gateway. This would create more hygienic conditions for the inhabitants after a period in which the city had experienced epidemics, exacerbated by its dirty and overcrowded slums and improve residents' comfort at the same time.

Four different dwelling types, labelled A–D, were designed and positioned to articulate with the courtyard, creating three distinct domains. The floor plans had also been carefully developed: the kitchen was located adjacent to the access door, with the living room on the outside façade. A curious device in the floor plan in the dividing wall between the two bedrooms of dwelling Type B indicates a shaft marked 'V' (for *vuilstortkoker*, garbage chute) near the outer wall.

Plate presented this plan to the municipal Commissie voor Volkshuisvesting on 30 September 1918 as a provisional proposal for *Gemeentelijke Woningbouw in Spangen (Centraalbouw)*.[59] His accompanying description and motivation is most illuminating. His arguments are first and foremost economic. He argued that housing for the poorest class already required subsidy before the War. The city had to subsidise each of the public housing units with *ƒ*125 per annum and that the reality of rising construction costs, for which no end was in sight, was that even more subsidy might be inevitable.

59 "…een voorlopig plan voor een blok gemeentewoningen" ('Gemeentel. Woningbouw in Spangen (Centraalbouw)'; SAR: BRN 1190, (6)).

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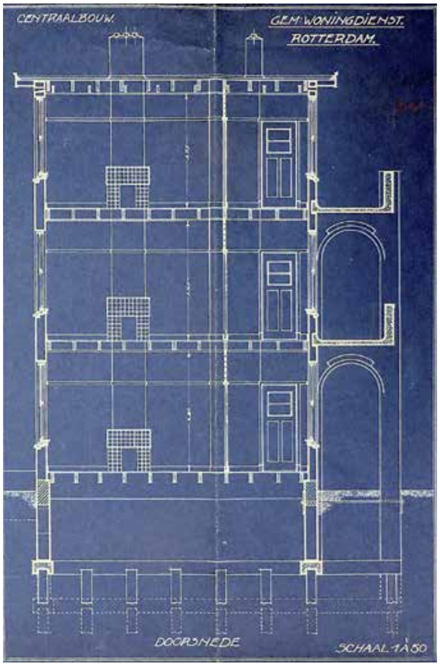


FIG. 5.4 Cross-section through the 'Centraalbouw' prototype with concrete aerail gallery supported by masonry arches, designed by Plate's Gemeentelijke Woningdienst (SAR: BRN 1190 (6)).

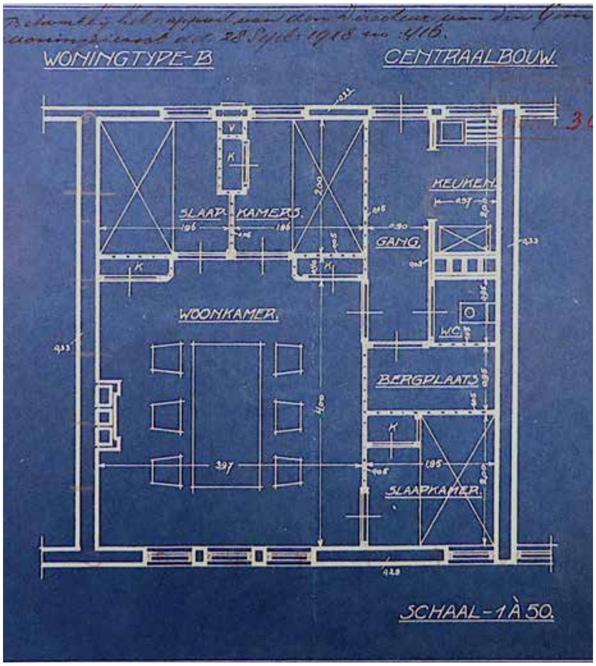


FIG. 5.5 Floor plan type 'B' showing the projected garbage chute, marked 'V' (SAR: BRN 1190 (6)).

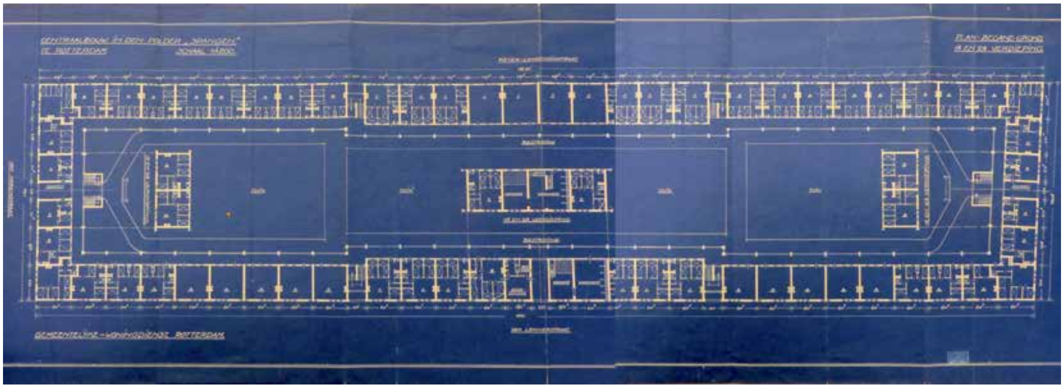


FIG. 5.6 The plan for the 'Centraalbouw' prototype developed by Plate's Gemeentelijke Woningdienst (SAR: BRN 1190 (6).

To substantiate his claims, Plate noted that the housing subsidy per social dwelling unit in Amsterdam already exceeded that of Rotterdam. In his opinion, only three options remained to continue affordable housing production:

- increasing rental prices (quickly set aside by him as simply unthinkable),
- application of new technologies (he specifically referred here to reinforced concrete as the material that would take the ‘leading role’, but argued that the exorbitant price thereof put this option out of play for the time being), and
- building different dwelling typologies.

Plate needed only one sentence to remind the city council that lowering construction standards would pose the grave danger of creating living environments of which the negative impacts on hygienic and moral standards would soon become evident.[60] He had no need to go into further detail. The number of deaths from the Spanish Flu was growing unabated as was the militant socialist rhetoric of the day (leading to Troelstra’s declaration of a revolution in less than two months’ time). By combining the economic arguments with the reality of the daily mortality rate in the city, and the prospect of social revolution, Plate neatly paved the way for the experiment his department was proposing.

Plate deftly whittled his argument down to naturally accommodate his proposal: an experiment in Spangen consisting of a number of multi-storey blocks–multi-storied by necessity of the high costs of the foundations required to build in the polder– and implementing centraalbouw with large well-lit communal stairs. This type would provide for greater spatial efficiency by eliminating all indoor staircases shared by two or three families only; while the application of the gallery was carefully planned to allow for good day lighting and ventilation. Housing Type B was projected in the extremities of the long block, so that the garbage chutes could be serviced easily through the main gateways. Residents in the middle of the block would need to walk down the gallery to reach the chutes, their lids opening onto the gallery.

The construction of these blocks with tax-money had to be undertaken with cognisance of the economy in this time of housing-need and a crisis in the property market[61] due to escalating material and labour costs. By labelling the project as an ‘experiment’, which it was, Director Plate, could motivate for higher expenditure

60 “… groot gevaar leveren dat woontoestanden in de hand gewerkt worden waarvan de nadelige invloed op hygiënisch en moreeel gebied zich met de jaren sterk zullen doen gelden.” (‘Gemeentel. Woningbouw in Spangen (Centraalbouw)'; SAR: BRN 1190, (6)).

61 (Siebers, 1924, p. 197).

on energy, home economy and comfort despite the extra construction cost this would bring to the project. To build in a safety-net for his proposal (and appease opponents), he argued that the laundry and bathhouse facilities were to be scaled to allow for future conversion to apartments, should the experiment fail.

Plate planned for an extensive centraalbouw experiment with buildings by different architects to be constructed in Spangen as variations on the topic. The reason for building multiple versions of the experiment was, he argued, to avoid possible future jealousy from other inhabitants of the neighbourhood towards the inhabitants of a singularly exceptional block. Plate's wish-list for private architects for the design of the housing that his service was planning at the time, including in Spangen, had already been submitted to the Commission for Public housing on 12 July 1918. This list included M Brinkman.[62]

Blocks VI & VII, Spangen

Plate's service commissioned Brinkman in August 1918[63] to further develop the centraalbouw prototype for construction on two street blocks, numbered VI & VII. Brinkman ran a successful architectural firm in Rotterdam, with numerous private residences and–for the time, high-tech–industrial installations completed.[64] He had, however, not designed any affordable mass housing when approached by Plate to design for two street blocks!

The invitation included a drawing showing the outlines of the project areas, but already stated, that "changes to the boundaries are not excluded". It also stipulated that the development of the designs would need to take place in collaboration with the director of the *Woningdienst*.[65] Plate's service clearly had preconceived ideas about what this housing block should achieve and was willing to redraw pre-existing urban plans to achieve this. Plate wanted to be personally involved.

62 Other architects named by Plate are CN van Goor, PG Buskens and the practice of Granpré Molière and Verhagen. ('Gemeenteijke Woningbouw onder leiding van particuliere architecten'; SAR: BRN 1190, (3). Eventually the practice of Meischke & Schmidt and newly appointed municipal housing architect Jacobus (JJP) Oud were tasked with designing the various blocks in the polder. A copy of the drawings of the Municipal Housing Service prototype is located in the JJP Oud archive (HNI: OudJ.9759.1.34) and informed his designs for housing designs for Blocks VIII and Block IX as well as Block IV and Block V in Spangen.

63 ('Uitnodiging ontwerp Woningbouw'; SAR: BRN 1190, (6)).

64 (Pey & Boersma, 1995).

65 "…dat eenige verschikking in de begrenzing niet buitengesloten… de volvoering van deze opdracht in voortdurende samentwerking met den Directeur van den Woningdienst plaast hebbe…" ('Uitnodiging ontwerp Woningbouw'; SAR: BRN 1190, (6)).

Why did Plate's department aproach Brinkman? Brinkman's specialisation in industrial installations equipped him with the tools to design both the planned concrete galleries as well as the hot water installations required for the bathhouse and laundry. But Plate and Brinkman were also well-acquainted and were both founding members of the *Rotterdamsche Kring* (Rotterdam Circle) in 1913. The *Rotterdamsche Kring* was an association of bankers, industrialists, architects, artists etc. that aimed at promoting the study of science, philosophy, religion, ethics and arts in the city.[66]

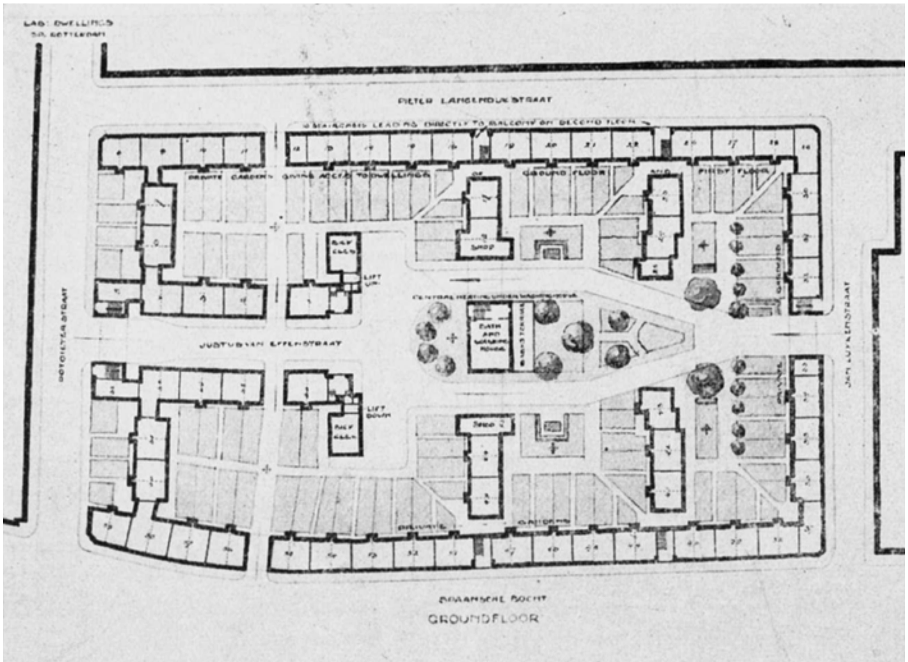


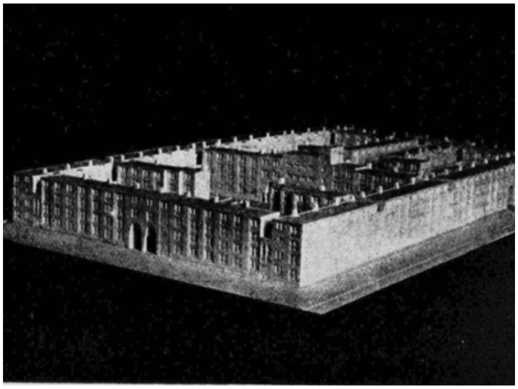
FIG. 5.7 Plan for the centraalbouw complex, annotated in English, published in the *Bouwkundig Weekblad* in 1920. Note the parcellation of the courtyards (Brinkman, 1920, p. 46).

Brinkman's design improved on the prototype of the GWD. Brinkman consolidated the two urban parcels he had been assigned; a possibility that had already been hinted at by Plate's service. Brinkman developed the design between 14 August and 23 November 1918, when he submitted an initial design to the city council. In this first submission he specifically noted that the design had been developed in

66 (Van der Pot, 1962, p. 139).

collaboration with the Director of the Gemeentelijke Woningdienst, August Plate in person.[67] In this new proposal, each housing unit was to be heated individually. The plans provided for a fire place in the lounge. The housewife would need to make do wtih a coal-fired cooker in the kitchen.

The City Council's response was hesitant. The council instructed the Gemeentelijke Woningdienst to have a model of the project commissioned, photographs of which were repeatedly published later.[68]



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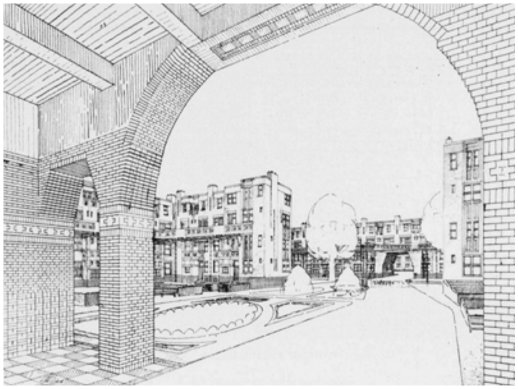

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FIG. 5.8 [1] The published photograph of the model commissioned by the City of Rotterdam to inform its decisions on the Blocks VI & VII project, as published in the *Bouwkundig Weekblad*. Note the double-arched entrance gateway, later to be further developed into the characteristic angled arch (Brinkman, 1920, p. 47); [2] Brinkman's perspective of the centraalbouw project, seen through the archway under the bathhouse published in the *Bouwkundig Weekblad*. The gateways to the streets had already been modulated to their final form, but the passage under the bathhouse, through which the perspective is drawn, was still to be further simplified (Brinkman, 1920, p. 45).

At four-storeys high, the upper floors were connected by a single concrete gallery on concrete columns at the third-floor level. The block was bisected by a central wing. Longitudinal and transverse wings not only provided more housing units, but also cut the block into smaller courtyard domains. The floor plans of the units were inventively improved. The two floors below the gallery contained vertically-stacked units: a ground floor unit and a first-floor unit with its own front door leading directly to an internal stair, very much in keeping with the Rotterdam practice at the time. These units were projected horizontally over a double construction bay.

67 (SAR: BRN 1190, (73)).

68 The instructions dated 16 May 1919 made ƒ750 available for the manufacturing of the model to be paid to the architect. ('16 mei 1919'; SAR: 1190, (6)).

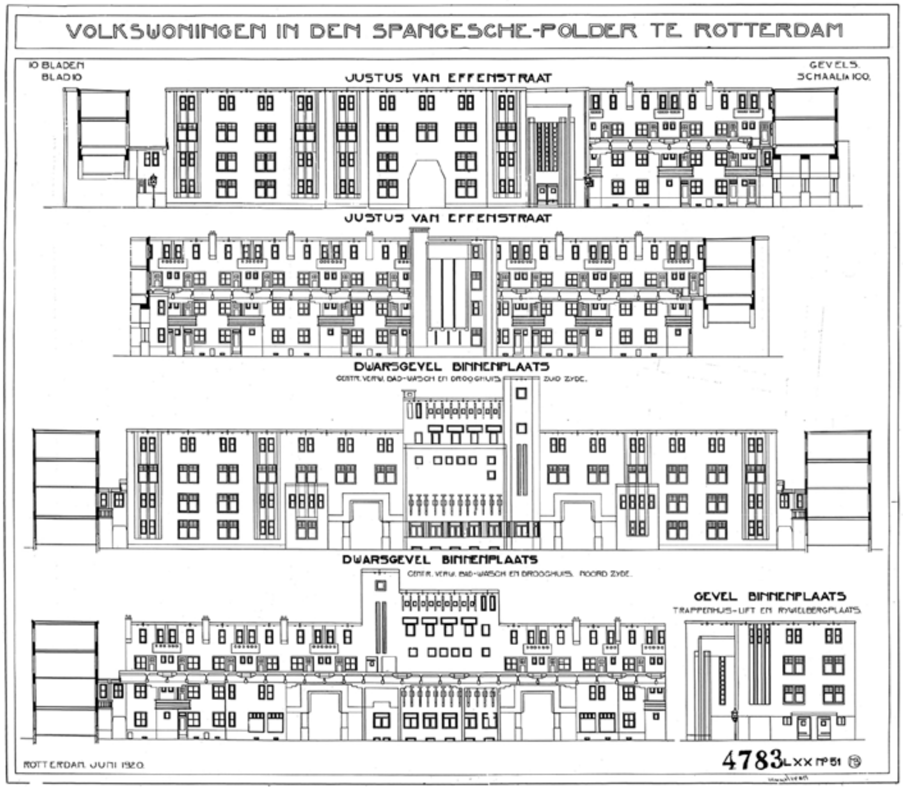

FIG. 5.9 Final elevation drawings by Brinkman for the Centraalbouw experiment in Spangen, dated June 1920 (HNI, BRIN 0011).

Conversely, the housing that opened onto the concrete gallery was projected as double-storey units over a single bay. The internal space planning maintained the logic of the GWD centraalbouw plan: the kitchens were located at the entrance door, with the sitting rooms located on the outside perimeter. This arrangement was unusual at the time.[69] The gallery, accessible by means of no fewer than ten stairwells and two elevators, was to run along the inner perimeter of the block, except at the north end, where it punctured through to the outside. The gallery connected the housing to the bathhouse on the third floor at the centre of the block.

69 A similar spatial layout of the Rosehaghe public housing complex (1919–22) of the similarly named Haarlem housing association, designed by architect JB (Han) van Loghem, elicited vehement objections from a municipal commission (De Wagt et al., 2005, p. 114).

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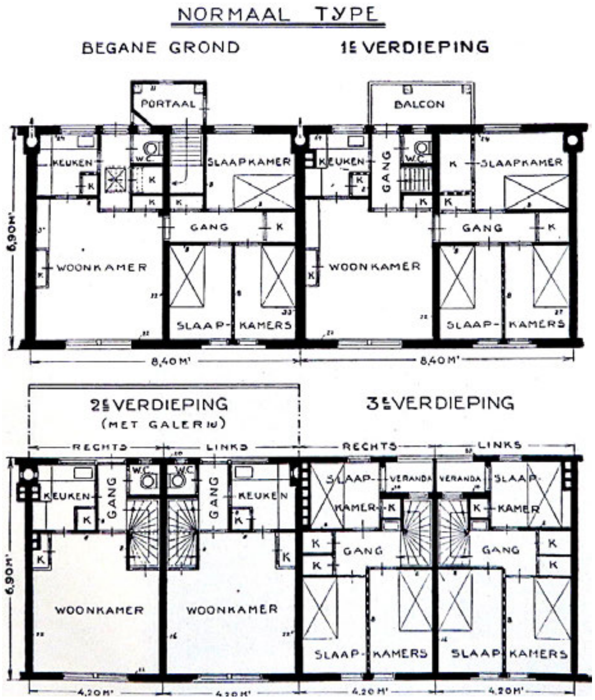

FIG. 5.10 Typical floor plans ('normaal type') published in 1924 in the *Tijdschrift voor Volkshuisvesting en Stedebouw.* The garbage chutes are clearly indicated in these drawings (Sweys, 1924, p. 199).

The bathhouse contained a coal storage facility and a water heating installation in its basement. On the ground floor was a bicycle store for the residents of the top floor units together with the bathhouses and laundries. The drying rooms were located directly above the bathhouses and laundries. Instead of a bank of garbage chutes located in the corners of the courtyard, each dwelling now had a garbage chute conveniently located inside the kitchen. The ground floor and first floor units all had their own gardens, in accordance with the Rotterdam housing bylaws. The first-floor units also had a balcony. The top floor units had use of the gallery as outdoor space, but were also provided with small balconies facing the internal courtyard.

The most important alteration of the plans was, however, the introduction of the block heating system. Brinkman's motivation for the design submitted on 11 December 1919 along with the reworked plans, now for the first time argued for block heating for the project: "The desirability therefore is of course beyond all doubt."[70]

70 "De wenschelykheid is natuurlyk boven alle twyfels verheven." ('Eenige aanvullingen op de Nota van toelichtingen'; SAR: 1190, (6)).

He repeated Plate's appeasement strategy regarding the bathhouse as experiment stating that the laundry and bathhouse building had been scaled to allow for its conversion into 6 apartments, should it not prove successful.

The year 1919 brought steep rental price increases and as rentals were expected to continue their upward trend, more resources had to be mobilised to limit the occupation costs of public housing.[71] The City Council approved the construction of the experimental project after long deliberations on 15 April 1920.[72] The opinion of its Gezondheidscommissie, who, despite misgivings, gave a green light for its construction as experiment was noted as an important factor for the decision of the Council.[73] Their condition: the gallery, the use of elevators, refuge chutes were not to be replicated in other housing until proven to be successful.[74] In response, Brinkman concluded that "[t]he behaviour of the users [of the building] will determine if this first experiment will be continued into a second, where the multitude of experiences undergone with the first block, can be utilized",[75] but Plate's municipal gallery experiment was to remain limited to this single project.[76] A second gallery-type proposal for the GWD contemporary to that for Blocks VI & VII that also included garbage chutes by architect PG Buskens was deemed unfit by the Gezondheidscommissie and was therefore effectively dead on arrival when tabled before the City Council.[77]

The Rotterdam Municipal Council only approved the project after strong intervention from the socialist alderman AW (Arie) Heijkoop and with the provision that the apartment buildings be sold off once the property market had regained momentum (thereby reaffirming the precondition the City Council had set for itself before committing itself to the construction of public housing).[78]

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71 (De Jonge van Ellemeet, 1925, p. 315).

72 ('Raadsbijlage 15 april 1920'; SAR: 1190, (6)).

73 ('Galerijbouw in den polder Spangen, 29 maart 1919'; SAR: 1190, (6).).

74 (s.n., 1925b).

75 "Van het gedrag van der bewoners zal het in hoofdzaak moeten afhangen, of het de moeite waard is deze eerste proef te laten volgen door een tweede, waarbij dan van de vele ervaringen, met dit eerste blok opgedaan, kan worden gebruik gemaakt." (Brinkman, 1923, p. XLV).

76 He later resurrected the experiment with Willem van Tijen and Brinkman & Van der Vlugt resulting in the privately-developed Bergpolderflat building in Rotterdam.

77 (s.n., 1920b).

78 (Beeren et al., 1982, p. 29).

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5.4.3 Active experimentation

With the political green light given, the project was nearly scuppered again due to further increases in material costs. It took nearly a year before costs had deflated again making awarding of the tender for the construction, possible.[79] Most of the construction was traditional brick and mortar with timber flooring and roof. Less traditional were the concrete gallery and the industrial hot water boiler installation, the latter commissioned from the Koninklijke FW Braat, an iron- and engineering works company located in Delft.[80] The project was awarded to A Bikker of Leerdam on 28 March 1921.[81] The first residents moved into the building in September 1922.

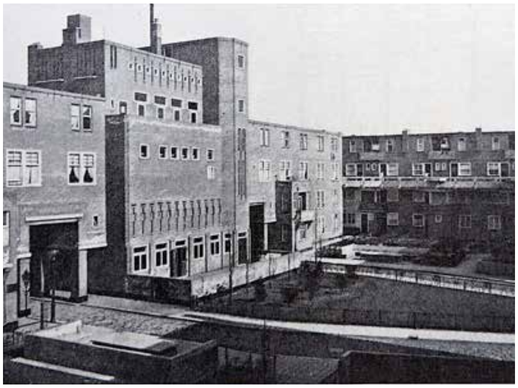
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FIG. 5.11 Two photographs of the completed Centraalbouw Spangen, soon after completion, featuring the bath house centrally. Published in the *Tijdschrift voor Volkshuisvesting en stedebouw* in 1924 (Sweys, 1924, p200–1).

5.4.3.1 2E+Co of the Spangen Public housing complex

With the political green light given, the project was nearly scuppered again due to further increases in material costs. It took nearly a year before costs had deflated again making awarding of the tender for the construction, possible.[82] Most authors

79 (s.n., 1921b).

80 (De Jonge van Ellemeet, 1925, p. 316).

81 (s.n., 1921a).

82 As included in the 1982 legal 'Description' of the project as monument (gazette in 1985) but also included in the texts of (Brinkman, 1920), (Siebers, 1924, p. 196) and (De Jonge van Ellemeet, 1925).

neglected to mention the introduction of a garbage chute, or the lack of alcove-beds (still a viable option in Rotterdam at the time), the provision of both a gas connection for a gas cooker[83] and space for a coal-burning oven (should it be required), and the narrow floor plate of the building, which allowed for daylight penetration.[84] Most of these aspects relating to the economy, energy use and comfort of the Brinkman design were already present in the GWD prototype. Plate, in his letter accompanying the submission of this prototype to the city council, went to great lengths to describe these benefits.

Economy

Aware of the sensitivities of the municipal apparatus, Plate opened his argument with economical concerns. His first statement was that the cost of foundations in Spangen made the choice for multi-storey buildings inevitable. The proposed gallery system was an essential innovation for improved construction economy because it could accommodate high densities per hectare. The communal access system would lead to a more economical use of the building area, obviating a mass of internal staircases.

Economy is directly mentioned only in one of the three texts[85] that were published during and at completion of the project. In an article titled *Volkswoningbouw te Rotterdam in den polder "Spangen". Architect M Brinkman* (Public housing in the Rotterdam in the polder "Spangen". Architect M Brinkman) Brinkman himself explains how the choice for the gallery in combination with a specific aspect of the dwelling configuration–the provision of an internal stair for the first floor dwellings, thereby requiring only a single aerial gallery–was economically beneficial, and that more than half of the dwellings in the block could be reached by means of the single aerial gallery.[86] This argument is given strength when considering that by this device, Brinkman could eliminate one of the two concrete galleries of the original Woningdienst prototype (which would have called for three if applied to a four-storey design). Brinkman's gallery design, in which the concrete gallery is carried on

83 (Brinkman, 1923, p. XLIV).

84 (Sweys, 1924).

85 The first was by an unknown author in 1920, before the commencement of construction in the *Bouwkundig Weekblad* (Brinkman, 1920). The second, a volume containing a collection of projects then under construction, and notably compiled by HP Berlage amongst others (Berlage, Keppler, Kromhout, & Wils, 1921, pp. 19-21) contained only drawings, the number of units, cost estimates and sketch-plans. The last, an entry in the *Rotterdamsche Jaarboekje* was penned by Brinkman himself (Brinkman, 1923) and is the only published text relating to the project by him.

86 (Brinkman, 1920, p. 48).

concrete columns and beams, also eliminated some labour. The design was simplified between 1918 and 1920, reducing the expensive brickwork detailing Brinkman had proposed for the monumental archways under the bathhouse building where arches were eliminated in favour of flat lintels. All of these changes were aimed at reducing construction costs.

A crucial element of the project that could not be penny-pinched was the mechanical elevators, which at the end of 1919 were more expensive than usually.[87] To allay the Municipal Councils fears of excessive operating costs becoming a problem for the city, Brinkman proposed that these lifts be coin-operated, or made available for use only at certain times of the day.[88]

The most obvious design aspect of the Spangen Block VI & VII that addressed economy, energy and comfort, was the provision of block heating and the bathhouse and laundry facilities. The living room with its radiator did not require either a fire-place or a chimney (both included in the first GWD proposal and later the first Brinkman proposal (later eliminated). The centralisation of the heating installation brought about an economy of scale, as commentator De Jonge van Ellemeet pointed out in his assessment of the project in 1925.[89] This increase in achievable comfort, however, required an economical sacrifice, requiring a higher initial investment, although the afore-mentioned economy of scale tempered this. When seen in the context of the entire project, the cost of the two lifts did not exceed 0,5%; the hot water, block heating, laundry and bathhouse system equated to 5,45% of the total sum of investment in Block VI & VII, Spangen.[90]

The Woningdienst developed very spatially economically floor plans. The floors were not carried by the façades but by the dividing walls and were therefore spanned with timbers of a limited size. Plate reported that space was more efficiently utilised in the GWD prototype by eliminating a wall between the kitchen and the entrance corridor.[91] Brinkman's floor plans adopted this. Even the basement was accessible

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87 "Hoewel de inrigtingskosten op het oogenblik vrij wat hooger zijn dan in normale tijden…" (Despite the higher installation costs than in normal times…) (Brinkman, 1920, p. 49).

88 (Brinkman, 1920, p. 49).

89 (De Jonge van Ellemeet, 1925, p. 315).

90 The lifts cost ƒ9 645 and the total hot water installation (including the installation of the laundry and bathhouse facilities) cost ƒ103 825,38 of the ƒ1 920 000 construction cost (Sweys, 1924, p. 200)

91 ('Galerijbouw in den polder Spangen, 29 maart 1919'; SAR: 1190, (6)).

to the ground and first floor units as extra storage space, albeit accessible through a floor hatch, and in so doing, avoided the need for an "ugly garden shed".[92]

Energy

One of the most curious aspects of the executed building was that both a gas connection and a flue were provided in the kitchens. Flues were a remnant of an earlier version of the project, dating to 1918 and published in the *Bouwkundig Weekblad* at the start of 1920.[93] The drawings reproduced in the publication, annotated in English, show that the kitchen was to have a coal stove with a simple extraction hood over it to ventilate the combustion fumes out. There was a fireplace located in the lounge and a coal hopper incorporated in the kitchen. There was to be an asbestos hatch located behind the stove in the kitchen, which could be opened to let heat radiate from the stove into the living room, asbestos being applied as a fire-proof safety precaution. This simple device made the optimal use of the heat generated by cooking, contributing to both home economy and comfort.

Block heating was included in the design reworking of 1919, probably after discussions with the installations firm FW Braat, and possibly on the insistance of Plate, who had already hinted at the possibility two years before. He then already proposed the use of block heating as it would eliminate the need for a smokestack and bring construction cost benefits.[94] The smokestacks were, however, constructed. While progressives Plate and Brinkman were in favour of housewives cooking on gas, they probably couldn't exclude the possibility of a fuel shortage as experienced during the War, or the inability of the municipal gas works to continuously provide gas to the entire city. The provision of a smokestack would give residents the option to use combustion stoves fired with coal (or even other combustion materials such as turf). De Jonge van Ellemeet noted in retrospect in 1925 that this could easily have been omitted as most families were cooking on gas in any case.[95]

The centraalbouw prototype proposed shallow floor plates varying from 6,3 to 6,98 metres from façade to façade. Brinkman and Plate continued using the same narrow floor plates, maintaining a 6,9-metre floorplate depth for the

92 "dat de woningen van begane grond en eerste verdieping worden voorzien van een, door luik en open trapje te bereieken keldertje, om zoodoende de leelyke tuinschuurtjes te vermyden." ('M Brinkman 11 December 1919'; SAR: 1190, (73)).

93 (Brinkman, 1920).

94 ('Eenige aanvullingen op de Nota van toelichtingen;. SAR: 1190, (6)).

95 (De Jonge van Ellemeet, 1925, p. 315).

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apartments throughout. Brinkman went to the effort of highlighting the benefits to the Municipal Council pointing out that the narrow floor plates would allow for solar ingress into the living room. He noted with some pride that all the living rooms in the entire complex would receive direct sunlight.[96] Positioning the gallery on the outside of the block ensured daylight penetration to the living rooms located here.

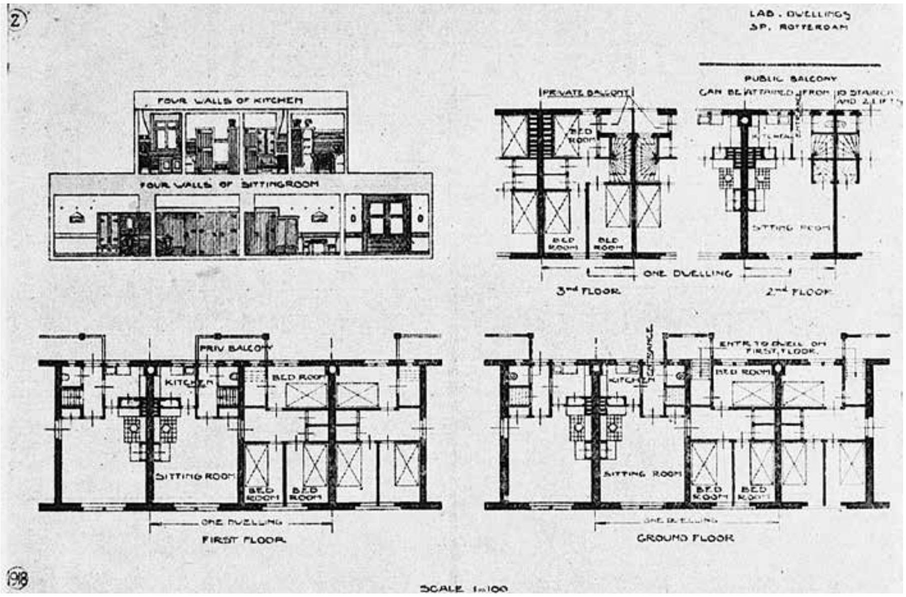

FIG. 5.12 Presentation drawing, dated 1918, published in the Bouwkundig Weekblad in 1920. The coal burner is indicated by a circle on a chequered field in the “siting room” (Brinkman, 1920, p. 47).

Comfort

The well-appointed, light and spacious apartments at Blocks VI & VII were in a class of its own for their time. All the apartments had direct sunlight at some point during the day. Residents had space heating that only required turning on a tap. The same was true for piped hot water. No more hauling coal, stoking a fire and boiling a kettle to fill a tub to do the dishes.

96 (‘Eenige aanvullingen op de Nota van toelichtingen’; SAR: 1190, (6)).

With gas as medium for cooking there was no need any more to purchase, haul and store coal, eliminating back-breaking work and back-breaking cleaning, no coal dust to sweep up and no ashes to clean out. Their kitchens were light and remarkably modern: the small gas cooker took up limited space and kitchen waste was simply dropped down the chute. The apartment was light and could be naturally aired.

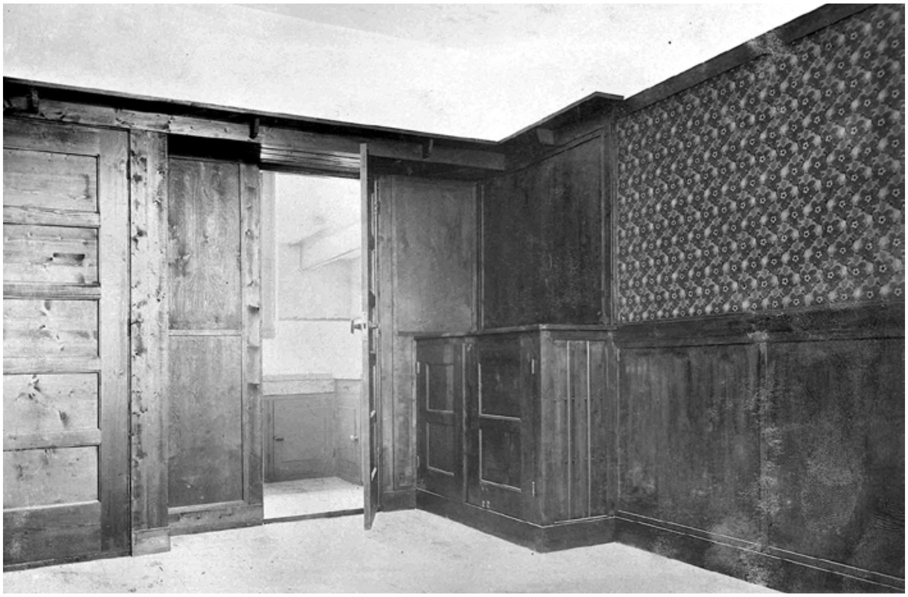

FIG. 5.13 Original interior of a house in Block VI and VII, Spangen (SAR: XXV-1-03-03-50).

The bathhouse complex (the laundry facilities) provided the space, tubs and hot water to do the weekly washing. No more knocking about with a washtub in the small kitchen or the lounge. If need be, a small amount of washing could be done in the kitchen sink and dried in the little private garden or out of sight on the balcony. The washing could be dried even during cold and wet winter weather in the heated drying attics in the bathhouse complex. On sunny days the drying racks on the roof of the bathhouse could also be used with added benefit that sunlight disinfects the washing.

Plate's argument for the aerial street and lift was that residents and delivery people, including the postman, would be able to comfortably access the houses from this 'public street'. Children could play right outside the front door–even if this was two storeys above ground level–in full sight of the housewife in the kitchen. The Brinkman design provided ten stairwells and two lifts. The lifts being a first for high-density public housing in the Netherlands.

A nice hot comforting shower or bath was available at a small fee only a couple of steps away.

Great care was taken with regards to the interior layout and finishing. Cupboards and a built-in settee in the living room were mandated. Ground and first floor units had a little basement store and a secure bike store where units lacked a private front garden.

5.4.4 Concrete experience 1922–81: Gradual evolution

Originally the neighbourhood Spangen housed lower to middle income families supported by a bread-winner employed by, what today would be termed essential services. The suburb was home to the families of educated customs, railways officials and policemen.[97] These employees were buffered against the deprivations of the Great Depression in the 1930s. Mooted rental increases resulted in civic unrest in Rotterdam, leading to the deployment of riot police.[98] Even though Spangen was spared the Nazi bombing of Rotterdam in May 1940,[99] the neighbourhood was hit by later bombings, for instance in the proximate Huygens Street. The complex of Blocks VI & VII was spared any direct damage. World War II (WWII), however, disrupted the normal maintenance cycle for the block resulting in a 'poor' grading during a September 1947 inspection by the technical head of the Gemeentelijke Woningdienst. In this report the windows were listed as being in urgent need of repair or replacing due to postponed maintenance of the paintwork. The roof was in need of repair and the plumbing of the kitchen sinks were in dire straits. The sewerage system needed repair due to soil subsidence. Finally, the inspector noted that the stairwells needed 'freshening up' and the concrete sections of the gallery and the asphalt needed repair. The only aspect that did not require urgent attention according to the inspector was the foundations.[100] We can assume that some maintenance was carried out due to this recommendation, windows and doors replaced, and stairwells redecorated. In fact, each year's budgeting allowed for

97 (Steenhuis Stedenbouw/landschap I Urban fabric, 2009, p. 6).

98 (Nijssen & Wietsema, 1989, p. 118).

99 (Nieuwenhuis, 1961).

100 ('Rapport betreffende de onderhoudstoestand van het complex woningen Blokken 6 en 7, Spangen, september 1947'; SAR: BNR 673 (34)).

general maintenance of all the buildings in the custodianship of the GWD and its successor, the *Gemeentelijke Woningstichting* (Municipal Housing Foundation, GWS). The details were not always specified, but often went to the replacement of ceilings, granolith kitchen sinks and general repairs such as repainting of dwellings before new tenants would occupy them and maintenance to doors and windows.[101]

The post-WWII housing shortage in the Netherlands meant that the gallery block remained popular. In 2001, a resident who had lived in Spangen for 40 years, could recall that the block had been "…only for the rich. You had to work for the municipal council or at an official institution, or you didn't end up there."[102] By the 1970s the original inhabitant population was slowly thinning out. Unemployment was growing in the Netherlands and more attractive alternatives for the middleclass in newly created neighbourhoods meant that the social situation for the poorer neighbourhoods in the Netherlands had taken a turn for the worst. Spangen was one of the worst hit areas in Rotterdam. The once luxurious workers-class public housing was now deemed outdated and too small. This led to the overrepresentation of single persons and immigrants, the closing of neighbourhood facilities such as neighbourhood shops and a general lack of control over cars in the public realm.[103]

5.4.4.1 The 2E+Co of the Gradual Evolution

To allay fears of the city burdening itself with long-term costs in management of the bathhouse, Brinkman argued that this facility could be leased to a third party to operate.[104] The City of Rotterdam was not inclined to take responsibility for the operation of the laundry and bathhouse. In November 1922, just after the completion of the block an advertisement was placed for a private lease-holder to operate the block heating, laundry- and bathhouse, sell bathing and washing consumables and manage the bicycle storage as a commercial concern.

The facility proved to be a long-term financial burden for the city. By 1925 it was already being forwarded as argument against other municipal laundry facilities: "The building and machines stand there and generate no [financial] interest."[105]

101 ('Begroting 1948/1949. Bijzonder onderhoud'; SAR: BNR 673 (23)).

102 "Dat was echt voor rijkeluismensen. Je moest bij de gemeente werken of bij een officiële instantie, anders kwam je d'r niet in" (De Jong, 2001, p. 12).

103 (Van der Hoeve, Friso, & Stenvert, 2002, p. 35).

104 ('Eenige aanvullingen op de Nota van toelichtingen'.SAR: 1190, (6)).

105 "Het gebouw en de machinerieën zouden daar vrijwel renteloos staan." (s.n., 1925b).

De Stichting tot Beheer en Exploitatie van Woningen te R'dam
is voornemens te verpachten:

a. het stoken van de centrale verwarming der woningen van den galerijbouw in Spangen.

b. de exploitatie van het aldaar aanwezige waschhuis met badinrichting, inclusief verkoop van waschbenoodigheden en aanverwante artikelen, eventueel gecombineerd met de exploitatie van rijwielbergplaatsen, enz.

Nadere inlichtingen zijn te bekomen aan het kantoor der STICHTING, Hoondiusstraat 2, alhier. 65133 46

FIG. 5.14 A newspaper advertisement calling for an individual to operate the bath house and laundry as commercial venture (s.n., 1922b).

But the city seemingly had no choice to, for instance, convert the laundry, drying and bathhouse facility to dwellings, as Plate and Brinkman had said could be done. Their argument had been a smokescreen: the units (which had no individual drying/ laundry or bathing facilities) could not function without these centralised facilities.

With such a high level of comfort for its time–in part certainly due to high social subsidies–it is no wonder that the complex of Blocks VI & VII was much appreciated by its culturally homogenous inhabitants of the time; more so than its contemporaries. This community thrived. A street association (*straatvereniging*) was founded which even arranged excursions for resident housewives.[106]

At the end of the 1950s, households in the Netherlands started to make the transition to consumer culture with the associated increase in comfort demands and the need for space for consumer goods such as washing machines, fridges etc.[107] At Blocks VI & VII the laundry facilities were also upgraded: nine washing machines were in place in the central washhouse by 1953.[108]

The reality of the matter is that Blocks VI & VII continued to require a high amount of maintenance and subsidy. The entire heating system–including supplies, operations, small- and large-scale maintenance and staffing costs for the central water heating installation, bath house and laundry–was especially expensive and had to be subsidised from central municipal budgets to balance the books for a period of 55 years. The meagre income generated by the lifts was collected by the staff of the bath house and was included in the income budget entries for the *Was-en Badinrichting annex Central Verwarming* (Laundry and washing faciality annex block heating). The income from the residents' contribution that made up part of their

106 (Boddaert, 1991, p. 78).

107 (Hofland, 2004, p. 39).

108 (s.n., 1953).

rental only covered an average of 53% of the total operating costs of the central facilities over the entire operation lifetime. For a rather typical year, 1953/54 the municipality was forced to double the income from the facility to balance its operating budget.[109]

This loss continued through the 1950s.[110]

The old 1922 laundry and drying facility was closed in 1960 after a lifespan of 38 years. "Due to the continuing decrease in its use and the increased cost, the hand-washing and drying facility operated in the Justus van Effen Street, that was brought into life for the benefit of the inhabitants in 1922, will be closed from 1 February 1960."[111] This brought down the cost of the facility and by 1966/67 the shortfall, now only for the bath house and heating installation was estimated at ƒ9 346.[112] Despite all these subsidies inhabitants were paying more for their block heating and the maintenance of the bath-house than for rental by the mid-1960s.[113] The Gemeentelijke Woningstichting toyed with installing diesel-fired burners in the water heating installation to reduce the cost to the inhabitants, but did not have the funds to do so.[114]

The discovery in 1959 of inland gas resources and the subsequent exploration and exploitation of the North Sea gas fields started in 1961, led to a transition from coal and diesel to natural gas as energy source for heating. The block heating installation at the Justus van Effen Street was converted to gas in 1966/67,[115] but this did not substantially expand the heat delivery to the dwellings, limited to extant service runs. Over time the system was continually tweaked to improve its performance. By 1971/72 the Gemeentelijke Woningstichting created an annuity to service the

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109 ('Gemeentelijke Woningstichting Rotterdam. Begroting Exploitatiejaar 1955/56'; SAR: BNR 673 (38)).

110 The 1958 shortfall was estimated at ƒ42 103, down from the estimate for 1956/7 of 1957/8 ƒ46 460. ('Begroting Gemeentelijke Woningstichting, 1958. Bijlage VIII'; SAR: BNR 673 (25), p. 3).

111 "Op grond van het teruglopende gebuik en de gestegen tekorten werd de in de Justus van Effenstraat geëxploiteerde handwasserij en drooginrichting, bij de bouw van het complex in 1922 gesticht ten behoeve van de bewonders, met ingang van 1 februari 1960 gesloten." ('Gemeentelijke Woningstichting. Jaarverslag 1959/60'; SAR: BNR 637 (13), p.7).

112 ('Begroting Gemeentelijke Woningstichting, 1974. Bijlage 8'; SAR: BNR 673 (23), p. 7).

113 (s.n., 1966).

114 (s.n., 1966).

115 The Rotterdam Municipal Council had voted to loan ƒ35 000 to the Gemeentlijke Woningstichting to upgrade the heating system to an automatic gas fired block heating system. ('Begroting Gemeentelijke Woningstichting, 1969. Bijlage VIII'; SAR: BNR 673 (25), p. 7).

eventual replacement of the block heating system.[116] The annuity for the heating system for that annual budget was ƒ132 511, close to the original installation cost of ƒ144 408.[117] No annuity, however, was created to replace the pumps servicing the block heating installation, despite an initial investment cost of ƒ22 452 and an estimated value at the time of ƒ15 178.[118] This leads to the conclusion that the Gemeentelijke Woningstichting intended to eventually replace the central with a decentralised system.[119]

Over time some open balconies were enclosed to provide space for, amongst others, showers when new tenants moved in.[120] In 1972 the Gemeentelijke Woningstichting noted an operating loss for the bathhouse: an amount of ƒ35 233,63. In the same year, the management and cost of the bathhouse, a public service, was then transferred to the *Dienst der Gemeentelijke Ziekenhuizen* (Municipal Hospitals Services). This service was in charge of all public bathhouses in the city.[121] By May of 1982, this service advised the residents of Block VI & VII that the municipality would announce the permanent closure of the bathhouse on 1 June of that year.[122] By this time the first large renovation project was already in the planning stage. However, not all apartments had been provided with individual showers yet.

In a project meeting of the same month, the planning team agreed that a letter would be written requesting a postponement of the date for closure as this would leave residents without any bathing facilities.[123] In June a group of inhabitants arranged a mass-shower session in the bath house to protest against its imminent closure.[124]

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116 This was a general trend for the entire pre-World War II housing stock of the Gemeentelijke Woningstichting, evidenced in its annual budgets for the time (SAR: BNR 673).

117 This was in part paid for through credit extended by the Rotterdam Municipal Council (SAR: BNR 673 (25).

118 (‘Begroting Gemeentelijke Woningstichting, 1971/72. Bijlage 8’’; SAR: BNR 673 (23), p. 34).

119 Other blocks in Spangen, Spangen I & V (built to a design of JJP Oud in 1919) and Blocks II & III, having been built without block heating, been equipped with hot water geysers in 1966/7 (funded through credit obtained from the Rotterdam City Council) (‘Begroting Gemeente Wooningstichting, 1970/71. Bijlage 8’; SAR: BNR 673 (23), p. 7).

120 (Van der Hoeve et al., 2002, p. 35).

121 (‘Onderhoudsbegroting 1968. Bijlage VIII’; SAR: BNR 673 (23), p. 11).

122 Minutes of the twelfth planning team meeting. (‘Kort verslag van de 12e planteamvergadering Justus van Effenstraat, gehouden op donderdag 25 may 1982…’; SAR: 837 (96), p. 3).

123 Minutes of the twelfth planning team meeting. (‘Kort verslag van de 12e planteamvergadering Justus van Effenstraat, gehouden op donderdag 25 may 1982…’; SAR: 837 (96), p. 3).

124 Letter from Erkend Wijkorgaan Spangen to the GWR, 17 June 1982 (Ref 82.272/EvD); SAR: 837 (99)).

The garbage chute system received negative comment from early on. An early commentor noted in 1924 already that the municipality had great difficulty in clearing out the collection points because the collection points were strung along the entire inner perimeter, instead of being bundled together in a few easily accessible places.[125] The system was abandoned by 1978, after the housing complex featured in a film entitled *Volkswoningen* Episode 10.[126] This movie starts with a sequence showing a garbage man pulling a cart filled with garbage bags over the aerial gallery and into the lift: a far cry from the hygienic and efficient vision foreseen by Plate's team and further developed by Brinkman and Plate.

The aerial gallery proved to be the Achilles heel of the longer-term affordability of the project: Plate's arguments relating to the cost benefits of the gallery system did not take long-term maintenance into account. In the 1949/50 maintenance budget 32% of the total annual maintenance budget was allocated to repairing the waterproofing of the gallery.[127] The following year the budgeted amount was 5,7% indicating that only maintenance was needed,[128] but two years later another 1% of the entire budget for the block was spent on structural repair and 2% on waterproofing.[129] In 1955 the maintenance to the asphalt gallery floor amounted to *ƒ*5 000.[130] This was not sufficient to address all problems with the gallery. Just one year later in the budget of 1956/57, a further *ƒ*1 440 was budgeted for repairs to the concrete structure of the gallery, and *ƒ* 2046 to repair the asphalt floor![131]

The dwellings were also proving to be quite damp and cold. The budget for 1948/49 shows that provision had to be made for the "covering of damp walls with plasterboard on cavity laths etc. in dwellings…"[132] Measures against dampness and replacement of granolithic kitchen sinks appeared in the 1949/50 budget.[133] In the 1953/54 budget a third of the budget for the project was allocated to application of damp proof sheeting–possibly asbestos-cement panels–to exterior walls,[134]

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125 (Siebers, 1924).

126 (SAR: Collection Image and Sound, No. BB 2872).

127 An amount of *ƒ*2 500 of a total of *ƒ* 7 745 was budgeted for repair of the asphalt floor on the gallery, ('Onderhoudsbegroting 1949'50. Bijlage VIII'; SAR: BNR 673 (23), p.7).

128 ('Onderhoudsbegroting over het exploitatiejaar 1950/51'; SAR: BNR 673 (23), p. 3).

129 ('Gemeentelijke Woningstichting. Begroting voor het Expoitatiejaar 1952/53'; SAR: BNR 673 (23); p. 9).

130 ('Gemeentelijke Woningstichting. Begroting voor het Expoitatiejaar 1954/55'; SAR: BNR 673 (23)).

131 ('Gemeentelijke Woningstichting. Begroting voor het Expoitatiejaar 1956/57'; SAR: BNR 673 (23), p. 7).

132 Budgeted at *ƒ*550 ('Begroting 1948/1949. Bijzonder onderhoud'; SAR: BNR 673 (23)).

133 Both at *ƒ*1 000 ('Onderhoudsbegroting 1949/'50'; SAR: BNR 673 (23), p. 29).

134 "Bekleden van vochtige buitenmuren, *ƒ* 6 000" ('Gemeentelijke Woningstichting. Begroting voor het Exploitatiejaar 1952/53' SAR: BNR 673 (23), p. 9).

This same year all dwellings were re-painted internally due to damp damage to the walls.[135] It is possible that the original timber wall panelling had been removed from many dwellings by now, exacerbating the problem of damp.

The relative decrease in the comfort levels of the dwellings drove residents away. In a 1978 interview an inhabitant told of her love for her dwelling in the block, because "…if you always lived in a home located on the upper floor of a building, if you were born in one, then this (dwellings on a gallery) is, certainly, a breath of fresh air." Yes, she felt forced to move, despite having "…a separate entrance and good relationships with the neighbours…" in this "…little town…" due to the lack of comfort. She stated that the house was too damp and that housing foundation would not extend the limited heating system into adjacent rooms and that the "…cold from all sides…" and that "…it is incredibly difficult to get it (the dwelling) warm and dry in winter".[136]

Many inhabitants were used to the status quo though, some residents were reported to have lived here a full 61 years; from 1921–83 when the first large scale renovation commenced.[137] In the interim some alterations had of course been made, continuing the slow pace of gradual evolution. The spare kitchen smokestacks built in case they might be used in combustion cooking and heating, had to a large extent been removed by the early 1980s.[138]

The *Gemeentelijke Woningdienst Rotterdam* had undergone a gradual evolution change in the nature of the organisation. The largest of these was the change from Gemeentelijke Woningstichting (Municipal Public housing Foundation) to *Gemeentelijke Woningbedrijf Rotterdam* (Rotterdam Housing Company, GWR) in 1979. This transition from foundation to company indicates a more market-driven economic approach. Entering the 1980s, the complex still known as Block VI and VII Spangen, was out-dated and expensive to maintain and occupy for this company.

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135 "Het binnenverfwerk van 266 won. a *ƒ* 50,--" ('Gemeentelijke Woningstichting. Begroting voor het Exploitatiejaar 1952/53'; SAR: BNR 673 (23), p. 9).

136 "…als je altijd op een bovenhuis gewoond hebt, in een bovenhuis geboren bent, dan is dit, ja, een verademing.'; '…eigen ingang en je gaat goed met de buren om…"; "alsof ik in een dorpje kwam"; "…weigering van de gemeentestichting in de andere vertrekken verwarming aan te leggen…"; "van alle kanten de kou en ontzettend moeilijk dit in de winter warm te krijgen en droog te krijgen…" ('Volkswoningen' Episode 10', 42' 35" onwards. SAR: Collection Image and Sound BB 2872,).

137 (Boddaert, 1991, p. 79).

138 (Kuiper, 1986, p. 37).

5.4.5 Reflective observation

In reflecting on the first life-cycle of the complex Blocks VI & VII, Spangen, the 2E+Co innovations of the design have proven to be the source of comment and controversy. The design for Blocks VI & VII was widely published in the architectural press at the time of its construction, mostly with positive reviews. The popular press was split about its merits. The national Catholic newspaper *De Maasbode*, which was published in Rotterdam could speak no good of the project, likening it to a prison, more specifically, the Tower of London, adding their condolences to "…our citizens who, driven by the housing shortage, will soon enjoy the privilege of finding a house in this Spangenschen gallery building!"[139]

The *Sociaaldemocratisch Dagblad* responded in less than a month with a full-page spread on the project which included a sharp rebuttal to the *De Maasbode*. This exposée, which included photographs and a plan of the block, lauding its virtues. "It is especially the housewife who knows how to talk about this, because for every little thing she has to carry two or three steps down and back, and for that time she has to leave her little children unsupervised. How many serious accidents, how many fires are due to the fact that the housewife had to leave her little ones unguarded, we dare not say."[140]

During City Council meetings, the project was decried as a failure. Especially the laundry facilities proved to be an experiment the City Council were loath to repeat, despite calls from within the Council to do so:

"In answer to the wish of a couple of members [of the city council], that the city endeavour to continue to build communal laundries, other members have highlighted the less successful attempt with a laundry in the gallery building in Spangen…

139 "onze burgers die binnenkort, gedreven door den woningnood het voorrecht zullen genieten eene huisversting te vinden in dezen Spangenschen galerijbouw." (s.n., 1922c).

140 "Het is vooral de huisvrouw, die hiervan weet mee te praten omdat ze voor iedere kleinigheid twee of drie trappen af en weer op moet sjouwen, en in dien tijd haar kleine kinderen zonder toezicht moet achterlaten. Hoeveel ernstige ongelukken, hoeveel branden zijn toe te schrijven aan het feit, dat de vrouw des huizes haar kleinen onbewaakt moest achterlaten, wagen wij niet te zeggen." (s.n., 1922a).

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The cause [of this failure] must, according to some, be sought in the impractical design of this laundry; the housewives are required to do the laundry themselves, which is not ideal as laundering should be seen as paid professional work."[141]

FIG. 5.15 A photograph of the laundry shortly after completion (J Frijhof; Housden, 1960, p. 158).

The social and financial failure of the laundry was repeatedly referred to as case in discussions about public provision of such facilities.[142] The continued costs to the public purse was even highlighted when the City Council debated its 1927 budget. Criticism came from both left and right. Even those in favour of a strong social municipal engagement in public health, could not ignore the technical shortcomings of the installations, which coupled with the still-rudimentary laundry facilities resulted in a hot, humid un-tempered environment in which back-breaking work had

141 "Tegenover den wensch van enkele leden, dat de oprichting van gemeentelijke wasscherijen zal worden bevorderd, wezen andere leden op de minder geslaagde proef te dezen opzichten met de wasscherij in het woningcomplex van den galerijbouw in Spangen... De oorzaak daarvan moet volgens sommigen gezocht worden in den onpraktische opzet van deze wasscherij; de huisvrouwen moeten daar zelf de wasch doen, hetgeen geen goede toestand is, aangezien wasscherij als vakarbeid moet worden beschouwd." (s.n., 1925b).

142 See (s.n., 1925c) and (s.n., 1926b), in both cases reporting to the high cost of maintaining the washing and laundry facilities of this public housing complex.

to be undertaken. In the same 1927 budget meeting, Suze Groeneweg, a prominent socialist and first woman in the Dutch parliament and the Rotterdam City Council, noted: "…the advantage… of block heating and provisions for hot water and of the opportunity to do the laundry out-of-doors…" but concluded that: "…[t]he washhouse of the gallery building is still not what it should be. The women still need to manually turn the washing machines. The drying facility is also not what it ideally should be; the space in which the women move, is still very hot."[143]

At the same council meeting the entire project was used as an argument against the continuation of the City's public housing programme. The project was also used as reason to support private initiative as vehicle of choice for addressing the housing shortage. In debates on the City's 1927 budget, one conservative alderman vented that the complex "…has presented a loss of ƒ 13,336 over the last year, approximately ƒ 50 per unit or ƒ 1 per week. Additionally, most people find a burner more appealing than block heating, and one should not exaggerate with regards to the hot water provision. Or that of the laundry [facilities]. One of the advantages of private housing development has always been their attics, which provide a place for drying [of washing]. In the gallery building 264 families reside. When one sees how little use is made of the washing and drying installation, it transpires that one should not impose things on the populace that they have not asked for. The speaker asks if it is not highly advisable to assess if the further working of this block on this current basis can be sustained."[144]

By this time Plate had been relieved of his duties as Director of the Housing Service and the "excessively capitalist" city disengaged from its active role in housing production.[145]

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143 "…de voordeelen… van centrale verwarming en voorzieningen met warm water en van de gelegenheid om de wasch buitenshuis te behandelen. Het washuis van den galerijbouw is nog niet zoo-als het moest zijn. De vrouwen moeten nog altijd zelf de waschmachine in beweging brengen. De drooginrichting is eveneens nog niet zoals zij wezen kon; de ruimte waarin de vrouwen zich bewegen, is nog sterk verhit." (s.n., 1926a).

144 Alderman HE van den Brule (RKSP): "Het blok in Spangen… heeft het laaste jaar een verlies van ƒ 13,366 gegeven, dat is ongeveer ƒ 50 per woning of ƒ 1 per week. Bovendien, de meeste menschen vinden een kachel aangenamer dan centrale verwarming, en ook ten aanzien van een warmwatervoorziening moet men niet overdrijven. En de wasch. Een van de voordelen van den particulieren bouw zijn de zolders met gelegenheid tot drogen geweest. In den galerijbouw wonen 264 gezinnen. Ziet men dan, hoe weinig er gebruik maken van de wasch- en de drooginrichting, dan blijkt dat men den menschen toch maar liever geen dingen moet opdringen die zij niet wenschen. Spr. vraagt, of het niet ernstig aanbeveling verdient, na te gaan of de expoitatie van dit block op den tegenwoodigen voet wel te handhaven is." (s.n., 1926a).

145 (Van Stiphout, 2005, p. 270).

Spangen Blocks VI & VII was derided in the liberal media, but lauded in socialist newspapers and in the architectural press.[146] It was often especially referred to when presenting the development of the city of Rotterdam or public housing in the Netherlands. In 1928, in a jubilee edition celebrating the 600th birthday year of Rotterdam, the early death of Brinkman (referred to as one of the 'younger masters' of Rotterdam) was bemoaned.[147] In the same publication, Heykoop, the socialist alderman under whose watch the project had been approved, lauded the project. It is worth quoting this passage as it contains the essence of what the project had become known for:

"The great Brinkman plan, with its upper galleries 7 M. above street level and of approximately 800 M length, on which the baker, the milkman and the greengrocer can wheel along their carts with ease, and access the ground floor door, without the house wife needing to walk down stairs, is an extraordinary example of modern public housing. These dwellings, provided with block heating and special garbage chutes, with neat built-in kitchen counters, appointed with modern ablutions [toilets], closely approach the ideals of urban housing. The gardens between the various blocks, the bath- and washing provisions in the centre, complete this neat complex, which our city can justly be proud of."[148]

The city itself was happy to mention it as "one of a kind" in a three-page feature on the architecture of the city, published in the *Nieuw Rotterdamsche Courant* (NRC) marking the 'Olympic, Nenijto- and jubilee year', but then only as an aside…[149]

The project was also included in a national exhibition arranged by the Nederlandsch Instituut voor Volkshuisvesting en Stedebouw (Netherlands Institute for Public Housing and Urbanism) in Amsterdam in 1930.[150] Six years after the completion of the block, the Rotterdam Socialists Newspaper *Voorwaats Sociaal-Democratisch*

146 (s.n., 1922a).

147 (Otten, 1928).

148 "Het groote plan-Brinkman, met zijn 7 M. hoog boven de straat aangebrachte galerijen van pl.m. 800 M. lengte, waarop de bakker, de melkboer en de groenteboer hun wagens rustig voortduwen en aan de étagedeur komen, zonder dat de huisvrouw trappen behoeft te lopen, is een uitnemend staal van modernen volkswoningbouw. Deze woningen, voorzien van centraal verwarming en van speciale vuilnis-afvoerkokers, met keurig ingebouwde keukenbuffetten en ook overigens voorzien van modern gemakken, benaderen het ideaal van groote stads-woningbouw. De tuinen tussen de diverse blokken, de bad- en wasinrichting in het midden, volmaken dit keurige complex, waarop onze stad terecht trotsch kan zijn." (Heykoop, 1928, p. 61).

149 "…eenig in zijn soort" ('Rotterdam in het Olympische, Nenijto- en Jubileumjaar'; (s.n., 1928c)).

150 (Nederlandsch Instituut voor Volkshuisvesting en Stedebouw, 1930).

Dagblad concluded that the 'Gallerijbouw' should be seen as a success and that this principle be applied again in the Rotterdam suburb Blijdorp.[151]

The ideas developed by Plate's GWD and further refined by Plate and Brinkman inspired a second Rotterdam architectural icon. In 1934, W van Tijen stated that the Bergpolderflat tower block housing in Rotterdam, designed by himself, JA Brinkman (son of Michiel) and LC (Leendert) van der Vlugt, is a "modern continuation of the ideas that inspired the design of the gallery building designed and executed by the late architect Brinkman in collaboration with Ir. Plate".[152]

The 1938 jubilee publication

As time progressed the focus of reporting on the project in the architectural historiography moved from an architectural to the socio-cultural history of the development of the city: Van Ravesteijn in 1948 delved into the politics and finances of public housing development in Rotterdam early in the Twentieth Century,[153] and Nieuwenhuis (1957) focused on a previous generation of the actors engaged as municipal engineers in the development of the city.[154]

In 1952 Wim van Tijen and E de Maar concluded that the project had been "…an interesting experiment, with little influence."[155] (despite Van Tijen's earlier statement that the Bergpolderflat building of which he had been co-designer, had been designed as a continuation of the ideas encapsulated by the gallery building).

The failure of technical aspects of the project had started to show by then, leading to the concrete balcony's technical shortcomings being published in 1956[156] and 1957.[157]

By this point a new dynamic had entered the general valuation of the project. In the early 1960s the cultural and architectural value of Blocks VII & VII became

151 (s.n., 1930).

152 "…een moderne voortzetting van de gedachte die heeft voorgezeten bij het ontwerp van den galerijbouw door wijlen architect Brinkman in samenwekring met Ir. Plate onworpen en uitgevoerd." (Van Tijen, 1934, p. 47).

153 (Van Ravesteyn, 1948).

154 (Nieuwenhuis, 1956).

155 "een interessante proefneming, welke weinig navolging vond." (De Maar & Van Tijen, 1952).

156 (Rosema, 1956).

157 (Bosschaert, 1957).

appreciated. The *Historisch Genootschap Roterodamum* (Historic Association Roterodamum), included the complex in their 1972 inventory of valuable Rotterdam buildings. Their list, presented to the City Council, led to its eventual listing as a municipal monument in 1973.[158] The first attempt to underscore the architectural value of the project was made by Franz Füeg in a Swiss retrospective on the work of the architectural practice Van den Broek and Bakema, the successors of JA Brinkman and LC van der Vlugt who in turn followed on from Michiel Brinkman.[159] Füeg positioned the "Wohnhof Spangen in Rotterdam 1919–1920. Architect Michiel Brinkmann [sic]" as part of the heritage of this practice. This publication already included a host of images that would become iconic in the future, including images of the baker's cart being wheeled across the gallery and the interior of the laundry. A year later, the Architectural Association (AA) published a special edition of its journal on the work of JH van den Broek and JB Bakema, as the successors Brinkman & Van der Vlugt, and Brinkman.[160] The author, Brian Housden was less-than flattering when he stated: "One of the most striking things about this scheme is the extra-ordinary impression of naivety it gives. Here are streets 12 feet above ground supported on slender in-situ concrete columns in a manner that looks haphazard. Where the street turns a corner, the corner is cut at a right angle in a most obvious and unarchitectural way." [A somewhat unfair comment as Brinkman had noted in 1920 that the corners had been pragmatically cut away to allow for delivery carts to turn the corners without damaging the balustrade![161]]. Housden continued: "There are flower boxes, made from concrete, built out from the parapet where also a few squares of mosaic have been placed. The most obvious source for the more striking forms is MacIntosh but the whole scheme has a childish quality and a coarseness that the talented designer from Glasgow would not have admired."[162]

However, at the same time the project was receiving newfound attention abroad, even when with some disdain, none other than JB (Jaap) Bakema reintroduced it into the canon of architectural education at the then Delft Technische Hogeschool (Delft Institute of Technology, now the Delft University of Technology). Jaap Bakema and Herman Hertzberger, both influential in the institution as parttime professors in the 1960s, had already brought fame to the building through their lauding of it in the 1960/1961 edition of the architectural magazine *Forum*.[163] From now on first-

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158 (Van Emstede, 2015, p. 176).

159 (Füeg, 1959).

160 (Housden, 1960).

161 ('Ter verdere voldoenning aan de opdracht tot…'; SAR: 1190, (6), dos 154.).

162 (Housden, 1960, p. 155).

163 (Bakema, 1960–1) & (Hertzberger, 1960–1). Bakema, Hertzberger and Aldo van Eyck were the editors of the magazine and used it to propagate their Structuralist ideals.

year students would be taken on excursion to see the building on their first day of lectures. The project featured again as part of the Van den Broek & Bakema legacy in the exhibition, and its catalogue of their oeuvre *Bouwen voor een open samenleving* (Building for an open society) at Museum Boymans Van Beuningen in Rotterdam in 1962.[164]

FIG. 5.16 Two iconic images of the Justus van Effen block, both featuring the aerial gallery included in the book *Bouwen voor een open samenleving' on the legacy of Van den Broek and Bakema architects.* (Joedicke, 1962, s.n).

From here the fame of the project spread both nationally and internationally, the most important authors to address the project being Grinberg,[165] Fanelli[166] and Casciato, Panzini & Polano.[167] Of these only Fanelli noted the collaboration of Plate and Brinkman in developing the design.

But this didn't bestow the complex any formal protection, even if the building now complied with the required minimum age of fifty years.

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164 (Joedicke, 1962).

165 (Grinberg, 1982).

166 (Fanelli, 1978, p. 43–4).

167 (Casciato, Panzini, & Polano, 1980).

For years following the enactment of the first Dutch *Monumentenwet* (Monuments Act) in 1961, the resultant monument's register was full of buildings dating to the end of the ninetieth and the beginning of the twentieth century, the so-called *jonge/re monumenten* (young/er monuments). The process towards a more balanced national monument's list, described in detail by Kuipers,[168] is summarised here.

Conservationists and architects alike agitated for the redress of the imbalance. A group of architects for instance published their preselection of important younger buildings worthy of national protection in the *Plan* Nr.4 in 1970[169] Some cities, notably Amsterdam in 1972 and Rotterdam in 1973, added late nineteenth and early twentieth century buildings to their municipal registers, but attention to the imbalance in the national monuments register remained.

The *Nederlands Documenatiecentrum voor de Bouwkunst* (Netherlands Documentation Centre for Architecture, NDB), the precursor to the current *Het Nieuwe Instituut,* (The New Institute, HNI)[170] organised four large exhibitions under the title *Nederlandse Architectuur 1888–1903* (Dutch Architecture 1888–1903) in 1975. Again, the Justus van Effen Block featured. But it was only after the deputy minister for Culture decided that younger *bouwkunst* (architecture) would be given preference in future listing in 1979 activities that the RDMZ gave this operational attention to the matter. Still, it was only after neogothic churches and other, mostly end-ninetieth century buildings, had been evaluated, listed and registered that so-called 'young monuments of 1900–40)', were addressed, responding to the urgency highlighted in *Plan* in 1970.

With the NDB, the RDMZ compiled a list of *Bijzondere monumenten van jongere bouwkunst* (Special monuments of younger architecture) in 1980.[171] The Justus van Effen Block was included on this list and granted *voorbescherming* (provisional protection) in 1982.

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168 (Kuipers, 1997).

169 (s.n., 1970).

170 The NDB was closely affiliated with the department for Art History at the RDMZ.

171 (Kuipers, 2018).

5.4.6 Learning Cycle 1: 2E+Co in the Actor-Factor-Set Ecosystem

The built form of the Justus Quarter, or Block VII & VII Spangen, also known as the Brinkman Block, the Galerijbouw Spangen or the Justus van Effen Street, was closely entwined with the social, architectural, economic, technological and political context of its genesis. This included the housing shortage, dire state of urban health and the impacts of WWI, including fuel and food-shortages, the Spanish Flu and typhoid epidemics and sky-rocketing material and labour prices. It represented progressive socialist ideals (particularly that of Plate and Heijkoop) with hope for improving living conditions through applications of new technologies. It was, however, only approved by the Rotterdam city council as experiment.

The final design of the project for Blocks VI & VII Spangen was a result of the close cooperation between Plate and Brinkman. It is fair to say that they, with possibly alderman Heijkoop, formed the most important actors in the Microsystem of the genesis of this unique building and its facilities. Together they lobbied the Mesosystem: the Rotterdam municipal council to ensure that the project would be implemented. In socially volatile times, these Mesosystem actors were willing to be placated with the label 'experiment' and platitudes in the form of promises of possible alterations of the plans or future transfer of this highly communal housing from public to private ownership.

5.5 Learning cycle 2 (1982–2000)

During the years 1983–85, Block VI & VII, by now called the Justus van Effen Block or Complex, underwent a first radical renovation. This process, planned by a team of professionals, residents' representatives and the agents for the owner, the GWR, was a major mutation in the fabric of the building.

5.5.1 S•E•T

5.5.1.1 Urban Renewal processes

By the 1970s, younger inhabitants of older public housing complexes nation-wide were starting to agitate for upgrading of the housing stock. Up to that point the country had been so bent on reducing the housing backlog resulting from the economic depression in the 1930s and WWII that the extant public housing was not given much attention. After years of expansive new housing production, cities could turn their attention to their decayed centres, adopting a process of demolition and replacement, (so-called sanering–renewal)[172] to construct new larger sized living units while making space for improved transport routes, office blocks and higher income speculative housing.[173]

Many low-income inhabitants became so called *saneringsnomaden* (urban renewal nomads), moving from one near-condemned, but cheap, building to the next. Due to this urban renewal policy the population of the city of Rotterdam, like most other Dutch cities decreased.[174]

With rental increases to pay for these new investments on the cards, the lower income society revolted. The inhabitants of public housing units dating to the end of the nineteenth century, most likely to be demolished, organized themselves into political movements. They soon had the support of social workers, architects and sociologists.[175]

The tide turned in Rotterdam when the elections of 1974 were won through a so called 'red' platform of socialism and urban renewal,[176] heralding a new era of experimentation in urban renewal simply known as the *Rotterdamse aanpak* (Rotterdam approach), with the slogan: *Bouwen voor de Buurt* (Building for the Neighbourhood–a slogan also employed in the Amsterdam urban renewals process of the 1970s).

172 Literally translated the word comes closest in meaning to 'cleansing', which was also motivated by 'slum clearing' for hygienic reasons to counter tbc and other pandemic diseases.

173 (De Ruiter et al., 1985, p. 9).

174 (De Ruiter et al., 1985, p. 9).

175 (Camp & Provoost, 1990, p. 59).

176 Rotterdam was such a 'red' city that in 1981 May Day was officially celebrated by the municipality under the then mayor, A van der Louw ("André van der Louw", 2020).

The Bouwen voor de Buurt slogan exemplified a bottom-up approach where decision-making was the result of extensive public consultation on neighbourhood-level This approach was the only possible course of action in a socially volatile period in a worker's city like Rotterdam: a harbour city with a radically left-wing politicized population which scrutinized all official movements, countered with passive and active civil unrest.

The 'Rotterdam approach' had a strong social agenda at its base. Planning and implementation proposals were steered by project groups made up of officials and neighbourhood representatives. Key points of this approach were:

- the retention of public housing as public housing, leaving no option for commercial development or the privatization of housing;
- retention of habitation rights of extant inhabitants of units;
- ensuring that rental and other costs remained affordable; and
- a mandate to the project group to allocate vacant rental units.[177]

The new approach of urban renewal was first applied to the older late nineteenth century housing stock. Whole neighbourhoods were tackled *en masse*. By the 1980s neighbourhoods dating to the beginning of the twentieth century were next in line and by 1982 the implementation of the urban renewal process commenced in Spangen. By now, Spangen one of the poorest neighbourhoods in the Netherlands and a hotspot of illegality with many abandoned housing units presenting their boarded-up windows to the abandoned streets. It was a refuge for drug dealers and users, famous amongst French drug tourists, presenting a particularly grim spectacle.[178]

In Spangen, 45% of all residential units were in private ownership, but were very small. One of the major obstacles faced in the urban renewal was increasing the dwelling size required to improve living conditions in the blocks. It was estimated that this would lead to a loss of 30% of the housing stock in the neighbourhood.[179]

These obstacles despite, the whole of Spangen was declared a *Stadsvernieuwingsgebied* (urban regeneration zone) on 11 March 1982 by the

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177 This project group consisted of bureaucrats and inhabitants and excluded owners of property, thereby excluding capitalist interest (De Ruiter et al., 1985, p. 12).

178 (Steenhuis Stedenbouw/landschap I Urban fabric, 2009, p. 6).

179 (De Ruiter et al., 1985, p. 222).

Rotterdam Municipal Council,[180] paving the way for the commencement of large-scale subsidised demolition and reconstruction, or renovation projects. The Justus van Effen Street housing block was one of the first identified for renewal. Available subsidies included the very important national subsidy from the Ministry of *Volkshuisvesting, Ruimtelijke Ordening en Milieu* (Housing and Physical Planning, VROM) for dwelling quality improvement. This subsidy increased from the equivalent of € 791-mil to € 2506-mil between 1971 and 1982 by which time it represented a staggering 3,9% of the GDP.[181] This far-reaching financing programme was applied from 1977 onwards through the *Interim Saldo Regeling* (Interim Balance Agreement), which allowed for shortfalls of approved projects to be covered from state coffers.[182]

The urban renewal in Rotterdam saw three strategic building intervention levels:

- Maintenance Regime;
- Small Neighbourhood Plus; and
- High Level Renovation.[183]

The High Level Renovation of the Justus van Effen Block encompassed a total renovation of the internal space plan coupled with heating and sound insulation that conformed to the current construction norms. The payback period for these investments was calculated to have been 43 years in 1989.[184]

While the renovation was being planned, the 1982 provisional protection as National Monument added further complexity to the challenge of change. The Justus van Effenstraat public housing complex was officially registered a National Monument in 1985 after completion of the renovation project.[185]

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180 Proposed by the Mayor and aldermen on 12 February/3 March 1982 and confirmed by the *Daagelijks bestuur van het Openbaar Ligaam Rijnmond* (Daily Management of the Rijnmond Public Liaison Office) on 11 March 1982. (‘Document R-392/789'; SAR: 837 (7)).

181 (Stouten, 2004, p. 178, presents these figures in Euro equivalent for 2004.

182 (Stouten, 2004, p. 179).

183 “Instandhoudingsregeling, Kleine Beurt Plus and Hoog Niveau Renovatie.” (Hogervorst, Jongh, Meurs, & Noorlander, [s.a.], p. 15).

184 (Hogervorst et al., [s.a.]).

185 For a survey of this process see (Van Emstede, 2011, p. 4).

5.5.2 Abstract conceptualisation

The renovation of the Justus van Effen Block was guided by a blanket approach for the entire neighbourhood. A project group the *Projectgroep* was created and tasked with "preparing the renewal of the neighbourhood (Spangen) and promoting and assisting in its execution."[186] In March 1983, the Projectgroep set out a project brief with ambitions for the whole urban renewal of the area. The group consisted of residents' representatives, assisted by a social advisor and representation from various municipal departments, including *Stadsontwikkeling* (Urban Development), *Volkshuisvesting* (Public Housing Services), *Woonruimtezaken* (Home Space Planning Services), *Bouw- en Woningtoezicht* (Building and Housing Supervisory services), *Verkeersdienst* (Traffic) and *Gemeentewerken* (Municipal Works). The project team reported directly to the Mayor and Municipal Council. The workgroup prepared the blanket *Plan van Aanpak, Spangen*[187] or project brief, for the entire multiyear programme, setting for themselves the ambition to achieve the building minimum norms contained in the *Voorschriften en Wenken, 1965*[188] (Prescripts and Guidelines, 1965) of VROM. Under the heading *Woningkwaliteit en renovatiefasering* (Housing quality and renovation phasing) the general deficiencies of housing in Spangen that needed to be attended to are clearly set out:

- too small rooms;
- lack of showers (in dwellings);
- kitchens too small;
- poor provision and quality of sanitary facilities;
- insufficient sound proofing between flats;
- poor heat insulation and absence of double glazing; and
- lack of bicycle storage facilities on ground floors.[189]

The Plan van Aanpak further stated that the dwellings in the worst state were to be renovated first. The Justus van Effenstraat was scheduled to be the second block to be addressed, implicating that it must have been in dire straits. It estimated that the renovation would reduce the number of dwellings of the Justus van Effenstraat from 264 to 160.[190] A *woonwensenonderzoek* (living conditions aspirations

186 ('Plan van Aanpak, Spangen. Projectgroep Spangen'; SAR: 837 (16), p. 3).

187 ('Plan van Aanpak, Spangen. Projectgroep Spangen'; SAR: 837 (16)).

188 ('Plan van Aanpak, Spangen. Projectgroep Spangen'; SAR: 837 (16), p. 4).

189 ('Plan van Aanpak, Spangen. Projectgroep Spangen'. (SAR: 837 (16), p. 14).

190 ('Plan van Aanpak, Spangen. Projectgroep Spangen'. (SAR: 837 (16), p. 20).

assessment) was undertaken in January 1982, although certain norms had already been set out in the specific project, *Project Brief* that included:

- the Norm NEN 1068 to be achieved for all dwellings; and
- lowering of the basic rentals for the dwellings. [191]

The NEN 1068, *Thermische isolatie van gebouwen. Rekenmethode* (Thermal insulation of buildings. Calculation Method), a standard set by the *Nederlands Normalisatie-Instituut* (Dutch Standards Institute), was first published in 1964, with a new edition in 1981 in part as a response to the oil crisis that had highlighted the economic benefits of energy use reduction. By now the NEN 1068 prescribed an insulation value (thermal heat resistance coefficient) of 1,3 m^2K/W for the skin of a residential building.

The first project team meeting took place on 15 October 1981 with in attendance, representatives of the owner, the GWR, an external specialist advising a pre-constituted residents commission, which included representation from the *Wijkorgaan* (neighbourhood committee) and the architectural practice selected by the project team, Leo de Jonge Architects.[192]

The architect was given the go-ahead to compose the project specifications on 23 April 1982, indicating that the project design was already well advanced. The unit size was increased by reducing the number of units from 264 to 164 as mandated by the original Plan van Aanpak entirely altering the space-plan structure of the building, and requiring a total reconfiguration of all services as well as a modulation of the façade openings.

An undated project sheet issued by the GWR, possibly just before construction commenced on 1 February 1984, listed the expanded project team. The project architect Ton Kuiper represented Leo de Jonge architects. The structural engineer

191 Minutes of the second planning team meeting. ('Kort verslag van de 2e planteamvergadering Justus van Effenstraat, gehouden op donderdag 12 november 1981…'; SAR: 837 (96), p. 3).

192 Minutes of the first planning team meeting. 'Kort verslag van de 1e planteamvergadering Justus van Effenstraat, gehouden op donderdag 15 october 1981…' Listed in the first minutes are: For the architectural practice Leo de Jonge: Arie van Ree, Dee Schimmel, Jan van de Wetering. For the Rotterdam Housing Corporation: Joop Huijzer, Koos Stekenburg (chair), Rob Wijs, Jenny van Duijn-Schakelaar, Sylvia de Jong and Rob Teunissen. For the Public Housing Department, Ben Noorlander. Evert van Diepen and an unspecified external specialist. For the block and the neighbourhood: Albert Wijman, Leen Groen and Willem Böhm. Minutes of the first planning team meeting. ('Kort verslag van de 1e planteamvergadering Justus van Effenstraat, gehouden op donderdag 15 october 1981…'; SAR: 837 (96)); (Van der Hoeve et al., 2002, p. 36).

(Baas) and contractor (*Verenigde Dura Bedrijven, Rotterdam*) were now also included. Additionally, the *Bewonersorganisatie Spangen* (Residents Association Spangen) and the Projectgroep Spangen were given seats at the table.[193]

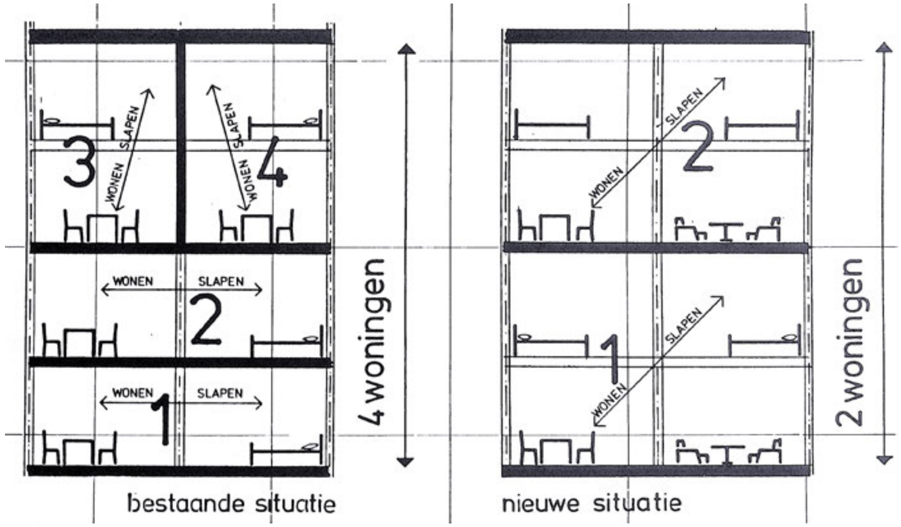

FIG. 5.17 Typical section of the block showing the intimal and proposed spatial structure (Leo de Jonge architects; SAR: 396.03).

The Rijksdienst voor de Monumentenzorg (RDMZ) was not represented in the project plan team meetings. When news came of the provisional listing of the complex in 1982, the project team expressed its fear of negative impact, although they also saw it as a potential subsidy source. Before the first plan team meeting, a discussion had already taken place with the *monumentenzorg* (monuments care services; it is unclear if the author refers to the municipal or national service). The team was quite adamant that it be communicated to the monuments care services that "the process of listing on the monuments list cannot be allowed to delay the project".[194] For the rest of the process communication remained on this level, through individuals from the inner circle selected to engage monuments care services on individual subjects. One of the topics most discussed being the potential for subsidy. The project manager affirmed that the building would definitely be given provisional

193 (Van Steijn & Krevelen, 1984, p. 25).

194 Minutes of the first planning team meeting ('Kort verslag van de 1e planteamvergadering Justus van Effenstraat, gehouden op dinsdag 15 november 1982…'; SAR: 837 (96), p. 4.)

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monuments protection after having had contact with the RDMZ.[195] The project team, however, still decided that the architect would engage the RDMZ to ensure that the RDMZ would not be too demanding in their requirements.[196] This action indicates a sense of opposition–if not animosity–from the side of the project team towards the monument's services.

Two residents' organizations representing the Spangen neighbourhood and the Justus van Effen Block were included in the planning team. They supported enlarging the existing units, in line with the already approved Plan van Aanpak,[197] despite the resultant 37% reduction in number of dwellings.[198] The architects however protested against a re-design of the interior layout of the units, arguing that the logic relating the internal spaces, doors and windows would be lost,[199] but their objections were in vain: the political decision had already been made.

At the very first plan team meeting the poor state of the gallery was mentioned: there had been complaints from inhabitants regarding its appearance.[200] Yet, despite specialist opinion as far back as 1956[201] indicating that the original construction method was flawed, leading to moisture ingress and decay of the steel reinforcing and the historical challenges in the maintenance of the gallery, discussion on the gallery did not enter plan team discussions until June 1982, 6 months into the planning process. In July, the architects reported that initial investigations showed that the quality of the concrete of the aerial street and balconies was poor and that at least 50% of all reinforcing was affected by decay.[202] By meeting 16, 24 August 1982, the architect had invited three unnamed specialist concrete contractors to tender on the repairs of the balcony. Only two of the contractors were willing to participate.[203] Both proposed two solutions, which

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195 Minutes of the sixteenth planning team meeting 'Kort verslag van de 16e planteamvergadering Justus van Effenstraat, gehouden op dinsdag 124 augustus 1982…'; SAR: 837 (96), p. 3.).

196 "…dat Monumentenzorg niet al te veel beperkende eisen gaat stellen". Minutes of the nineteenth planning team meeting ('Kort verslag van de 19e planteamvergadering Justus van Effenstraat, gehouden op woensdag 7 october 1982…'; SAR: 837 (96), p. 4.).

197 ('Plan van Aanpak, Spangen. Projectgroep Spangen'; SAR: 837 (16)).

198 (Van der Hoeve et al., 2002, p. 36).

199 (Van der Hoeve et al., 2002, p. 36).

200 Minutes of the first planning team meeting '(Kort verslag van de 1e planteamvergadering Justus van Effenstraat, gehouden op donderdag 15 october 1981…'; SAR: 837 (96), p. 5).

201 (Rosema, 1956).

202 Minutes of the fifteenth planning team meeting (Kort verslag van de 15e planteamvergadering Justus van Effenstraat, gehouden op donderdag 7 juli 1982…'; SAR: 837 (96), p. 1).

203 Minutes of the sixteenth planning team meeting ('Kort verslag van de 16e planteamvergadering Justus van Effenstraat, gehouden op donderdag 7 juli 1982…'; SAR: 837 (96), p. 4).

included either repair of the concrete and replacement of the asphalt layer, the problematic and costly waterproofing surface of the gallery, with a torch-on waterproofing membrane, or a complete demolition and replacement. They both indicated that most of the gallery should ideally be replaced.[204] Repair was possible, but they were only prepared to give a 5-year guarantee on the repairs. The contractors were of the opinion that repairing the balcony would be more costly and require more time than complete replacement. These calculations were deemed important enough to be entered into the meeting minutes in detail.[205]

Economic decisions were the driving factor, sealing the future of the gallery and access system, despite initial opposition from the RDMZ.[206] After undertaking further investigations the RDMZ reported in 1983 that the subsequent of plastic coatings and membranes, (*kunststof coatings en folie*)[207] over the original asphalt had not solved the problem of leakages. This layer had grown as thick as the concrete structure itself and the expert of the RDMZ doubted if it could be removed without damaging the gallery structure; a conclusion that suited the project team's ambitions.[208] Any future opposition from monument specialist or other conservation commenters was easily overruled.[209]

The lifts were to be upgraded: one was to be reconfigured as goods lift; the other persons lift.

Communications by the project team with the outside world was limited. Third parties complained in 1982 that: "It is probably because this project is highly regarded as architectural and urban heritage, that the plan team has, to date, declined to provide any information of the improvement (renovation) plans. They obviously feel overly scrutinised."[210] Meeting minutes noted communications

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204 Minutes of the eighteenth planning team meeting ('Kort verslag van de 18e planteamvergadering Justus van Effenstraat, gehouden op dinsdag 12 september 1982…'; SAR: 837 (96), p. 5).

205 The specialists were Bimco and Ivacon. Minutes of the nineteenth planning team meeting ('Kort verslag van de 19e planteamvergadering Justus van Effenstraat, gehouden op donderdag 6 october juli 1982…'; SAR: 837 (96), p. 5).

206 Internal memorandum penned by PK van der Schuit of the RDMZ dated 27 July 1983 ('Betreft: Betonreparatie, gevelreiniging e.d. No. MTB-83-36'. RCE: 5368/46868).

207 Internal memorandum penned by PK van der Schuit of the RDMZ dated 27 July 1983 ('Betreft: Betonreparatie, gevelreiniging e.d. No. MTB-83-36'. RCE: 5368/46868).

208 Internal memorandum penned by PK van der Schuit of the RDMZ dated 27 July 1983 ('Betreft: Betonreparatie, gevelreiniging e.d. No. MTB-83-36' (RCE: 5368/46868).

209 Such as (Giltaij-Lansink, 1987).

210 'Wellicht omdat het hier om zeer gerenomeerd architectonische en stedebouwkundige erfgoed gaat, heeft het planteam tot dusverre geweigerd informatie over het verbeteringsplan te geven.' (Den Ouden, 1982, p. 3).

with the press: at one meeting the plan team decided against the architect being interviewed by a journalist from the NRC daily newspaper,[211] although the following minutes indicate that this interview had taken place after all.[212] Conversely, much energy was put into communication with the inhabitants with whom regular meetings were held, and for whom information leaflets were produced.[213]

Because of the provisional protection of the building, approval of the project by the RDMZ was a prerequisite for the approval by the municipal *Bouw- en Woning Toezicht* (Building and housing supervision). The project team could be sure of their case, as early discussions with the RDMZ did not highlight any conflict in approach,[214] and continuous topic driven discussions took place between the architects and the RDMZ, relating for instance to window partitioning and the plans for the individual dwellings. Communications confirmed that the monuments services would concern itself mainly with the "…appearance and character of the building".[215] Main architectural topics remained the aesthetics of the window partitioning,[216] the renovation and hydrophobic treatment of the façade[217] and the idea of reconstructing the original interior of one dwelling as a museum.[218] The plan team submitted their proposals to the authorities by November 1983.[219]

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211 Minutes of the third planning team meeting ('Kort verslag van de 3e planteamvergadering Justus van Effenstraat, gehouden op donderdag 26 november 1981…'; SAR: 837 (96), p. 4).

212 Minutes of the fourth planning team meeting ('Kort verslag van de 4e planteamvergadering Justus van Effenstraat, gehouden op donderdag 10 december 1981…'; SAR: 837 (96), p. 4).

213 Minutes of the fourth planning team meeting ('Kort verslag van de 4e planteamvergadering Justus van Effenstraat, gehouden op donderdag 10 december 1981…'; SAR: 837 (96), p. 5).

214 Minutes of the thirty-fourth planning team meeting 'Kort verslag van de 34e planteamvergadering Justus van Effenstraat, gehouden op dinsdag 27 september 19(82…'; SAR: 837 (96), p. 1).

215 'Plannen (goedkeuring daarvan). Er wordt v.n.l gekeken naar het uiterlijk en behoud van het karakter van het pand'. Minutes of the eighteenth planning team meeting ('Kort verslag van de 18e planteamvergadering Justus van Effenstraat, gehouden op dinsdag 21 september 1982…'; SAR: 837 (96), p. 5).

216 Minutes of the eighteenth planning team meeting ('Kort verslag van de 18e planteamvergadering Justus van Effenstraat, gehouden op dinsdag 21 september 1982…'; SAR: 837 (96), p. 5).

217 Minutes of the thirty-sixth planning team meeting ('Kort verslag van de 36e planteamvergadering Justus van Effenstraat, gehouden op donderdag 15 october 1981…'; SAR: 837 (96), p. 2).

218 Minutes of the thirty fourth planning team meeting ('Kort verslag van de 34e planteamvergadering Justus van Effenstraat, gehouden op dinsdag 27 september 1982…'; SAR: 837 (96), p. 2).

219 Minutes of the thirty-sixth planning team meeting ('Kort verslag van de 36e planteamvergadering Justus van Effenstraat, gehouden op dinsdag 15 november 1982…'; SAR: 837 (96), p. 2).

5.5.3 Active experimentation

The renovation commenced in December 1983. The whole building was gutted, and a complete new interior layout, consisting of a number of standardized plan types were constructed in the envelope of the old complex. This radical departure from the space-plan logic of the original design included merging units both vertically and horizontally. Toilets, originally located on the façade, were now placed centrally in the house, ventilated mechanically with exhausts in new ventilation shafts. Kitchens were moved to the façade, internal staircases repositioned and balconies enclosed to be used as bathrooms.

At the same time all interior fittings and finishes were replaced and thermal and acoustic insulation installed. The characteristic stepped façade, which articulated the inside surrounds of the sitting room windows (now often kitchen or bedroom windows) was levelled out internally. All doors and windows were replaced, the latter in aluminium completed with double-glazing.

The choice fell on so-called maintenance-free aluminium sash windows frames and after a round of cost saving cuts, the mullion division of the windows, mirroring the original timber mullions, were cut from the budget.[220] The new aluminium sash windows were installed into the original timber frames.[221] The double-glazing chosen was a new product by glass-producer Galverbel called *Thermoplus Prestige*, launched in 1980. This factory assembled double glazing system had a gas filled cavity and low-emissivity (low-e) coating which gave it a far higher insulation value (1,6 W/m^{2}K) compared to normal double glazing (2,9 W/m^{2}K). This technically highly beneficial low-emissivity had the disadvantage of a noticeable colour implication.[222]

Now-obsolete windows were bricked up, and in some cases, small bathroom windows reconfigured as lighting boxes to light the gallery. Face brick façades were cleaned and a hydrophobic solution was applied to the walls to counter moisture ingress according to the standard practice of the day. The central facilities had by now been reduced to provide space heating for the dwellings (an add-on in the original argumentation for the bath-house and laundry to utilise the excess capacity of the installation). The laundry and bathing spaces were now vacant for which a new use had to be found. Typically for the Bouwen voor de Buurt approach, the

220 Trademark SIMEC® (Van der Hoeve et al., 2002, p. 37–8).

221 (Van der Hoeve et al., 2002, p. 35).

222 (Bot, 2009, p. 473).

representatives of the tenant and neighbourhood associations were already tasked at the second team meeting to undertake a questionnaire to find solutions to this problem.[223]

Eventually even the block heating system was removed. Each individual dwelling was provided with a gas-fired boiler and its own piped hot water radiators in all rooms. Now the entire bath-house building at the heart of the block was vacant, but its renovation had to wait due to budgetary constraints and only urgent structural issues were addressed.

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FIG. 5.18 The Justus van Effen Block shortly after the completion of the 1983–85 renovation (both G. Dukker; [1] RCE: 403.422; [2] RCE: 403.434).

The project was completed and the first residents moved in, in 1985.[224] An article in the Dutch Daily *Het Vrije Volk* listed the most important mutations: "The houses got central heating, double glazing and a bathroom. The approach was so thorough that in reality, only the exterior of the building remained."[225] As per standard practice, the statement of significance, composed before the renovation, remained unchanged when the block was registered as National Monument on 30 May 1985. It still today reflects the state of the building as it was when identified for legal protection, before its radical transformation:

223 Minutes of the second planning team meeting ('Kort verslag van de 2e planteamvergadering Justus van Effenstraat, gehouden op donderdag 6 januarie 1982…'; SAR: 837 (96), p. 3).

224 The first residents of the renovated block received their keys on 16 February 1985 (s.n., 1985).

225 "De huizen krijgen centrale verwarming, dubbelglas en een badkamer. De aanpak is zo ingrijpend, dat eigenlijk alleen de buitenkant van het bouwblok blijft staan." (s.n., 1985).

"The whole is built of brick with the use of white painted concrete for the supporting of occasionally inclined gateways and for the gallery, including the balustrade and the integrated planters.... The dwelling… spans double the façade of the mirrored double storied upper dwellings located side-by-side on the gallery, which in turn each have an entrance from the gallery in the second storey, each of which has a veranda on the third storey above the entrance ways. These have concrete parapets into which are set the same original blue mosaic tiles as are set into the gallery parapet. The windows of the dwellings are timber framed and partly mullioned and are of different sizes, though set into the façade with a consistent regularity… The bathhouse and laundry, located centrally in the lateral dwelling row, and contained by gateways, consists of five levels… The façades of this complex – in which various gateways penetrate the inner courtyard are… enlivened by the application of projecting chimneys and the gallery side, brick rebate panels, -dentils, and other forms of ornamental brickwork and also by a continuous circular cemented plinth applied to all façades."[226]

The famous concrete aerial street was replaced with prefabricated concrete elements in totality. The now dysfunctional garbage chutes, were demolished. The chimneys were gone and the original blue tiles replaced along with the concrete gallery. Aluminium had replaced the mullioned timber frames and some windows were closed up. As compensation a shop-house unit on the ground floor was retrofitted as museum dwelling.

5.5.4 The 2E+Co of the Justus van Effen Block

5.5.4.1 Economy

Subsidies played a big role in the decision-making of the plan team of the first Justus van Effenstraat renovation project. The GWR, operating as a commercial entity since 1979 applied to a range of possible subsidies.

A conference paper, presented by the head responsible for issuance of heritage permits for the South West District division of the RDMZ which included Rotterdam,

226 Number 46868 (Rijksdienst voor het Cultueel Erfgoed, [s.a.]b).

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Frits van Voorden,[227] summarises the main sources in 1986: Of the total cost of the project (ƒ19 635 271), the Ministry of Housing and the Environment and the Ministry of Welfare, Health and Cultural Affairs (this was after all a National Monument in the making) funded ƒ9 000 000, 49% of the total budget. Of this ƒ6 559 989 was to be spent on labour through a programme to provide jobs for unemployed.[228] This means that 33,5% of the total budget and 73% of the subsidy had to be spent predominantly on a labour force with little to no construction knowledge or experience.[229] In Rotterdam unemployment among the working population stood at 24% in 1983. Of these 70% lived in older neighbourhoods,[230] the nineteenth century Oude Noorden and Spangen. Most had been unemployed for longer than two years and were unskilled.[231] The way in which the subsidy had been structured meant that these men with no specific built heritage trade skills, had to be productively occupied, for the renovation project to be a financial success.

There were other subsidies that the project team considered. At the very first meeting the project team, taking cognisance of the potential future listing as national monument, decided to investigate whether funding could be procured from monument services.[232] By March 1982 they had learnt that no direct conservation subsidy could be expected from the RDMZ for the renovation.[233] Another possible source for funding was a subsidy for housing for immigrants (*Pot etnische minderheden*).[234] This subsidy was awarded per household of ethnic minority that would return or choose to live in the complex after its completion (ƒ 30 000–40 000 per dwelling). By April 1983, the team estimated that only 5 minority families would remain in the complex after completion and that the contribution from this subsidy would be limited in its impact.[235] The *Woonomgevingssubsidie*

227 Presented at the conference 'Funding architectural heritage' held at York, UK, in September 1986.

228 (Van Voorden, 1986, p. 10). Van Voorden was appointed as Professor of Restoration at the TU Delft in 1987.

229 The norm was that around 70% of the labour force had to have been unemployed (Van Voorden, 1986, p. 11).

230 (Stouten, 2004, p. 191).

231 (Stouten, 2004, p. 191).

232 Minutes of the first planning team meeting ('Kort verslag van de 1e planteamvergadering Justus van Effenstraat, gehouden op donderdag 15 october 1981…'; SAR: 837 (96), p. 4).

233 Minutes of the twenty-seventh planning team meeting ('Kort verslag van de 27e planteamvergadering Justus van Effenstraat, gehouden op woendag 23 maart 1982…'; SAR: 837 (96), p. 2).

234 Minutes of the third planning team meeting ('Kort verslag van de 3e planteamvergadering Justus van Effenstraat, gehouden op donderdag 26 november 1981…'; SAR: 837 (96), p. 5).

235 Minutes of the twenty-eighth planning team meeting ('Kort verslag van de 28e planteamvergadering Justus van Effenstraat, gehouden op woensdag 27 april 1983…' . SAR: 837 (96), p. 3).

(Neighbourhood environment subsidy), supported the renovation of old dwellings and overdue maintenance of street sidewalks with ƒ 2 500 per dwelling.[236]

Further, an unspecified possible subsidy for insulation was mentioned on the fifteenth plan team meeting. This subsidy was, however, not mentioned again in subsequent meetings.[237]

The Ministry VROM committed to an annual contribution to offset the shortfall in running costs of the complex after renovation, which in 1985 came to ƒ 946,840.

Despite all of these subsidies, the rent (which included heating) of ƒ 176 per month before the renovation was set at ƒ 285 per month[238] and residents now had to foot their own gas bills as well. This was a rather staggering increase, but those who returned found themselves in larger, more comfortable and aesthetically more presentable houses.

5.5.4.2 Energy

The future of the block heating system, was first tabled at the fifth project team meeting, on 6 January 1982, during which it was decided that a so-called *Energiebesparing Renovatie* (Energy-saving Renovation) team be tasked to investigate options for either maintaining the principle of block heating, or replacing it with individual central heating for space heating and electrical geysers for individual stand-alone hot water systems.[239] This shows that individual control over energy costs for inhabitants then had a high priority. The issue of ventilation was tabled as an aspect that required attention, but was seldom discussed in further team meetings. The group decided that individually adjustable mechanical ventilation was the preferred method compared to a centralised system as it was more easily adjusted than the natural ventilation in a meeting as late as 27 April 1983.[240] The

236 Minutes of the thirteenth planning team meeting ('Kort verslag van de 13e planteamvergadering Justus van Effenstraat, gehouden op dinsdag 8 juni 1982…'; SAR: 837 (96), p. 5).

237 Minutes of the fifteenth planning team meeting ('Kort verslag van de 15e planteamvergadering Justus van Effenstraat, gehouden op donderdag 7 juli 1982…'; SAR: 837 (96), p. 1).

238 (Van Voorden, 1986, p. 11).

239 Minutes of the fifth planning team meeting ('Kort verslag van de 5e planteamvergadering Justus van Effenstraat, gehouden op donderdag 6 januarie 1982…'; SAR: 837 (96), p. 3).

240 Minutes of the twenty ninth planning team meeting ('Kort verslag van de 29e planteamvergadering Justus van Effenstraat, gehouden op woensdag 27 april 1983…'; SAR: 837 (96), p. 2).

installation and operational costs of this option were not mentioned in the minutes. [241]

In the following meeting, the services specialist reported that good block heating was cheaper than individual heating,[242] but he argued that the choice of such a system would depend on the capacity, boiler type, cost and operating economy.[243] The plan team eventually delayed any decision on the matter and requested the advice of a heating installer to be delivered to the Municipal Works Department, thereby postponing a difficult decision for the time being.[244] For the next number of meetings the focus returned to the somewhat more graspable issue of the reconfiguration of the space plan.

It was only six months later that the heating installation were discussed again. There was still no conclusion on the type of system, but the chair and representative of the GWR, referred to a possible subsidy for an energy-efficient system.[245]

Despite the general social increased awareness of household energy-saving, proposals for insulating the dwellings were only addressed very late in the process. Proposals for layouts were already being tested with inhabitants when the first mention of insulation was made in the minutes. "Calculation of energy use after renovation" was listed as the 47th task on the project team's task list.[246]

The team feared that 100mm Rockwool insulation instead of 50mm might reduce the space in the dwellings too much and would need to be tested with the residents' associations (despite representatives of these parties serving on the planning team). The efficacy of the insulation was not to interfere with the planning of the

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241 Minutes of the thirty second and thirty third team meeting ('Kort verslag van de 32e planteamvergadering Justus van Effenstraat, gehouden op woensdag 27 august 1983…'; SAR: 837 (96), p. 2.); Kort verslag van de 33e planteamvergadering Justus van Effenstraat, gehouden op dinsdag 6 september 1983…'; SAR: 837 (96), p. 1).

242 Minutes of the sixth planning team meeting ('Kort verslag van de 6e planteamvergadering Justus van Effenstraat, gehouden op donderdag 6 januari 1982…'; SAR: 837 (96), p. 1).

243 "geïnstalleerd vermogen; welke ketel nodig is; wat de kosten zijn; wat het rendement is" Minutes of the sixth planning team meeting. ('Kort verslag van de 6e planteamvergadering Justus van Effenstraat, gehouden op donderdag 6 januari 1982…'; SAR: 837 (96), p. 2).

244 Minutes of the sixth planning team meeting ('Kort verslag van de 6e planteamvergadering Justus van Effenstraat, gehouden op donderdag 6 januari 1982…'; SAR: 837 (96), p. 2).

245 Minutes of the fifteenth planning team meeting ('Kort verslag van de 15e planteamvergadering Justus van Effenstraat, gehouden op donderdag 7 juli 1982…'; SAR: 837 (96), p. 1).

246 "raming energieverbruik na renovatie". Minutes of the twenteeth planning team meeting ('Kort verslag van de 20e planteamvergadering Justus van Effenstraat, gehouden op donderdag 19 oktober 1982…'; SAR: 837 (96), p. 2).

dwelling units, which already carried the support of the residents. The as-built drawings, compiled in 1986 after the completion of the project, indicated the final decision: 100mm rock wool to perimeter walls, (in places thickened to cover over the characteristic step in the gable that Brinkman designed around the living room windows); party walls were insulated with 50mm Rockwool. Insulation was installed behind 12,5mm gypsum board in turn nailed to timber battens. Timber floors received a 60mm Rockwool blanket over gypsum ceiling panels. According to the NEN 1068 standard, the thermal resistance of the skin of the building was to be at least 1,3 m^2K/W. The resultant value was higher, at 1,5 m^2K/W.

Hot water provision had not been discussed yet by the twentieth team meeting in July 1982. [247] The first next mention of any heating system was minuted in December 1982, when the proposal was to reinstate the communcal heating system for both space heating and hot water.

The architect presented an updated proposal for the unit layouts, which now included a small *berging* (storeroom) instead of an additional study. When pressed to give more information on the use of this berging, he stated that the little storeroom could eventually also house individual gas combination boilers. This comment opened up a proverbial can of worms. A cost benefit analysis, comparing individual gas combination boilers with block heating two systems was proposed to inform a decision for one or the other. The plan-team representatives, however, were given the green light to communicate the possibility of providing individual gas combination boilers to the inhabitants.[248]

Discussions continued apace during following meetings. The planning team was told that the municipality would be willing to continue the delivery of gas for cooking, but that hot water and space heating were to be electric. The planning team decided that shower spaces were to be naturally ventilated while the rest of the units would be aired by mechanical means.[249] The preference for block heating remained, being stated as the only option as late as the twenty-eight meeting in April 1983.[250]

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247 "raming energieverbruik na renovatie". Minutes of the twenteenth planning team meting. ('Kort verslag van de 20e planteamvergadering Justus van Effenstraat, gehouden op donderdag 19 oktober 1982…'; SAR: 837 (96), p. 2).

248 Minutes of the twenty-third planning team meeting ('Kort verslag van de 23e planteamvergadering Justus van Effenstraat, gehouden op donderdag 7 december 1982…'; SAR: 837 (96), p. 2).

249 Minutes of the twenty-fifth planning team meeting ('Kort verslag van de 25e planteamvergadering Justus van Effenstraat, gehouden op dinsdag 18 januari 1983…'; SAR: 837 (96), p. 3).

250 Minutes of the twenty-eighth planning team meeting ('Kort verslag van de 28e planteamvergadering Justus van Effenstraat, gehouden op woensdag 27 april 1983…'; SAR: 837 (96), p. 2).

Then, rather out of the blue, on the twenty-nineth plan team meeting, the choice was made for individual combination gas boilers. This was a complete U-turn on the issue of heating and hot water and discussions are noted on the installation of individual units per dwelling, in spite of space implications and individual flues. The chair, the representative of the GWR, made a point of noting that this proposal did not carry his approval.[251] The opinion of the residents, however, overruled all calculations and expert opinion. This is not strange when taking into account that their contributions to the centralised bath-house installation had by now outstripped their monthly rentals.

By the next meeting the architects presented their plans for individual gas-fired boilers, and it is noted that, apart from issues such as basement installation (in the smallest dwelling) and provisions for smokestacks for the gas boilers (in the basements these had to be cut into the walls, above of which service shafts, servicing toilets and kitchens were positioned) this aspect of the project was ready for approval. And with that the issue of heating and hot water was resolved: gas fired individual combination boilers were to provide hot tap water and heat to radiators in each room.

This choice of heating installation system for the piping and radiators was left to the contractor. Dura presented two flexible tubing options: Gabotherm and Upolet, both brand new products. The potential ease with which untrained artisans could install the new heating reticulation, may have been a highly significant factor taking into consideration that the contractor who had to employ a last cohort of untrained men.

Gabotherm, a German system that included flexible piping and radiators, is still on the market today. Upolet a Finnish system, was introduced onto the Dutch market in 1981. This integral space-heating system included radiators, radiator valves, pressure-ring connectors, stopcocks etc. all served by a flexible polybutene tube reticulation.

251 Minutes of the thirtieth team meeting (‘Kort verslag van de 30e planteamvergadering Justus van Effenstraat, gehouden op woensdag 25 mei 1983…'; SAR: 837 (96), p. 2).

VOOR WATERLEIDING, CV-INSTALLATIES ENZ.

Upolet polybuteen buis: flexibel, geen oxidatie, gemakkelijk en snel

De Apeldoornse onderneming Tubex Trading heeft op de Nederlandse markt een nieuw produkt geïntroduceerd: de Upolet polybuteen buis. Het is flexibele kunststof buis, die geschikt is voor koud- en warmwaterleidingen en als zodanig toepasbaar bij de aanleg van het waterleidingnet, centrale- en vloerverwarming. Het Finse produkt heeft een aantal opvallende eigenschappen, zoals bestand zijn tegen temperaturen van 95 graden Celsius en buigzaamheid. Dit laatste betekent dat het materiaal zich gemakkelijk laat verwerken. De buis kan met de hand in de gewenste richting worden gebogen en aan elkaar gekoppeld worden met de bekende knelfittingen, die in vele variaties bijna overal te koop zijn. Daar er ook afsluiters, radiatorkranen, kogelkranen, e.d. met knelverbinding te koop zijn, maakt dit een zeer gavarieërde toepassing van dit soort buis mogelijk.
Het spreekt vanzelf dat het gebruik van een buigtang niet nodig is, maar ook een pijpensnijder is in principe overbodig. Het materiaal kan eenvoudig gesneden worden met een mes, gezaagd met een ijzerzaag of „te lijf" worden gegaan met een snijtang. In combinatie met een flexibele pvc-mantelbuis kan de polybuteen buis in betonnen vloeren worden gelegd en ook in wanden worden weggewerkt. Het voordeel hiervan is dat bij beschadigingen - met boren, spijkeren, e.d. - de vloer niet hoeft te worden opengebroken. Door de verbinding aan beide zijden los te koppelen kan de beschadigde buis weggehaald en vervangen worden. De flexibiliteit van het materiaal heeft mogelijk het nadeel dat geen „strak werk" geleverd kan worden. Indien dit „voor het zicht" absoluut noodzakelijk is, kan de buis in een stalen of koperen mantel worden weggewerkt.

Het materiaal kan bijvoorbeeld met een mes op de gewenste lengte worden afgesneden.

Upolet flexibele buis kan gekoppeld worden met knelfittingen, die al jarenlang bij netwerken van koperen en stalen buis worden gebruikt. De levensduur van het materiaal wordt ingeschat op 50 jaar.

Geluidarm

Door de zeer gladde binnenwand van de buis is de weerstand geringen dan bij koperen en stalen buis en daardoor wordt het watergeruis tot een minimum beperkt. Het materiaal is geluidarm en zeer sterk. Indien lekkages ontstaan, moeten die steeds gezocht worden in de knelverbinding en dat is natuurlijk simpel te verhelpen door die verbinding aan te draaien. Door de gladheid zet zich zuurstof in het water niet vast en leidt dus ook niet tot corrosie; ook in de radiatoren kan daarvan geen sprake zijn.
Een ander voordeel van Upolet is de prijs. Deze loopt gelijk met die van koperen buis. 12, 15 en 18 mm diameter kost per meter resp. ongeveer ƒ 3,70, ƒ 4,75 en ƒ 4,80. Het materiaal is licht in gewicht: honderd meter Upolet kan één persoon gemakkelijk dragen (20 meter koperen pijp van vijf lengtes lukt beslist niet). Het transport is ook gemakkelijk door de wijze van verpakken; de buis past prima in de kofferbak van een auto. Upolet kan dus heel goed verwerkt worden door doe-het-zelvers.
Het feit dat de buissoort niet is toegerust met het KIWA-keurmerk hoeft geen minpunt te zijn, omdat iedere afzonderlijke waterleidingmaatschappij zijn eigen beslissingsrecht heeft ten aanzien van toe te passen materialen. Wellicht wordt wel binnenkort een verklaring van „geen bezwaar" afgegeven. Upolet is wel voorzien van een Fins soort KIWA-keurmerk.

FIG. 5.19 A newspaper advert for the Upolet system (*Leidse Courant*, 27 June 1981).

The main benefit of the Upolet system, as advertised in the press, was its ease of use: it was light, bendable, could be joined with mechanical hose-connectors, and could be used by anyone without prior training. All of these benefits were advertised to cost roughly the same as the more traditional copper tubing.[252] Despite the Upolet patent system not yet having been approved by the KIVA (the Dutch Standards institution),[253] the project team selected it for the Justus van Effen block in December 1983.[254]

5.5.4.3 Comfort

An issue that played a large role in developing the floor plans for the renovation project was comfort. This involved the size and number of rooms of each unit to be delivered by the renovations. The new larger dwelling had to have more and larger rooms, the product of the residents' own wishes and it is therefore not strange that a

252 (s.n., 1981).

253 (s.n., 1981).

254 Minutes of the thirty-seventh team meeting ('Kort verslag van de 37e planteamvergadering Justus van Effenstraat, gehouden op woensdag 6 december 1983…'; SAR: 837 (96), p. 2).

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resident said: "…we are very happy. The renovation… was carried out perfectly. We now have the space of what used to be two apartments in one".[255]

The renovation provided each unit with an indoor bathroom and new enlarged kitchens that could be closed off from the living area with space for a washing machine and a large fridge.

The thermal comfort of the dwellings had certainly been improved with improved insulation and heating provided to all rooms. While in the past only the small living room could be heated to 18°C at a 10°C outdoor temperature, inhabitants were advised to set their thermostats to 20°C for the entire dwelling, the design temperature for the system.[256] The damp problem had, seemingly, been conquered…

5.5.5 Concrete Experience 1922–81: Gradual Evolution

The project was completed in 1985 and the first residents moved into homes that had been designed to their collective wishes. The custodian, the GWR, programmed a maintenance regime and budget for a 5-year short-term maintenance cycle, and a ten-year medium cycle through which the complete 50-year renovation project life-span would be managed. To this aim they implemented a new computerized 'Systematic Management and Maintenance' (SBO) system for the complex in early 1986.[257]

The renovation provided each unit with an indoor bathroom and new enlarged kitchens that could be closed off from the living area with space for a washing machine and a large fridge.

Discontent also increased among the inhabitants regarding the appearance of the façades of the project.[258] This was already raised during the renovation process,[259] but could not be addressed in the contract, hamstrung as it was by a very tight

255 "Over de woning zijn we zeer teverden. De renovatie… is perfect uitgevoerd. We hebben nu de ruimte van twee vroegere flats in een." (Boddaert, 1991, p. 78).

256 Notes of information evening held with the inhabitants on 24 March 1986 ('Infoavond 25 maart 1986'; SAR: 837 (100), p. 2).

257 "Systematisch Beheer en Onderhoud." Agenda of the Justus van Effen Tenants Association ('Vergadering huurdersvereninging en GWR. 18 december 1985'; SAR: 837 (96), p. 5).

258 (Van Emstede, 2011).

259 (Giltaij-Lansink, 1987, p. 35); (Kuiper, 1986, p. 37).

budget. The treated brickwork was too patchy and dull and did not conform to their expectations of what a newly renovated building should look like.

At the time, painting buildings in *trendkleuren* (trend colours)–the term used by the architect[260]–was seen as a valid strategy in an era when many face brick buildings were being isolated on the exterior, thereby presupposing painting. The painting approach was deemed to be so fashionable and successful that an edition of the magazine *Renovatie en Onderhoud, Maandblad voor Stadsvernieuwing* was dedicated to the topic. [261] A proposal already developed in 1986 was resurrected: all courtyard–facing walls were painted in white, with highlights in grey tones. These were specifically chosen not to be so-called trend-colours, but rather to highlight the architectural qualities of the building in a "jovial lightness".[262]

FIG. 5.20 Poster produced by the GWR to introduce the new *huismeester* (care taker) for Justus van Effen (SAR: 837).

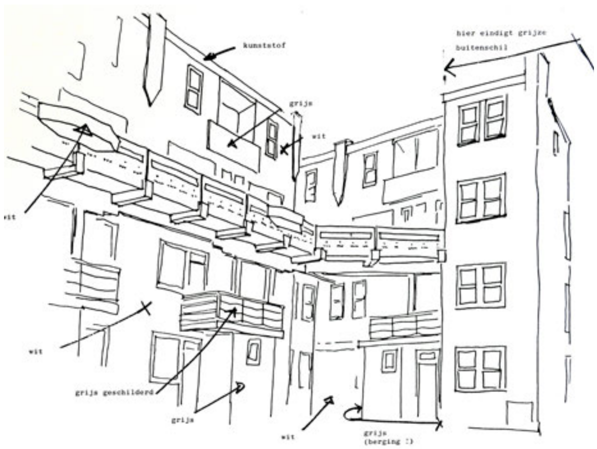

FIG. 5.21 The 1986 proposal to paint the courtyard facing walls (Leo de Jonge Architects; RCE: 5368/46868).

260 (Giltaij-Lansink, 1987, p. 36).

261 “Veel kleur door weinig verf. Door Stadsvernieuwing wijken in Rotterdam vrolijker.” (Colourful without much paint. Through urban renewal Rotterdam neighbourhooods become more cheerfull); Vol 15 (4) April 1990.

262 (Van Emstede, 2015, p. 185).

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FIG. 5.22 The Justus van Effen Block in 1990 after its brickwork-facades were painted (GJ Dukker; [1] RCE: 276.797; [2] RCE: 276.799).

The communal character of the housing complex became a systemic problem: Residents complained that vehicular access into the complex needed to be brought under control as this had a negative effect on the urban environment.[263] Inter-cultural integration was included in the architectural agenda. Both a kindergarten and a recreational space to be run by a neighbourhood organization and a space for the Turkish Women's Association were installed within the cleared-out shell of the former bathhouse. Cultural integration, however, remained a point of issue. According to an inhabitant at that time: "Social contacts within the complex remain mostly restricted… the ground floor and gallery each have their own territories."[264] "It has all become more distant, probably due to the fact that people from so many different national backgrounds have to live together. Real intercultural contact between adults is an illusion…"[265]

The newly constructed gallery did not live up to expectations: it leaked into bathrooms located in the now-enclosed balconies below them.[266]

263 (Boddaert, 1991, p. 78).

264 "De sociale kontakten in het blok zijn nogal beperkt… de begane grond en galerij hebben allebei hun eigen territorium." (Boddaert, 1991, p. 78).

265 "Het is allemaal afstandelijker geworden, heeft waarschijnlijk te maken met het het [sic] feit dat er zoveel verschillende bevolkingsgroepen door elkaar wonen. Echt 'inter-cultureel' kontakt tussen de volwassenen hier blijft een illusie…" (Boddaert, 1991, p. 78).

266 Minutes of the Tenants Association ('Kort verslag bewonersvergadering 11 mei 1989'; SAR: 837 (96), p, 1).

The project limped on through time, with tweaking taking place to try to stem the tide of decay only to completely fail by the late-1990s.

Spangen became one of the first official national no-go areas of the Netherlands, criminality had reached epidemic proportions. A long running crime detective series (1999-2006) on Dutch national television was named after and fantastically set in 'Spangen'. Themes, dramatized and presented as being endemic to the neighbourhood Spangen were amongst others, human trafficking, child abduction, murder and theft.[267] The internalized nature of the Justus van Effen complex made it especially vulnerable to criminality. In time the open street was closed off and stair wells leading to the peripheral streets were blocked up in an attempt to lock out criminality.

The 1983–85 operation had turned into a failure, but the patient was still alive. By early 2000 the building was all but mothballed, with a large number of the dwellings vacant. Urgent action was required to turn the tide, not only in the Justus van Effen Block, but in the whole of Spangen.

5.5.6 The 2E+Co of the Gradual Evolution

One of the main failures of the renovation was the heating and ventilation system. This was apparently cause for confusion amongst the new residents. An information evening to explain the working thereof was held in December 1985.[268] In another meeting held with the inhabitants in March 1986, exact instructions were issued on the use of the system.[269] Still many inhabitants could not get the hang of it and in 1986 a booklet had to be produced to explain its proper use.[270] It might have been a poor operation of the system or a malfunction, but inhabitants of at least one apartment already complained of mould growth as early as December.[271]

267 ("Spangen (televisieserie)", 2021).

268 Minutes of the Tenants Association and GWR Meeting ('Vergadering Huurdersvereniging en GWR, 18 December 1985'; SAR: 837 (96), p. 2).

269 Notes of information evening held with the inhabitants on 24 March 1986 ('Infoavond 25 maart 1986'; SAR: 837 (100), p. 1–3).

270 Agenda of the Justus van Effen Tenants Association Justus van Effenstraat ('Algemene Ledenvergadering Huurdersvereninging Justus van Effen. 15 december 1986'; SAR: 837 (96), p. 2).

271 Minutes of the Tenants Association and GWR Meeting ('Vergadering Huurdersvereniging en GWR, 18 december 1985'; SAR: 837 (96), p. 2).

According to the project team meeting minutes, the Upolet system started to fail very quickly after commissioning. Some components of the system were already exhibiting signs of corrosion in December 1985.[272] Various complaints were received of not only leaking pipes and junctions, but also rusting radiators and leaking radiator valves.[273]

By 1986 it became evident that the hot water and heating system installation had been a dismal failure. In response to a questionnaire, 47% of the 118 respondents (of the 164 dwellings) reported problems with the hot water and space heating installation.[274] This was ascribed to the system "…not being installed according to the manufacturer's instructions."[275] A month later an GWR inspector reported: "None of dwellings we visited did not have trouble with the heating installation."[276] The situation was so bad that a financial claim was instituted against the contractor even after they had attempted to repair the system.[277] The gas-fired boilers too proved to be a disaster and all were replaced at cost of the manufacturer after numerous attempts at repairing them.[278]

To add insult to injury the spray-painted interiors also started to yellow soon after completion,[279] in part due to the ventilation not functioning well.[280] In the aforementioned questionnaire of 1986, this aesthetic bother was listed 67 times.[281]

The new windows were another source of frustration for inhabitants; in the 1986 questionnaire 'problems with the windows' were listed by 51% of the

272 Minutes of the Tenants Association and GWR Meeting ('Vergadering Huurdersvereniging en GWR, 18 December 1985'; SAR: 837 (96), p. 5).

273 ('GRW-13: cv-installaties complex 'Justus Van Effen'', complex No. 0116'. 24 September 1986. SAR: 837 (101), p. 1).

274 ('Overzicht enquête Justus van Effen' 07 August 1986. SAR: 837 (101).

275 "…niet volgens voorschrift verwerkt." ('30 oktober 1986: overleg Huurdersvereniging…'; SAR: 837 (100), p. 3).

276 ('GRW-13: cv-installaties complex 'Justus Van Effen'', complex No. 0116'. (24 September 1986). SAR: 837 (101), p. 2).

277 Minutes of the Tenants Association and GWR Meeting ('Vergadering Huurdersvereniging en GWR, 18 December 1985'; SAR: 837 (96), p. 2).

278 Letter from the district manager GWR to the tenants of the Justus van Effen Street ('Aan: de bewoners van de Justus van Effenstraat' Ref U1591/JH/RP. (Undated). SAR: 837 (100), p. 1).

279 "…niet volgens voorschrift verwerkt." ('Betreft : klachten J. v. Effen', (September 1988). SAR: 837 (101)).

280 ('Betreft : klachten J. v. Effen', (September 1988). SAR: 837 (101).

281 ('Overzight enquette Justus van Effen', (07 August 1986). SAR: 837 (101)).

respondents.[282] The high-tech glazing proved to be difficult to procure when broken panes needed to be replaced[283] and the GWR went in search of a similar, more readily available option.[284]

The range of compound technical issues, including technical failures, led to long-time residents moving out of the complex.

FIG. 5.23 The Justus van Effen Block in 2004, all but moth-balled (GJ Dukker; RCE: 503.551)

282 ('Overzight enquette Justus van Effen' (07 August 1986). SAR: 837 (101)).

283 Notes of information evening held with the inhabitants. ('Infoavond 25 maart 1986'; SAR: 837 (100), p. 5).

284 Minutes of the Tenants Association and GWR Meeting ('Vergadering Huurdersvereniging en GWR, 18 December 1985'; SAR: 837 (96), p. 2).

5.5.7 Reflective observation

The impacts of the 1980s renovation of the project had done very little to dent the fame of the Justus van Effen Block, in part because its effects were never included in the description of the monument despite the fact that the building was only listed after the renovation process had reconfigured the interiors, reconstructed the gallery and altered the façades. There was some criticism to the project during the period of renovation.[285]

Curiously, while many mentioned the renovations undertaken under the guidance of Leo de Jonge Architects, the project was described in the way in which it had been delivered in 1922, without all the alterations. The short BONAS biography of Brinkman with his oeuvre published in 1995, [286] was but one of a number of publications that praised the original project.

Rotterdam was starting to sell itself as a city of architecture and different architectural guides[287] mentioned the project, following in the tradition set by Wattjes and Ten Bosch in 1941.[288] The floor plans were presented as if they still existed in the space-plan format of 1922. This common theme occurring in texts from the 1990s and 2000s, is typified by a guidebook *Architecture Rotterdam 1890-1945* which described the project as follows:

"The second stories are made up of apartments, each with its own entrance at ground level. The top levels contain maisonettes, accessible via a reinforced concrete gallery that runs along the blocks [sic] inner façade. The balustrades are meticulously detailed, with built-in planters and peep-holes for children."[289]

*Architectuur en Stedenbouw in Rotterdam. 1980–194*0, pictures the building in its unpainted state, albeit with façade changed, window replacements and masonry repairs, of the 1983–85 renovation. It too describes the project as if the renovation had never taken place![290]

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285 (Giltaij-Lansink, 1987).

286 (Pey & Boersma, 1995).

287 (Groenendijk & Vollaard, 1987); (Groenendijk, et al., 1998) & (Groenendijk & Vollaard, 2004).

288 (Wattjes & Ten Bosch, 1941).

289 (Devolder, 1991).

290 In fact, this is a common approach in this publication, which tends to ignore the effects of the Bouwen voor de Buurt urban renewals as far as possible (De Graaf & Van Oudheusden, 1992).

At the same time the renovation was planned and executed, the ‘Spangen block’ as it was sometimes referred to, inspired a younger generation of architects, exposed to it during their studies at the Delft University of Technology. One notable example is the Amsterdamsche Poort, a mixed-use shopping and housing development, designed by Atelier Pro between 1982–87.

The study and appreciation of the legacy of the so-called Modern Movement was continuing to grow in the Netherlands, leading to the creation of Docomomo in 1988.[291]

5.5.8 Learning Cycle 2: 2E+Co in the Actor-Factor-Set Ecosystem

The Bouwen voor de Buurt approach created the *Project Groep Spangen* (Project Group Spangen) for the urban renewal of the neighbourhood and the *Projectgroep Justus van Effen* (Project Group Justus van Effen) for the renovation of the building. These teams were defined early on in the process and little variation was allowed in their composition. They occupied the entire Microsystem of abstract conceptualisation. Reflective observation was all but absent and communication was all but one-directional to Exosystemic actors, including the RDMZ.

This limited the influence of ecosystemic and Exosystemic actors and factors on the built project. The Bouwen voor de Buurt approach influenced the parties that played an active part in the abstract conceptualisation of the mutation and the execution thereof.

Decision-making was through compromise and consensus: a three-way tug of war between architect, community and official monuments department advisors. The team was at the mercy of the inhabitants as a result of how the decision-making process was structured. Ironically most of the inhabitants, in a twist of fate, never returned to live at the Justus van Effen Street.[292] The Bouwen voor de Buurt approach effectively resulted in providing residents with what they wanted. Upgrades were driven by their ambitions for comfort and economy, which in turn

291 The International Committee for Documentation and Conservation of Buildings, Sites and Neighbourhoods of the Modern Movement, or ‘DOcumenteren en COnserveren van gebouwen en stedenbouwkundige en landschappelijke ensembles van de MOdern MOvement’ (DoCoMoMo, in Dutch). (Docomomo_nl, [s.a.]).

292 (Giltaij-Lansink, 1987, p. 35).

mandated improved energy efficiency. All this was achievable due to a well-resourced renovation subsidy system.

Much of what went wrong in the renovation is related to the prescripts of the various subsidies. The RDMZ could only impact on the Microsystem deliberations at a distance through the agency of correspondence or engagement with plan team members. Finances are drivers of proximal processes and the RDMZ had no financial means to influence decisions, effectively banishing it to the Exosystem where the *voorbescherming* (provisional protection) offered a modicum of protection for the appearance of the building.

The requirement that the renovation project had to engage unemployed workers resulted in poor workmanship. The subsidy regime also influenced the ill-fated choice of the heating system 'type' for individual dwellings. However, the choice between central or individual heating was driven by the residents' ambitions and experiences and was not made on the base of economic principles (a new block heating system had been calculated to be cheaper to operate). The transition of the Gemeentelijke Woningstichting from a housing foundation to a housing corporation called the Gemeentelijke Woningdienst Rotterdam (GWR), was a change that radically influenced the future of Block VI & VII Spangen. It also led to the renaming of *Block VI & VII* to *Justus van Effenblok*. Profitability was one of the most important drivers in the evolution of this built project, and one of the main ambitions of the GBR was that a maintenance free housing complex be realised with a 25-year life span.[293]

The change in window frames was driven by the economic promise of low-maintenance of the aluminium window frames (the original timber windows had to be replaced in the 1940s already), and high effectiveness held by new technology (evidenced by the use of a brand-new double-glazing system). At the same time the expectation of the residents of 'new' (fashionable) dwellings had to be met and it is possible that aluminium frames, which in principle should have been more dependable in operations, also suited their ambitions.

It is fair to say that the project team only paid lip service to the heritage values of the complex and its emergent monumental status. For instance, an evaluation and motivation for the reconfiguration of the dwellings penned by the project architects, quoted the authoritative 1960/61 article by architect Jaap Bakema[294] (noting only the word 'Bakema' as source, well aware that their audience would be suitably

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293 (Goede, 2009).

294 (Bakema, 1960–1).

impressed): “The houses are too small and therefore no longer meet the needs, which is now accepted for public housing, but that is almost all that is lacking. For the rest, this housing complex wins out almost in every respect from the results of our sophisticated housing construction programmes for cheap housing.” The author continues: “The fact that this rather objective assessment was made as early as 1960 and we are now preparing plans for the renovation of the complex almost 25 years later, gives food for thought and perhaps is an explanation for the, in all respects, poor living climate in the complex.”[295] This was a rather selective and disingenuous use of the intent of Bakema[296] expressed in the 1960 article as a song of praise to the block, but also a wilful statement connecting social problems with spatial and technological issues in service of a pre-defined trajectory. During discussions with the RDMZ, the architect had gone as far as to argue that seeing as a new material was being used for the window frames, their appearance should also be ‘new’.[297]

This mutation was unsuccessful due to three critical aspects. Firstly, no real reflective observation was undertaken by the project team. Secondly, not enough freedom was given in the abstract conceptualising process before making a start on the active experimentation. This led to near-extinction of the project, were it not for the high regard of the project in the ecosystem through actors in the Exosystem. Thirdly and most importantly, the strict decentralisation of the Bouwen voor de Buurt approach meant that a very limited influence was tolerated from Exosystemic specialists, their advice was easily negated.

Other drivers, as we have seen were institutional norms and standards originating in the Exosystem at the time and in response to other Exosystem processes, such as the oil crises of the 1970s. Norms on insulation leading to a choice for replacement of windows and doors were also influenced by concerns over household economy.

295 “De woningen zijn te klein en voorzien daardoor niet meer in het behoeftesthema, dat nu aanvaard wordt voor volkswoningbouw, maar dat is dan ook vrijwel alles wat ontbreekt. Voor het overige wint dit wooncentrum het vrijwel nog in alle opzichten van de resultaten van onze uitgekiende woningbouw programma’s voor goedkope woningen... Dat deze tamelijke objectieve konstatering reeds in 1960 werd gedaan en we nu bijna 25 jaar later plannen voorbereiden voor de renovatie van het komplex, geeft te denken en wellicht een verklaring voor het in all opzichten huidige slechte woonklimaat in het complex.” (Leo de Jonge Architecten, c. 1984, p. 1).

296 This was the first time that the project again elicited architectural praise since its inclusion in the 1929 Woningwet exhibition.

297 (Giltaij-Lansink, 1987).

5.6 Learning cycle 3 (2000–19)

In the year 2000 the Justus van Effen complex was still under the management of the municipal housing company, now called the Woonbedrijf Rotterdam (Housing Company Rotterdam, WBR). The 1983–85 renovation had been a dismal failure and the complex was partly abandoned and boarded-up. Now, only 15 years after the completion of the previous renovation the WBR issued an architectural competition to develop conceptual designs for a new renovation project.[298]

The GWR was already seeking advice and funds for this. With a problematic, decrepit and costly national monument on his hands, the director of the WBR, FM Erkens, attempted to enlist the financial help of the RDMZ.[299] In a letter to the director of the RDMZ, Erkens accepted that the first renovation had not stood the test of time and that the block, like the rest of Spangen, was a cause for concern. Erkens also related to how the WBR had invested in investigations into the neighbourhood Spangen, where it owned a large portion of the housing stock, the Justus van Effen Block specifically, leading to the conclusion that a number of problems had to be addressed. Erkens concluded that many of the problems at the Justus van Effen Block were caused by the previous renovation. He noted how the changes to the exterior of the building "have negatively affected both the original character of the exterior and the monument values that this represented, but fortunately not in an irreversible manner."[300]

It is clear from Erkens' letter that the 1983–85 renovation project hadn't achieved its aims and the lofty lifecycle and maintenance ambitions of the GWR by far not been met despite the GWR's initial confidence that a 50-year life-cycle for the renovation project had been achieved. [301] The failure of the 1983–85 renovation is even more poignant in the light of the instruction to the project team to use so-called

298 Architectural practices were engaged to present a vision for the renovation of the block. The team Molenaar & Van Winden with Hebly Theunissen Architects, one of the parties invited to develop a vision, were awarded the project. Other architects included Rouw & De Kock Architects and Villa Nova Architects.

299 (Erkens, 2001).

300 "In mijn ogen... heben deze maatregelen aan de buitezijde het oorspronklijke karakter van het complex en de daarin vertegenwoordige monumentenwaarde sterk aangetast, gelukkig overigens niet op een onomkeerbare manier." (Erkens, 2001, p. 1).

301 ('Onderwerp : overleg huurdersvereeniging Justus van Effen, GWR en BOS…'(29 January 1986); SAR: 837 (100), p. 1).

maintenance-free materials that would result in delivering a building that would not require any major maintenance for 25-years.[302]

It was to take nine more years before contractors once again established their site office in the courtyard of the Justus van Effen and a second radical renovation project commenced in 2010.

5.6.1 S•E•T

By the year 2000, the situation in Spangen was dire, so dire that the city tried desperately to draw investors to the polder by giving away housing units for free, conditional to the investment of € 70 000 per apartment![303] Four years later, to sweeten the pot, buyers of so-called *kluswoningen* (DIY dwellings) in Spangen were promised free access to soccer games at the local Sparta stadium.[304] A new draft urban vision for Rotterdam, called *Stadsvisie Rotterdam* (City Vision Rotterdam) was completed by 2007. For Spangen this meant a radical rupture from the socially driven approach of the Bouwen voor de Buurt years and the ambitions of Plate's GWD: to provide good accommodation for the working class. Spangen, together with other problematic neighbourhoods, were repositioned in this new vision as being ideally suited to a process of gentrification, which in turn would "…stimulate the … creative economy… contribute to, in the first place, the desired attractiveness of Rotterdam as a living city for Rotterdammers that like the experimental, diverse qualities of the inner-city edge-zones…" and "contribute to the… strengthening of the economic structure" of the city.[305]

By now a new dynamic had entered the building industry. The drive towards sustainability had, since the 1987 publication of the Brundtland Report become a large socio-economic theme. In 2002 the European Union passed Directive 2002/91 (Energy Efficiency in Buildings), which sets standards for energy efficiency and how it was to be measured. This applied to "…new and major

302 (Goede, 2009).

303 (Slotboom, 2004).

304 The houses cost 'only' € 210 000 for 150msq (Hoogstad, 2007).

305 "…draagt in de eerste plaats bij aan de gewenste aantrekkelijkheid van Rotterdam als woonstad voor kenniswerkers en als woonstad voor Rotterdammers die houden van het experimentele, pluriforme milieu van binnenstedelijke randzones…' aan de draagkracht van de tweede pijler: economische structuurversterking…" (Gemeente Rotterdam, 2007, p. 137). This had already been taking place, with the already mentioned DIY dwelling projects, the Aagje Wolff-Betje Dekenplein project, dating to 2006 and the Wallis Block dating to 2006–7. The city was willing to invest in renovation projects (Strörmann, 2012).

renovations of existing buildings."[306] The ever-increasing awareness of the impacts of energy use was reflected in local building regulations as well. The 2003 Dutch Building Regulations (Bouwbesluit)[307] were amended to include stricter provisions for insulation, the Rc-value for residential units being increased from 1,3 m^2K/W to 2,5 m^2K/W.

'Green' living–or more precisely, low-energy living– was becoming fashionable and promised operating cost benefits.

5.6.2 Abstract conceptualisation

The WBR had come to the conclusion that the tenant-driven design exercise of the 1980s renovation had delivered problems with the unit mix (including size and price), leading to a dysfunctional inhabitant mix.[308] This was, as said, a result of the Bouwen voor de Buurt approach, which, while aiming at higher unit differentiation, in fact ended up limiting the unit differentiation in the Justus van Effen Block, in accordance with inhabitants' wishes. The WBR called for proposals from a selected number of architects regarding this problematic building. The competition was won by Molenaar & Van Winden Architects in collaboration with Hebly Theunissen Architects,[309] but did not immediately lead to a project appointment.

The 2000 proposal by Molenaar & Van Winden / Hebly Theunissen Architects was pragmatic in proposing the upgrade of the interior of the dwellings, based on the existing floor plans from the 1980s. Cost considerations initially led to a strategy to retain many of the dwelling floor plans, services etc. For now, there was no talk of replacing the insulation or the heating system, and accessibility was to be improved by adding new glazed lifts, clipped onto the gallery.

What set the Molenaar & Van Winden / Hebly Theunissen's proposal apart was their focus on the cultural historical value of the project: they proposed to restore the 'hidden' monumental façade of the courtyard from under its white mask. The priority given to the dignity of the monument should come as no surprise: Arjen Hebly had been awestruck by the block when he visited it as a first-year student.

306 (European Parliament, 2002: I.1/68).

307 (De Jong, 2008).

308 (Erkens, 2001, p. 2).

309 (Goede, 2009).

When interviewed for the TV programme *Voor de Buis: Verhalen van Staal en Steen* (2013) he called the experience "...een klap voor mijn kop" (a slap against my head; an epiphany).[310] Joris Molenaar had written about the project in the TU Delft Architecture Faculty magazine, *BK Nieuws*, when he was a student.

The monumental status and historic character of the building was becoming more and more important. Erkens in the aforementioned 2001 letter to the RDMZ proposed the creation of a joint team to initiate the renovation project, the *Werkgroep Justus van Effen* (Working Party Justus Van Effen).[311] Eager for commitment from the RDMZ, he mentioned that the project had been entered onto the *Top 100 lijst* (Top 100 List).[312] This list, published under the name *UNESCO "Top 100" onroerende objecten* (UNESCO "Top 100" immovable objects) was a list of buildings selected for special mention under the 1954 UNESCO Hague Convention. Inclusion on this list led to a WBR project proposal for the Justus van Effen Block in 2002 to conclude that: "The monumental and the public housing driven improvements cannot be undertaken in isolation."[313]

This proposed Werkgroep Justus van Effen was constituted in 2000 and was led by a representative of the WBR and consisted of representatives of Urban Design and Housing Service of the City of Rotterdam (*dS+V*, both spatial planning and monuments care), RDMZ and the Ontwikkelingsbedrijf Rotterdam (Rotterdam Development Corporation).[314] This team was tasked to strategically explore the conditions for the renovation of the project including, on special request of the WBR, to specify the moment when the inhabitants of the project were to be included in the planning process.[315] The Werkgroep developed a plan consisting of an initiation phase, planned for 2001–3, following which a definition phase (project brief) would be developed, before its execution in 2005–6.[316] As part of the first phase of the project, the Working Party commissioned a number of studies. Concurrently specialist reports relating to both the current state of conservation and the cultural historical value of the building were commissioned and delivered to inform the

310 (SAR: Collection Image and Sound, No. 7463).

311 (Van Berk, 2003, p. 8).

312 (Erkens, 2001).

313 "De monumentale- en volkshuisvestelijke verbeteringen kunnen niet zonder elkaar." (Woningbedrijf Rotterdam, 2002, p. 1).

314 The team consisted of: JPL van Rooijen (RDMZ), JI Hage and MFM Knibbeler, (dS+V Ruimtelijke Ordening [City of Rotterdam monuments services]), MJ van Ansem (dS+V), MAJ Korstanje (Rotterdam Development Corporation) and KA van Berk, (WBR West) (Van Berk, 2003).

315 (Van Berk, 2003, p. 8).

316 (Van Berk, 2003, p. 8).

project. These four specialist reports were strategically chosen: an architectural-historical survey (Van der Hoeve et al., 2002), building-technical survey (Spring Architects, 2002), market exploration and potential profits report (Mondria Advies & De Jong, 2002) and a cultural-historical exploration of the urban context (Steenhuis, 2003) were commissioned. Inhabitants were informed of the process, but did not have direct representation on the working group.[317]

This early document also proposed the remodelling of the dwellings, based on a refined formula for a combination of sale (49%) free-market rental (21%) and public housing rental (30%) dwelling composition and the ambition to increase dwelling size through a further reduction of the number of dwellings from 164 to 130. Three dwelling types were proposed. The most basic was selling the apartments as an empty shell, leaving the infill to the inhabitant (the so-called Rotterdam 'klus-woning' (DIY-dwellings), a model much used at the time to draw young inhabitants to invest in decaying neighbourhoods in Rotterdam). Alternately, the interiors of the remaining dwellings would be completed, either in a 'contemporary' or 'historical' styling. This latter option proposed to give potential residents the option to have their homes modelled after the historical original interiors.

Finances, the economy of the project, was also highlighted in the document, with the project cost estimated at a ball-park global estimate of € 15–20 million. "Finances will play an important role in estimating the feasibility, both in the distribution and extent of the costs and in the possibilities of subsidies."[318]

The Werkgroep was ready to present its findings in 2003, specifically the conclusions of the four reports it had commissioned. The conclusions didn't contradict each other as their tasks had been limited to specific domains. The urban assessment concluded that the urban plan had value as an integral unit, and the access system of the Justus van Effen block, strung across two city bocks was historically valuable, more so than the adjacent block by JJP Oud. The historical parcellation of the courtyard needed to be maintained as integral part of the urban structure. The cultural historical assessment focussed on the built form of what it called the 'super block', and on the main constructional elements: the brick walls, timber bearing beams and concrete construction. Other valuable elements included the access system with its lifts, stairs and remaining decorative element, the unabashed flat roof, the façade articulation and materialisation and, in agreement with the urban

317 (Woningbedrijf Rotterdam, 2006b).

318 "Financiën zullen een belangrijk onderdeel worden van een studie naar de haalbaarheid van een renovatie, zowel de hoogte als de verdeling over partijen en de mogelijkheid van subsidies." (Woningbedrijf Rotterdam, 2002, p. 2).

analysis, the spatial structure of the courtyard. Spring architects concluded that the building was sound, that replacement was called for, as some elements had reached the end of their functional and economic lives. This is a curious conclusion if we take into account that the 25-year maintenance period for the block had not yet been breached and Spring was the successor-practice of Leo de Jonge architects, the designers of the first renovation! They thought that noise transfer between gallery and individual units was problematic and needed to be addressed.

The market assessment was disconcerting. Their conclusion was that 'despite the fact that it concerns a monument', the conditions for sale of the units were not very favourable. The reasons: the poor daylighting of the living units under the galleries and those along the narrow Peter Langedijk street (facing one of Oud's Spangen housing projects). In their view, the neighbourhood would require a facelift and the availability of parking would further hamper sales.

These negative market assessment conclusions aside, the team projected that construction could commence in 2005–06 after concluding preparations and discussion with inhabitants and the neighbourhood.[319] The project limped ahead over the next three years: discussions focussed on the courtyards (2005) and access system, which were seen as the greatest contributing factor to the systemic social dysfunction of the project. The planning for the renovation of the buildings were repeatedly moved forward. By 2005 it was planned for implementation in 2007.[320]

Molenaar & Van Winden / Hebly Theunissen architects were invited to present their vision for the renovation project at a Werkgroep workshop in 2005. Their analysis took the authenticity and optimal functioning and the project as monument of public housing, as key point of departure. The collective space was regarded to be the source of the dysfunctionality of the project. Their presentation included a discussion on the quality of the dwellings, specifically mentioning fire safety and a need for storage units for the gallery dwellings. To address the latter, they proposed to sacrifice a dwelling adjacent to the stairwells to be converted into store rooms. Other dwellings adjacent to stairwells would get doors opening directly onto the stair landings hoping that residents of these dwellings would appropriate these spatially, thereby taking control of these problematic public spaces.[321]

319 (Van Berk, 2003, p 8).

320 (Woningbedrijf Rotterdam, 2005, p. 2).

321 (Molenaar & Van Winden Architects & Hebly Theunissen Architects, 2005).

A restoration specialist and research institute, TNO, was appointed to investigate the façade and develop a methodology for its restoration in 2005.[322] By January 2006, without the architects having been appointed for the full project, discussions were still continuing with regards to the public space renovation, which was to be restored to as close as feasible to the original 1920s intention, hoping that conservation subsidies might help pay for the landscape. When the architects were eventually appointed, the scope was limited to the restoration of the Justus van Effen complex's façades only; conditional to a national subsidy of € 3,25mil.[323] The WBR still hoped to limit its financial outlay by upgrading the dwelling units through a low-level intervention: 'With regards to the dwellings, the WBR will first undertake an internal analysis of which qualities are present and which interventions are required to improve these qualities… adaptations to dwellings are to affect only the insides of the dwelling."[324] The whole project was estimated to lead to a € 6million loss. This first phase was to be evaluated by WBR management before final decision-making on the future of the project.[325] The WBR reprogrammed the interiors of the dwellings themselves, planning to: upgrade kitchens and bathrooms, remove a 1,8m section of wall between the kitchen and living room and merge two bedrooms. Not only was the intervention to be limited, it all had to happen as quickly as possible.[326]

Plans were so far advanced that a presentation was made to the Rotterdam *Commissie voor Welstand en Monumenten Rotterdam* (Aesthetics and Monuments Commission) in October 2006. The minutes listed interior changes planned to the built fabric as:

- replacement of aluminium frames with timber according to the original design;
- retention of the 1980s front doors;
- restoration of the façade (if financially feasible);
- replacement of the plastic planters with concrete;
- installation of a new glazed lift, central to the complex; and
- renovation of the courtyard…

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322 EJ Nusselder collaborated with the research institute TNO (T Wijffels) who was appointed separately. Nusselder sought advice from experts from the RDMZ, M van Hunen and R Crèvecoeur to inform his investigation and undertook a number of on-site experiments (Nusselder, 2006, p. 5)

323 (Woningbedrijf Rotterdam, 2006a).

324 "Voor wat betreft de woningen zal eerst intern bij en door het WBR worden geanalyseerd welke kwaliteit er aanwezig is en welke ingrepen mogelijk noodzaakelijk zijn om deze kwaliteit eventueel te verhogen… Eventuele aanpassingen vinden hierbij alleen plaats in de woning zelf." (Woningbedrijf Rotterdam, 2006a, p. 2).

325 (Woningbedrijf Rotterdam, 2006b).

326 (Oomen, 2005).

… the last mentioned retaining the focus for the renovation.[327]

By 2007 four mechanical engineering practices were invited to prepare presentations on an approach for the renovation of the project based on two ambitions:

1. "Building Physics: A comfortable and energy saving approach in keeping with the monumental value of the complex" and;

2. "Installations: A clever installation concept through which the envisaged flexible use of the dwellings can be achieved."[328]

W/E Adviseurs[329] were selected to develop the installations design.

Then in 2007, the WBR merged with housing group *De Nieuwe Unie* (The New Union), creating a new entity called *Woonstad Rotterdam* (Urban Rotterdam).[330] This new entity, with its fresh new logo and corporate identity, was eager to continue with the renovating project. A public picnic was arranged in the complex on 8 September 2007 as part of a national Open Monuments Day at which the renovation plans were made public,[331] and by 2008 the last residents of the block had been relocated in anticipation of the renovation project.

Unfortunately, both the project team and (new) owner became less and less convinced that the proposed approach, including the high cost of the façade restoration,[332] would deliver results any different to those of the 1980s renovation.[333] The project slowly came grounding to a halt except for some non-committal actions which continued, such as exploratory destructive investigations of the building.[334]

In 2008 Woonstad Rotterdam commissioned a third party, Han Michel Concepts, to create a strategic vision for the project to break the stalemate.

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327 (Commissie voor Welstand en Monumenten Rotterdam, 2006).

328 "Bouwfysica: Een comfortabele en energiezuinige aanpak die recht doet aan de monumentale waarden van het complex. Installaties: Een vernuftig installatie concept waardoor het beoogde flexibele gebruik mogelijk wordt." (Molenaar & Van Winden Architects, 2007).

329 Cees Leenaerts, was the project advisor.

330 (Woonstad Rotterdam, 2008, p. 5).

331 (Woonstad Rotterdam, 2008, p. 38).

332 (Molenaar, 2011).

333 (Goede, 2009, p. 66).

334 (Molenaar & Van Winden Architects, 2008).

Michel proposed a new perspective embodied by the slogan: "Justus van Effen 100% monument."[335] This slogan presented a clever play of words: the Dutch 'NU' translates to 'Now' in English, implying that the whole meaning involved both 100%-Monument and 100%-Now. Gone was the piecemeal approach: it was replaced by a grand vision building on a number of aspects of the first proposal. The most important, first highlighted by the competition entry of Molenaar & Van Winden / Hebly Theunissen, was that the monumental value of the block could have developmental currency. In the Michel proposal, an idealised history of the complex was presented as design generator and would lead the way to the resurrection of the complex and its return from purgatory, grown from…

"…the eminence of Justus. Throughout the world, Justus van Effen is celebrated despite the bad state of the monument. However, this global fame has no influence on the inhabitants of Rotterdam. With them Justus van Effen does not equate to a good home address. That will change. Visitors will soon find a luminous monument, one of the characteristic buildings of Rotterdam. It will be special to be able to live and work in this beautiful monument."[336]

The new vision had a number of focus-points, based in a marriage of a monumental nature and the idea of current-ness, which became critical factors in the new concept:

- 100% monument (exterior): In keeping with the original Molenaar & Van Winden / Hebly Theunissen concept the exterior would be restored to 'the original design from 1921. The same goes for the courtyard. The history of the site would be presented on-site;[337]
- 100% now (interior): The interior had to be neutral, modern, spacious and flexible, suitable for live-work arrangements, offering freedom of choice; and
- new communality: a central coffee bar, laundry and communal communication technologies such as broad-band internet; all "…handy and comfortable".[338]

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335 (Michel, 2009).

336 "…de faam van Justus. In de hele wereld is Justus van Effen een begrip, ondanks de slechte staat van het monument. Op Rotterdammers heeft deze wereldfaam echter geen invloed. Bij hen staat Justus van Effen niet genoteerd als een goed woonadres. Dat gaat veranderen. Bezoekers treffen straks een stralend monument aan, een van de karakteristieke gebouwen van Rotterdam. Het wordt bijzonder om in dit mooie monument te mogen wonen en werken." (Michel, 2009, p. 5).

337 (Michel, 2009, p. 6).

338 "…handig en comfortabel" (Michel, 2009, p. 14).

By April 2009, the 100% Now aspect had grown to include ambitious energy systems.[339]

In a vision document prepared for Woonstad Rotterdam, circulated to the different actors in April 2009, including the RCE, (successor of the RDMZ) the project ambition is worded as: "Just as 80 years ago, Justus van Effen is ahead of its time with sustainable services such as sustainable energy generation and digital infrastructure."[340] Now things moved fast: by early July 2009 an application for monuments permit had been submitted to the Rotterdam Monuments office (d+SV Rotterdam Bureau Monumenten). It described the project as "Façades restoration, dwelling and courtyard renovation, new collective and sustainable energy installations."[341]

FIG. 5.24 Cover of sketchbook exploring the possibilities to reinstate the original spatial intent of the Brinkman floor plans (Molenaar & Van Winden with Hebly Theunissen).

FIG. 5.25 Floor plan comparison showing the three renovation changes.

The architects' appointment was expanded to include developing new floor-plans based on the '100% Mo**nu**ment' vision. W/E Adviseurs analysed the extant building and developed a proposal for the new energy concept, based on the Dutch *Bouwbesluit* (Building Regulations) of 2003 for new buildings. W/E developed what

339 (Woonstad Rotterdam, 2009b, p. 12).

340 "Net als 80 jaar geleden is Justus van Effen de tijd vooruit met voorzieningen als duurzaam energieopwekking en digitale infrastructuur." (Woonstad Rotterdam, 2009a, p. 9).

341 "Restauratie gevels, renovatie woningen & binnenterrein, nieuwe collectieve & duurzame installaties." Application for Monuments Permit. City of Rotterdam, Division of spatial planning and Monuments Office. Project: 'Justus van Effenstraat 1t/m171.' Dated 1 July 2009. (s.n., 2009).

was called an ‘Energy concept’ and advised on other technical issues including sound insulation, fire safety, and daylighting.[342] This regulation was not binding to renovation projects, but was set as the goal-posts by which the project could achieve its 100% Now-ness.[343] Their proposal required new insulation applied to all dwellings coupled with a new aquifer thermal energy storage system with solar hot water and photo-voltaic augmentation. From the first word go, it was clear that some of the provisions of the Bouwbesluit 2003 could not be met for all rooms: “… the stated new-build requirements with regards to daylight penetration cannot be achieved… due to the monumental character of the complex, enlargement of the daylight surface is not possible.”[344]

The 100% Mo**nu**ment approach required the total stripping out of all the building services, the skin insulation and reconfiguration of the space plan to ensure the new dwellings, offered for sale or rent, would address the aspirations of the investors and tenants that Woonstad Rotterdam now hoped to attract to the project. The whole configuration of the building was re-visited and the internal space plan changes of the larger dwellings were to a large extent undone.

The project team maintained a flexible pragmatic approach, guided by the expertise of the architects and the requirements of the Rotterdam Aesthetics and Monuments Commission, but financial constraints remained. As the building had been uninhabited since the year before, a new financial concept could be developed in 2009, identifying a new inhabitant profile. A portion of the apartments was now to be sold off and the project was strategically positioned to attract the ‘creative-classes’[345]–along with private investors, a new tenant profile referred to as *kapitaalkrachtiger*[346] (with a greater capital) was to inhabit the block. Floor plans were developed to allow for a level of flexibility to accommodate home-offices,[347] and the Justus van Effen Complex was rebranded as the *Justus Kwartier* (Justus Quarter).

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342 (W/E Adviseurs, 2009a).

343 (W/E Adviseurs, 2009a).

344 “…dat voor diverse ruimten niet wordt voldaan aan de gestelde nieuwbouweisen met betrekking tot daglichttoetreding... Vanwege het monumentale karakter van het complex is vergroting van het daglichtoppervlak echter niet mogelijk.” (W/E Adviseurs, 2009a, p. 10).

345 A term coined by Richard Florida. See: (Florida, 2002).

346 (Maandag, 2012, p. 80).

347 (Woonstad Rotterdam, 2009b).

5.6.3 Active experimentation

Jurriëns Bouw, a contractor specialising in renovation and restoration, was appointed to execute the project. The 2-year renovation saw the project being stripped back to the bare brick walls and all the dwellings were completely gutted for the second time in 30 years!

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FIG. 5.26 The Justus Quarter renovation project: [1] Steam cleaning the facade (J Molenaar); [2] The Pieter Langendijk Street façade; [3] Inside the block; [4] Interior of a ground floor apartment (all 2011).

All insulation measures of the first renovation cycle, including the 1983–85 front doors and aluminium-framed double-glazed windows, were removed, the whole heating system was removed and a new block heating system installed. The façades were painstakingly restored to their 1922 appearance through removal of the 1989 paint layer and decayed bricks were replaced with purpose handmade facsimiles of the original bricks. The courtyard was completely reconfigured. Mature trees that had grown between 1984 and 2010 were removed and all the private gardens were incorporated in a new communal semi-public open space. The decision to restore the façade as faithfully as possible led to some apartments now having two front doors. Other small aesthetic interventions included the replacement of the 1983–85 polyester planters on the concrete gallery with pre-cast concrete reproductions imitating the original planters more closely than those that had been cast into the original in situ balcony wall.

Despite recommendations in 2003 to maintain the original layering of private and public (that would require private maintenance) believed to be an essential component of the historic character of the block, a single public space was created. The spectre of decrepit courtyards outweighed the historical value: “if one garden becomes rundown, it affects the overall image.”[348]

5.6.4 The 2E+Co of the Justus Quarter

The second renovation project of what had started out as Blocks VI & VII, Spangen, did not initially set high ambitions for improvements to economy, energy use or comfort: the focus was rather on addressing the social problems through modifying the courtyards and the circulation: addressing problems with bicycle storage, restoring roof edges, upgrading stairwells and installing better lighting in public areas.[349] The proposal to restore the façade to its original appearance was that of the architect’s team and was key to their winning of the 2000 architectural competition. The only 2E+Co aspects that the WBR initially required was upgrading the kitchens, opening up the dividing walls between kitchens and living rooms, and installing new sanitary fittings in the bathrooms. In some instances, the few remaining small dwellings were going to be merged.[350] This approach was driven by a wish to limit investment. Over time these ambitions expanded and by 2007 the project team presented concept drawings of new internal layouts, the implication of which would have been, in part, that that the insulation of the dwellings would have to be modified. [351] This opened the possibility of an energy-reduction upgrade driven renovation.

348 “…als één tuin verloedert tast dit het algehele beeld aan” (Commissie voor Welstand en Monumenten Rotterdam, 2011b).

349 (Molenaar & Van Winden Architects & Hebly Theunissen Architects, 2005, p. 50).

350 (Molenaar & Van Winden Architects & Hebly Theunissen Architects, 2005, p. 19).

351 (Molenaar & Van Winden Architects Hebly Theunissen Architects, 2007).

5.6.4.1 Economy

The WBR initially hoped to co-fund the project through the subsidy system of the RDMZ.[352] Probably hoping to attract funding for the façade renovation, Erkens wrote to the RDMZ that: "I assume that the Dutch government, in placing the Justus van Effenblock on the monuments list and on the so-called Top Hundred list, will be willing and able to bear a co-responsibility and -involvement and be in a position to contribute to the project, also in financial sense."[353] Erkens was to be disappointed as no subsidies would be forthcoming for the conservation of the monument.

Other subsidy options were soon identified. The city and its partners, including housing corporations could apply for project funding from the Ministry of *Wonen Wijken en Integratie* (Living, Neighbourhoods and Integration) 2009 budget for so-called *krachtwijken* (power-neighbourhoods, a euphemism for problem neighbourhoods). Rotterdam was awarded the lion's share in that year: a total of € 895 000 was awarded to the city to help fund the renovation of landmark buildings, amongst them, the Justus van Effen complex.[354]

Two 'green' subsidies were to play their part in the development of the renovation strategy:[355] The *Subsidieregeling glasisolatie* (subsidy for insulative glazing) of 2009 was a subsidy of € 50million issued by the *Rijksoverheid* (National Government).[356] The subsidy *Groen beleggen en financieren* (Green investment and financing) provided preferential loans for improving energy systems that would upgrade dwellings from Energy Labels F or G to Energy Labels A or B.[357] Subsidies remained limited and could never cover the whole renovation project. The project had to look to the market for its financial equilibrium and the apartments in the complex were marketed to prospective (hip, young) buyers. The 2009 global recession, however, hampered sales. Apartments intended for sale had to be let, and funding for some of the nice-to-haves evaporated. Balancing the project budget remained a challenge. This was exemplified by the discussions relating to the courtyard renovation, designed by landscape architect Michael van Gessel, which had to be amended at quite a late date to accommodate savings needed to cover other

352 (Erkens, 2001).

353 "Ik veronderstel dat de Nederlandse overheid middels plaatsing van het Justus van Effenblok op de monumentenlijst en op de zogenaamde Top Honderd lijst een medeverantwoordelijkheid en – betrokkenheid voor dit monument zal willen en kunnen dragen, ook in financiële zin." (Erkens, 2001, p 2).

354 (Gemeente Rotterdam, 2010, p. 46).

355 Personal communication, Cees Leendaerts, 30 June 2012.

356 (Rijksoverheid, 2016).

357 (Rijksdienst voor Ondernemend Nederland, 2016).

unforeseen costs, including concrete repairs that cost more than anticipated.[358] In the end the project investment totalled € 30 million. Construction costs came to € 16 million. The calculated realised a property value of € 21 million left the owner/ developer Woonstad Rotterdam with a € 9 million shortfall.[359]

5.6.4.2 Energy

FIG. 5.27 W/E Adviseurs energy and indoor climate concept for the Justus van Effen Complex (Stichting W/E Adviseurs. [s.a.]).

Initially the ambitions for the project 100% Now's aspirations we aligned with the Bouwbesluit of 2003,.[360] These had to be balanced with the qualities of the 100%Monument aspirations, informed by a growing awareness of sustainable

358 (Commissie voor Welstand en Monumenten Rotterdam, 2011c).

359 According to the entry of the project for the 2013 NRP Gulden Fenix competition (Nationaal Renovatie Programma, 2013).

360 (W/E Adviseurs, 2009a).

energy use. Soon however, the 100% Now ambition grew to the project becoming ‘energy neutral’, i.e., producing as much energy as the inhabitants consumed.[361]

W/E Adviseurs developed an energy system aimed at achieving the energy neutral ambitions for the project, which were to “…combine the original monumental values of the complex with the most modern forms of living comfort with the most modern insights with regards sustainability.”[362]

Skin: Thermal Insulation

Chapter 5 of the Bouwbesluit of 2003 titled *Voorschriften uit het oogpunt van energiezuinigheid* (Regulations from the perspective of energy saving) presented the team with ta challenge. They needed to increase the thermal resistance of the skin of the dwellings from the 1,5 m^2K/W achieved in the 1983–85 renovation to 2,5 m^2K/W and upgrade the windows and doors to have a thermal resistance of 4,1 W/m^2K.[363] The project team, however, set more ambitious goals[364] as part of the 100%Now goals, to achieve a sellable ‘energy neutral’ design.[365]

TABLE 5.2 Thermal design ambitions for the second renovation.

Element	Thermal Conductance or Resistance
Façades	R_c = 4,0 m^2K/W
Ground floor (over basement)	R_c = 2,5 m^2K/W
Roofs	R_c = 5,0 m^2K/W
Floors of balcony’s	R_c = 3,5 m^2K/W
Concrete roofs over entrances	R_c = 4,5 m^2K/W
Dividing walls to stairwells	R_c = 3,0 m^2K/W
Windows	U = 1,1 W/m^2K
Doors	U = 1,1 W/m^2K

361 (Schellekens, 2011).

362 “…het combineren van de oorspronkelijke monumentale waarden van het complex met de modernste vormen van woon- en leef comfort en de modernste inzichten wat betreft duurzaamheid.” (Woonstad Rotterdam et al., [s.a.]).

363 (De Jong, 2008, p. 463. Articles 5.2 & 5.3).

364 (W/E Adviseurs, 2009a, p.5).

365 (Hoogerland, Hebly, Molenaar, & Goede, 2010, p 37).

When necessary destructive demolitions were undertaken as part of the on-site investigations in 2008, a lot of moisture was discovered in the cavities between the 1922 masonry walls and the 1983 internal insulation sandwich.[366] The continuing problem of moisture ingress through the brick walls, noted as far back as the 1940s, was still a problem, even after the application of a hydrophobic compound during the first renovation.

W/E Adviseurs proposed a solution early on in the project development: instead of trying to keep moisture out totally, they proposed the application of gas-concrete insulation panels, glued to the inside of the exterior walls.[367] This 'moisture-controlling' product had "…characteristics… [of] a combination of a high illustration value, a low damp diffusion resistance and a high maximal water capacity. Multipor® can as consequence buffer a lot of water after which it can be transferred to outside or inside through damp diffusions…". This solution offered a number of added benefits apart from moisture control: the manufacturers brochure also referred to ease of installation and fire-resistance.[368]

The obvious benefits of the system clinched the deal and the system was used to develop insulation details for wall insulation. This whole system is well illustrated by a typical construction detail, widely published,[369] illustrating the window reveal, new windows and glazing, and insulation. The project team was confident of the success of this new approach, and reported at the 2010 Docomomo Eco,mo.mo conference even before constructing commenced that: [370]

"Instead of placing our trust in the barrier creating working of a plastic membrane, which sits on the wrong side to deal with rain penetration, the façade now again [with the use of Multipor gas cement panels] has the moisture regulatory function as the English Bond façade provided. The only difference is that the thermal quality is drastically improved."[371]

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366 (Hoogerland et al., 2010, p. 38).

367 The product Multipor® was manufactured by Exella Netherlands®.

368 (Xella Nederland BV, [s.a.]). The broshure for Multipor® was included in as annex in the W/E Adviseurs 2009 Report.

369 (Molenaar & Van Winden Architects & Hebly Theunissen Architects, 2010b, p. 39; (Hermans et al., 2011, p. 211) & (W/E Adviseurs, 2009b).

370 Held on 23 April 2010 at the Delft University of Technology.

371 "In plaats van te vertrouwen op de afsluitende werking van een plastic folie, die bij regendoorslag ook nog aan de verkeerde kant zit, heeft de gevel nu weer dezelfde vochtregulerende werking als de 'halve steen met klamp' die oorspronkelijke de gevel vormde. Alleen de thermische kwaliteit is aanzienlijk verbeterd." (Hoogerland et al., 2010, p. 39).

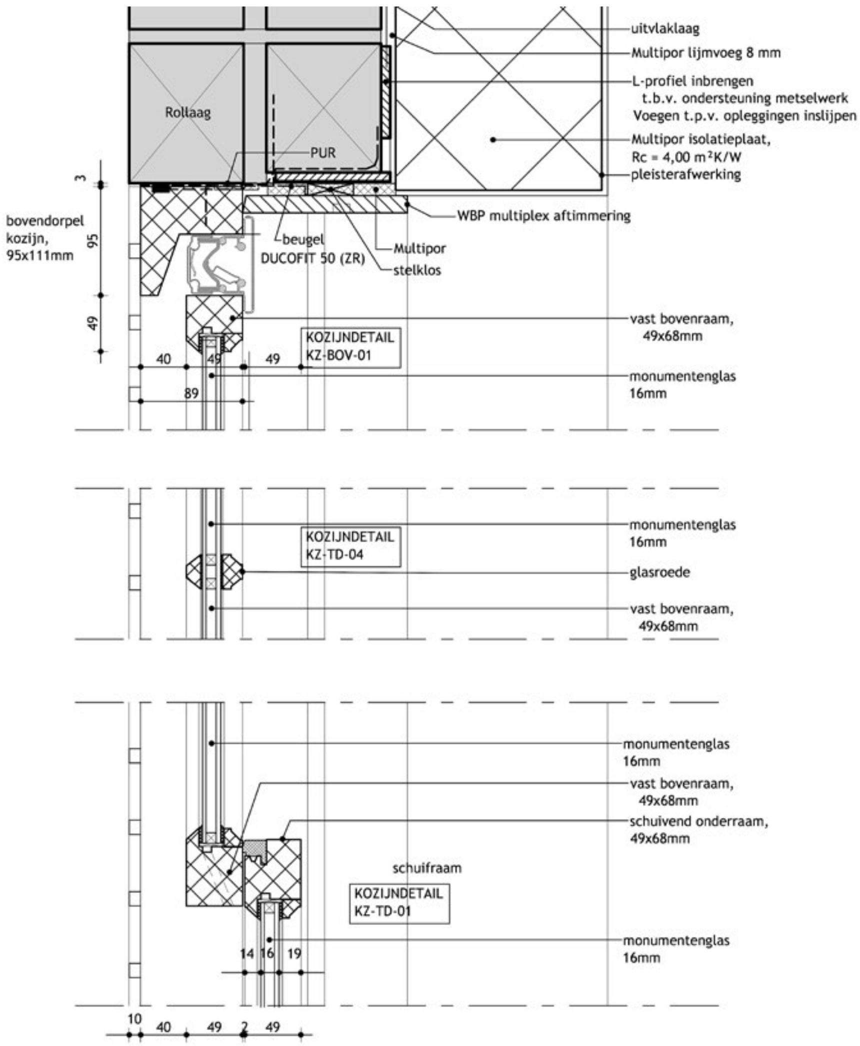

FIG. 5.28 Typical window section showing the Multipor ® insulation layer (Hoogerland et al., 2010, p. 39).

This was, however, not the system that was eventually applied. On site, the contractor found the gas-concrete panel product too difficult to install evenly. Achieving a smooth plastered wall finish proved very difficult and costly. He requested that this detail be substituted with the standard metal-stud drywall system.

W/E Adviseurs developed a new thermal installation approach, which largely resembled the system applied in 1983–5 in the end: in this case 18cm flax-wool blankets, with moisture barrier foils facing inwards into the dwelling, were glued to the inside of the brick walls. Over this, and free from the walls, a metal stud partition carried the 12mm gypsum board dry walling.[372] Flax fibre was chosen above other options such as rock wool and glass wool being evaluated as more environmentally friendly and because flax absorbs and retains moisture at high humidity, only to release it again at a low humidity.[373] A thermal resistance of 4,004 m^{2}W/K was theoretically achievable[374] with this system (in line with the ambitions) using the same thickness for the package as originally proposed for the Mulipor® installation, and therefore not requiring a space-plan or large-scale detail redesign.[375] It did necessitate greater attention to the restoration of the façade to limit moisture ingress. TNO was approached again, this time to provide advice on the application of a hydrophobic agent for the treatment of the façade post-cleaning, to avoid the recurrence of the moisture problems experienced after the 1983–5 renovation.[376]

The more traditional glass wool blanket-insulation was chosen for the roof and floor insulation (suspended under the floor dividing the basement and ground floor dwellings).[377] Two different products were specified for these locations. The insulation on top of the extant timber roof needed to be able to accommodate the proposed photo-voltaic collector installation as part of the energy neutral concept. As the original barge-board thickness was to be reinstated a 600mm edge-zone provided with only 55mm thick rigid cellular insulation to limit the visual impact proved sufficient for this. Ceiling cavities received 50mm mineral wool sound insulation blankets to add to the thermal qualities of the timber roof constructions.[378]

In the end a highly-isolative skin, with a value of 4,5 m^{2}K/K[379] was achieved for walls and roofs.

As part of the 100%Mo**nu**ment ambition, all doors and windows had to be restored to the 1921–22 ‘Brinkman’ appearance, while conforming to the 100%Now energy

372 (W/E Adviseurs, 2011).

373 (Isovlas, [s.a.]).

374 (W/E Adviseurs, 2009b, p. 2).

375 182mm for the stud-wall system in comparison to 180mm.

376 Minutes of the 7th site meeting (Woonstad Rotterdam, 2011b).

377 Isover® Mupan® Glasswool panels were used for floor insulation, the roof was provided with Rockwool® Taurexx® panels.

378 Tender drawings (Molenaar & Van Winden Architects & Hebly Theunissen Architects, 2010a, p. 3).

379 (Molenaar & Van Winden Architects & Hebly Theunissen Architects, 2008, p. 44); (Hoogerland et al., 2010, p. 38).

concept. This required ventilation grills be included in the window frames, as this could be designed to be aesthetically less obtrusive than providing grills in the face brick façade. Electrical turbines were located on the roofs of the complex to drive ventilation system.

Timber frames were manufactured to match the visual appearance based on photographs dating from the 1920s, but allowing for double-glazing using a special glass type developed for the renovation of monuments. [380] This culminated in a U=Value of 1,5 W/m^{2}K.[381]

Aluminium strips were provided on the inside of the window cavity where so-called *plakroeden* (mullions glued onto the outside of the glazing, mimicking the original window profiles) could be applied. This standard applied to most glazing, although other solutions had to be found where windows faced each other in terms of fire safety regulations.

TABLE 5.3 Evolution of thermal characteristics of the Galerijbouw Spangen project to the Justus Quarter.

	Block VI and VII	Justus van Effen Block	Justus Quartier	
	1922	1985	2012	Change (2012)
External walls (m^{2}K/W)	2.2	-	4,0	+ 182%
Window (W/m2K)	4.8	1,9	1,5	+ 281%

Services: Energy (Heating and Cooling) System

Plate and Brinkman originally envisaged the bathhouse to have a social cohesive effect on the inhabitants of Bocks VI & VII.[382] The attempt to continue this communal function of the built fabric the bathhouse's reuse as crèche and Turkish women's' club for a period after the 1983–85 renovation had not been a resounding success. The lost 'communality' of the bath-house proved a poetic argument for the use

380 "Stolker Glas Monusave [sic] (HR++) - Meerbladig isolerend glas Monumentaal Warmte reflecterend isolerend dubbelglas (BRL2201/2202)." (Molenaar & Van Winden Architects & Hebly Theunissen Architects, 2010b) .

381 The double-glazing consisted of a 3mm outer skin of drawn glass, a 6mm Xenon gas filled cavity and a 4mm glass panel onto which a heat-reflective low-e coating is applied (Hoogerland et al., 2010, p. 39).

382 (Brinkman, 1920); (Brinkman, 1923).

of another energy-saving choice: to re-introduce a communal block heating and cooling system.

No more would each dwelling have its own boiler, necessitating individual smoke ducts and tenant/owner management. The heating installation was relocated back to the boiler house basement of the bathhouse, the location of the original boiler house. Historical research was undertaken to determine the routing of the original 1922 block heating runs, and these were reused for the new heating and cooling installations.[383] The aquifer thermal energy storage system, was 'plugged' into the ground-water under the complex, augmented by gas boilers when required. Hot water heating was likewise sourced from the direct environment: the bathhouse roof received a roof-integrated solar hot water system, a so-called *zon-thermisch dak* (solar-thermal roof), which pre-heats hot water, augmented by gas when required. The conservancy tanks were located in the bathhouse from where well-insulated service runs to the various apartments, entering through the basement and rising in new service shafts. Heat-exchangers transferred the heat from the block heating system to floor heating coils.

The flooring of the block, originally timber plank floors on timber beams (with concrete sections at for instance front doors and on the ground floor), had to be modulated to accommodate the floor heating system (and the acoustic requirements). A new floor was therefore installed onto the extant, repaired timber construction. This construction linked to the aquifer thermal energy storage had the benefit of not only being able to provide heating for the dwellings, but could also be used to extract warmth from the floor of the dwelling in summer months and store this in the aquifer for future reuse.

It was crucial that the flooring installation be made as thin as possible. This was realized by building it up using an 8mm coconut fibre acoustic blanket onto which a patent egg crate system[384] was laid. The 16mm dia. heating/cooling coils were positioned into the patent egg crate system. This was laid in a new in situ cast anhydrite (calcium sulphate) floating floor system. In total this system was 50mm thick and could be taken up in the thickness of the doorframe. The entire top of the gallery was given a 100mm insulation layer with two purposes: to insulate the roof of the occasional room located below it and to eliminate the step up into the dwellings.

383 (Hoogerland et al., 2010, p.40).

384 WTH Noppenplaat®.

The whole system, including the solar hot water installation and photo-voltaic panels on the roofs was to be operated by an independent energy company, co-owned by the individual dwelling owners (private and corporate) and would create a new energy collective as a kind of poetic continuation of the collectivist spirit of the original Plate-Brinkman concept.[385] The energy-system, while requiring a more substantial upfront investment (offset through government subsidies) was designed to limit the household expenditure on energy.[386]

Reusing the bathhouse building in this manner was a neat post-rationalisation, based in a purpose-oriented reading of the collective nature of the new energy system, located in the 100%Mo**nu**ment ambition. In fact, if the 100%Now ambition was an energy-neutral building invented to address the predicted expectations of so a "capitally empowered' new residents" group then the monumental argument proved to be the vehicle to realise this ambition. Woonstad Rotterdam sold the idea as having been developed to specifically benefit the owners and tenants of the project[387]

The Rotterdam Aesthetics and Monuments Committee was not convinced that the benefits of the new system outweighed the negative visual impact and requested further studies of the visual impact of the solar system.[388] The roof had already been designed for the installation of the PV-panels, but the choice of system had not been made. The choice finally fell to the Solyndra® system,[389] a cylindrical tube system which could absorb solar radiation from 360 degrees. This meant that a very low incline was possible for the panels, minimising the visual impact. This installation was approved.

5.6.4.3 Comfort

Because the economic base of the renovation project was no longer aiming to house exclusively lower-income working class families, the floor plans were designed to attract *crea-midde klasse* (creative middle classes):[390] singles and couples, and

385 (Hoogerland et al., 2010, p. 40).

386 (Molenaar & Van Winden Architects & Hebly Theunissen Architects, 2008, p. 44).

387 (Woonstad Rotterdam, 2009b).

388 (Commissie voor Welstand en Monumenten Rotterdam, 2011a).

389 (Woonstad Rotterdam, 2011c, p. 3).

390 (Molenaar & Van Winden Architects & Hebly Theunissen Architects, 2008, p. 38).

couples with very young children as owners, while still allowing for some rental tenants with a *smalle beurs* (limited budget).[391]

New floor plans were developed to allow for flexible live-work situations with an ambition for a high level of *woon-werk comfort* (living working comfort).[392] Where separate enclosed kitchens had been an ambition of the 1983 renovation, kitchens were now internalised into living rooms, returning their spatial relationship to the original Plate and Brinkman design. The new floor plans provided for a range of choice: studios, two and three bedroomed and even a couple of four-storeyed *herenhuizen* (mansions), all with comfortable indoor climates, good sound insulation and new kitchens.[393]

When the project was brought to the market, comfort was key in the sales pitch: the first text in the sales brochure for the Justus Quarter was: *Monumentaal wonen met het comfort van nu* (monumental living with contemporary comfort).[394] The high quality of its finishing, which were chosen "with retention of the authentic character, as is fitting with the atmosphere of the twenties" was another key selling point.[395]

Comfort was also directly linked to sustainability with a notable portion of the brochure dedicated to *Duurzaamheid en comfort* (Sustainability and comfort).[396]

The landscaped courtyard was used as drawing card for the young creatives, the sale brochure sketching how one could "...even work on your laptop in the open air on the pretty benches" in what was now called the *Parkhof*.[397]

5.6.5 Concrete experience

The 2007–10 subprime mortgage crisis in the Unites Sates precipitated a global economic downturn. The sub-prime problem in the US became a global issue

391 (Strörmann, 2012, p. 11).

392 (Molenaar & Van Winden Architects & Hebly Theunissen Architects, 2008, p. 38).

393 (Woonstad Rotterdam, 2011a, pp. 18–46).

394 (Woonstad Rotterdam, 2011a, p. 3).

395 "Het hoge afwerkingsniveau met behoud van het authentieke karakter, passend bij de sfeer uit de jaren '20." (Woonstad Rotterdam, 2011a, p. 3).

396 (Woonstad Rotterdam, 2011a, p. 16–17).

397 "Op de mooie bankjes kun je zelfs met je laptop werken in de buitenlucht." (Woonstad Rotterdam, 2011a, p. 3).

when in 2008, the US investment bank, Lehman Brothers, filed for bankruptcy. The Netherlands was not spared. To guard the Dutch market from chaos, the Dutch government had to purchase entire banks (including the behemoth Fortis/ABN Amro in 2008 and SNS Reaal in 2013)[398] to save them from insolvency. GDP and consumer confidence fell. Real estate sales rates and house prices plummeted. By 2009 the number of annual sales was nearly half of what it was in 2007 and the indexed home price dropped by 16,3% on average for the country between 2008 (when prices were at a high) and 2013, when they were at their lowest.

This created a crisis for Woonstad Rotterdam. They had to bring the sale of apartments in the Justus Quarter to the market in the midst of a financial storm. Sales were disappointing. Woonstad Rotterdam had no other option but to fill the building by letting unsellable apartments out to tenants in both rent-control and as in free-market sectors.

Due to the additional project budget over-runs and disappointing sales, the photovoltaic system was initially cut from the project.[399] [Incidentally the manufacturer Solyndra filed for bankruptcy in 2011.[400]] Because the omission of the solar panels would mean more insolation on the roofs of the dwellings, they were painted white to avoid summer-time over-heating in the top-floor rooms. The solar panels were eventually placed in 2014–2015.

The restoration and renovation project was however well-received by new tenants, who were proud of living in a building so iconic that it was visited by a stream of: "… architecture students, tourists and pensioners".[401] Published reviews also lauded the restoration: "For decades it looked sad, completely dilapidated, neglected, painted white. But last Thursday a near-perfect renovation was completed and now it's radiant again."[402]

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398 (Rijksoverheid, 2013).

399 Personal Communication: Joris Molenaar. 15 June 2012.

400 ("Solyndra", 2021).

401 See: (Mannens, 2014).

402 "Decennialang stond het er treurig bij, volledig uitgewoond, verwaarloosd, wit geschilderd. Maar afgelopen donderdag werd een haast volmaakte renovatie afgerond en nu is het weer stralend." (Haan, 2012, p. V10).

5.6.6 Reflective observation

The project, on completion was well publicized. The painstaking restoration of the brick façade warranted a description of the project in the trade journal *Baksteen* in 2012, where it was prophetically described as a phoenix rearising.[403] Other trade journals were as complimentary, such as *Monumenten* which concluded even before the renovation project had been completed, that: "Michiel Brinkman's remarkable residential block faces a bright future."[404] With the entire complex now treated as an imprint architectural heritage, no one noticed that the museum-dwelling from 1985 had been sacrificed in the process. Brinkman's interiors were now finally abandoned.

In the 2013 the Justus Quarter was awarded the coveted Gulden Feniks prize for renovation, a prestigious national award issued annually by the *Nationaal Renovatie Platform* (National Renovation Platform) in the built environment.[405] This was a fact that didn't escape the residents, especially as it beat the prestigious renovation of the Rijksmuseum in Amsterdam to this prize.[406] In her doctoral assessment of value statements in Dutch monuments care 1981–2009, Charlotte van Emstede concluded that only time will tell how successful the renovation was.[407]

5.6.7 Learning Cycle 3: 2E+Co in the Actor-Factor-Set Ecosystem

The team for the second renovation cycle consisted of a small core team, centred around the owner, the architects and the systems engineers. This project team did not have such a strict institutional framework imposed on it and time had to be spent in finding a correct approach. It was also free to engage actors located in the Exosystem, retaining a fluid Mesosystemic process, occasionally inviting actors into the Microsystem to inform decisions. Importantly these decisions were subject to a healthy dose of scepticism. Woonstad Rotterdam's doubts about the renovation

403 "...om onlangs als een feniks te herrijzen na de restauratie en nieuwbouw van Molenaar & Van Winden en Hebly Theunissen." (De Vries, 2012, p. 12).

404 "Het bijzondere woonblok van Michiel Brinkman gaat een florissante toekomst tegemoet." (Van Alphen, 2011, p. 25).

405 (Nationaal Renovatie Programma, 2013).

406 (Mannens, 2014).

407 (Van Emstede, 2015, p. 201. See also other articles by Van Emstede: (2011) & (2012). More recently the project was assessed as part of the Beyond the Current project of the Faculty of Architecture of the TU Delft. See: (Oorschot et al., 2018).

project intentions, which differed so little from that of the 1983–85 renovation, would lead to a delay and re-appraisal of the ambitions for the project. The fact that the building was scarcely occupied, and after 2008, totally vacant, was an important Microsystemic factor that allowed the project team freedom to develop the project unencumbered by current residents' wishes.

The most significant moment in the abstract conceptualisation was the embracing of the 100%Mo**nu**ment approach, significantly brought to the project by an actor from the Exosystem. The heritage value of the complex had been confirmed in 1985 already by the listing of the structure on national level and a simple restorative approach would serve to exploit these qualities to the benefit of the project. This gave the combination of heritage and environmental qualities contained in the 100%Mo**nu**ment idea unique and therefor marketable qualities. The project team was not deaf to Exosystem influences, and amplified it by the monumental approach of the 100% Mo**nu**ment. Yet the 100%Now ambition to be cutting-edge, led to experimentation. In one instance, one such experiment, that of the wall insulation, had to be abandoned in favour of a more common insulation strategy. The 'now'-ness was an important factor with which the project team reached out to create support and enthusiasm for their approach in the Macro- and Exosystems, hence the importance of searching to find fit of new technologies.

The owner and architects, with W/E and the contractor, Jurriëns Bouw, composed the project team who influenced the evolution of those aspects of the building driven by 2E+Co. The choice of the systems was clearly related to the ambitions of the owner and the project team to produce a project that would appeal to a new demographics, hoping to benefit from subsidy systems (Exosystem). Subsidies did play a role by steering choices. In the end the owner had to invest an imposing amount of its own means in the project, in part due the economic crisis (an Exosystemic factor).

Likewise, the promise of energy-expense free living was an important factor, used to entice investment from the Exosystem.[408] The project hoped that attracted higher-income earners could be enticed to invest by two unique marketable attributes of the complex, its recognized heritage value and its energy-neutrality. The 100% Mo**nu**ment was not only a marketing ploy. The cultural (architectural/ aesthetic and historical) value of the building was fully recognised and the team aimed at reinstating important tangible and intangible attributes as inspirators

408 (Molenaar & Van Winden Architects & Hebly Theunissen Architects, 2007); (Woonstad Rotterdam et al., [s.a.]).

of the renovation project. Rebranding the complex was an important strategy in this process.

A new addition to the character of the complex was its newly planned 100% energy neutral aspect, responding to a broadened understanding of the ‘Now’ component of the 100%Monument concept. This ‘Now’ also related to comfort and economy, so closely linked to the ecological driver of the sustainability argument. This strategy relied on heritage and emotive values ascribed to environmental sustainability to bring about an influx of new cultural and economic capital and led to economic and social revival.

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FIG. 5.29 Views of the he Justus Quarter from its famous aerial street (2021).

5.7 Conclusions

How did this heritage learn and what were the factors driving the changes for 2E+Co in the Justus Quarter?

5.7.1 Actor Factor SET in the evolution of the building

In the first renovation, the aim was to achieve a result that would be equal to a new building and meet the increased 2E+Co standards. The existing building was effectively seen as a nuisance, its pending monument-status as a hindrance (except for the potential subsidy this might deliver) and come what may, it had to fit the provisions of the Bouwen voor de Buurt approach. The 1980s Bouwen voor de Buurt approach presented an all-encompassing vision for the future for workers class neighbourhoods in Rotterdam. This gave the residents a powerful platform within the Microsystem of architects, owner, contractor and other specialists. Under the Bouwen voor de Buurt programme, these Microsystem actors were obliged to execute the wishes of the owners where they aligned with the Bouwen voor de Buurt ambitions. The project team was expected to ‘make fit’ a pre-defined solution to general challenges in a very specific building. Importantly, the fast-paced Bouwen voor de Buurt approach short-circuited the learning cycle by eliminating a process of reflective observation.

The most important factor for the project, was the ambition of the residents for large, modern, comfortable, but still affordable dwellings. In this regard it is worth noting, that the 1980s project, while having dwelling differentiation as earmark, actually delivered a mono-type housing solution for the block through the process of consultation. In so doing the housing type mix of the complex was deduced.

Exosystem voices were in general not tolerated. This much is clear from the first exchanges between the WBR and the then RDMZ. When considering the complex for listing as national monument, the official tasked with assessing the building was denied consent to enter the living units and no specific efforts were made to save the interior elements that may still have been present.

The antagonist relationship between the project team and the outside world (Exo- and Macrosystems),[409] coupled with the strong voice of the owner's organisations, doomed the renovation project from the start. In the end the hamstrung architects and other professionals of the first renovation could only react to the wishes of the inhabitants, mitigated or amplified by economic and comfort arguments.

The failure of the first renovation cycle can be put down to:

- Macro- and Exosystemic factors created an imbalance in the power relationships in the Microsystem. The Bouwen voor de Buurt approach created both an umbrella approach not attuned to specifics of the building and gave residents too much power, even if it was evident that many would not return after the renovation project was completed;
- the same Macro- and Exosytemic factors allowed the Microsystem actors to shut out other actors, with the consequence that the appreciation for the public housing complex as built heritage had little impact on decision-making. In effect, the Bouwen voor de Buurt approach, meant to democratise decision-making, acted contrary to its intentions, and worked as exclusionary force;
- decisions for the application of new technologies were taken in the Microsystem, but the specific details were heavily informed by generalist subsidies created in the Exosystem; and
- that these decisions had long-term negative effects.

The architectural and technical approach of the second cycle renovation proposal, did not initially deviate much from the approach of the 1980s project and the proposal can be described by a contemporary description from the 1985 renovation: "The houses got central heating, double glazing and a bathroom. The approach was so thorough that in reality, only the exterior of the building remained."[410] It aimed at addressing the qualities of the courtyard, upgrading the vertical circulation system, comfortable dwelling access, comfortable storage of bicycles, and improving the comfort of the dwellings.

Fortunately, a hesitant owner, not trusting this already tried approach to deliver better results, delayed execution of the project. Instead, the failure of the approach of the first cycle called for close scrutiny, deep research and flexibility from the core team, which (as we have seen) was a loose grouping with not a single constant

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409 Also see (Van Emstede, 2015) for more on this.

410 "De huizen krijgen centrale verwarming, dubbel glas en een badkamer. De aanpak is zo ingrijpend, dat eigenlijk alleen de buitenkant van het bouwblok blijft staan." (s.n., 1985).

actor engaged continuously throughout the whole 10-year process of abstract conceptualisation–not even the architects. This second renovation planning process was not hamstrung by par-boiled ambitions the first project team had to accommodate. For instance, the decision to restore the façades of the complex brought the Skin shearing layer into direct conflict with the Space Plan: it was impossible to marry windows to the rooms behind them. This dilemma was resolved by reinstating the original space-plan intent as far as possible, even though this was not originally the intention of the owner. For the gallery-accessed dwellings this meant returning the kitchen to its position on the aerial street, living rooms facing outwards from the block, and toilets relocated to their original position. The architects had slowly realised that they would need to reinstate the original spatial connection between inside and out,[411] but the final decision depended on the adoption of the 100% Mo**nu**ment strategy.

The appointment of the project team in 2005 was preceded by years of thorough research. This team in turn delayed important decision-making to conduct research, either referring to other actors in the Exosystem through presentations at conferences etc, or inviting specialists into the Microsystem for short periods of input. This blurring of the boundaries between reflective observation and abstract conceptualisation, creating smaller iterative processes, was a strength of this approach. The project team allowed the building to guide their decisions: the already-mentioned investigations into the positioning of the original reticulation system being a case in point. Crucial lessons were also drawn from the 1980s mutation cycle, thereby creating a full learning cycle for the project.

The ambitions of the individual project team of each renovation cycle, the actors in the Microsystem during the process of abstract conceptualisation, and their relationship to the building (both the bricks and mortar and the commonly held perception of the heritage value of the building), played a significant role in the evolution of the genotype and its expression as phenotype.

5.7.2 Subsidies

The conditional availability of public funds for construction and subsequent work to the centraalbouw experiment in Spangen played a critical role in its genesis and evolution. The centraalbouw building type, with its centralised access system and

411 (Molenaar & Van Winden Architects & Hebly Theunissen Architects, 2007).

public provisions, was developed by civil servants, including Plate, at the GWD, further refined by Brinkman, commissioned by the Rotterdam municipality. The building was constructed with public money. The central facilities would for years call for continuing subsidisation for operations, maintenance and upgrade from public coffers and while the building was directly managed by municipal housing authorities, it remained in essence, a public building, though privately inhabited.

The heavily subsided urban renewals projects of the 1980s, including the Rotterdam Bouwen voor de Buurt, had a clear ideal: upgrading neighbourhoods (not buildings) to contemporary norms. Buildings were a factor to be moulded to the ambitions of the neighbourhood and project teams, driven by ambition for increased comfort with limited costs to tenants and owners along with the appearance of now-ness. Low-maintenance materials, insulation and new apparently maintenance-free windows with double glazing were commonly applied, also for the Justus van Effen Block pending monument status. This status brought little protection. Despite the gatekeeper role the RDMZ legally had, the fact that it had no money from its own budgets to provide to achieve its goals, meant that it had very little real agency and could very effectively be marginalised from any decision-making process. The history of the block did not substantially influence the vision for the renovation.

The second renovation of the complex commenced with a request for subsidisation of the planned renovation to the address of the national monument's services. Again, the request could not be met, again other subsidy sources not specifically aimed at conservation of cultural heritage took a dominant position in the decision-making processes. The subsidies awarded were again for neighbourhood quality and stimulated energy use reduction. More importantly, the built heritage value of the Justus Block had now become a factor embraced by the actors in the Microsystem under the 100% Mo**nu**ment slogan.

5.7.3 E+2Co alure and disenchantment

The effect of the malfunctioning of new, untested technologies on the evolution of the block cannot be understated. Brinkman and Plate's block heating, lifts, gallery and garbage chutes were innovations hard-won in the face of fiscal frugality. The garbage chutes were never a great success, but this failure was minor enough to be rectified in operations. In contrast to the idealistic approach of Plate and Brinkman, the choice for products used in the 2E+Co upgrade of the first renovation cycle was driven by a subsidy system that was specifically housing related and not geared to heritage conservation. The approach to the application of technology of the first renovation cycle was largely mirrored in the second. In both arguments for 2E+Co were structured around inhabitant comfort and the economy of reduced energy use.[412] The results were also similar: upgraded comfortable and contemporary dwellings with technological mod-cons, insulation of the building envelope, and the installation of a contemporary energy system. The approach of the project team for the second renovation to: "…use new innovative materials to make Justus van Effen more sustainable and to improve its energy management…" could also ring true for the approach of the first renovation, as does the accompanying caveat that: "Innovations in technology must be based on knowledge of this operation."[413]

However, the choice by the project team of the first renovation for the then new and untested Upolet piping system for use with the individual gas boilers, was a result of subsidy requirements. It had a disastrous effect not only on the longer-term conservation of fabric, but also on the reputation of the place: inhabitants were certainly not happy with the results of the installation. This gave the block a bad name and contributed to the unattractiveness of the project, leading to social decay and the shortening of the lifecycle of the first mutation. The choice for and application of the Upolet system is exemplary of how a Macrosystem factor (government attempting to address social problems) could influence decision making in the Microsystem, through actors in the Exosystem, impacting negatively on the AR-DNA of the building.

The project team in the second renovation were not totally immune to the siren song of technological progress, especially when it came to the utopian vision of an 'energy neutral' future for the complex. However, in contrast to the project team of the first renovation, independent expert opinion was sourced and adopted, and the team remained willing to change tack throughout the process.

5.7.4 Newness and narrative of the Justus Quarter

The genesis of the Block VI & VII public housing project had hygiene, economy, efficiency and a modicum of comfort as drivers. Its technologically progressive comfort installation served the project well during its first life-cycle, keeping its currency well into the 1970s. As one long-time resident recalled in 1978: "…to this

412 (Hoogerland et al., 2010).

413 "Voor de verduurzaming en de verbetering van de energiehuishouding van Justus van Effen maken we gebruik van nieuwe innovatieve materialen… Innovaties in de techniek moeten gebaseerd zijn op kennis van deze werking." (Hoogerland et al., 2010), p. 41).

day there are still people in Spangen who don't believe us when we say we have block heating."[414]

When comparing the two renovation cycles the project went through, it becomes clear that the ambition of *newness* was a constant factor that induced its evolution. It was not the heritage narrative that drove the 1980s renovation: it was the sweeping ambition of newness and the promises of progress that 2E+Co technologies could bring.

The progressive application of climate technologies in service of an affordable hygienic environment in the original Galerijbouw Spangen project was chanced opportunistically as a handy argument to justify interventions. The resultant appearance of the building did, however, not harmonise with the commonly held heritage narrative; the technologies failed to deliver to the promises made.

It was only with the 2000 architectural competition that the heritage value of the complex entered the Microsystem as dominant driving factor in the evolution of the building, despite the project being registered as National Monument already in 1985. The aspiration to newness was rivalled by the emergent heritage narrative of its historical innovativeness especially relating to hygiene, energy, economy and comfort.

The legend of the innovativeness of the Brinkman-block originated before the building existed. The description published by Brinkman in the *Bouwkundig Weekblad* in 1920 saw the light of day even before the design had been finally approved by the authorities. Brinkman summarised the essence of the complex as a novel experiment through the introduction of the gallery and contained ground-breaking thinking through its central provision of unheard-of services for public housing.[415] (Notably Brinkman said nothing about the building's aesthetics.) The narrative of novelty of this public housing complex was readily adopted by other commentators, for instance, alderman Heykoop in 1928 described how the dwellings had been provided with the most modern of comforts, including neat kitchens and ablution facilities.

The untimely passing of Michiel Brinkman so soon after the completion of this ground-breaking housing block added allure to the narrative on the origin of the complex. The continuation of Brinkman's practice by his son, leds to arguably the most lauded dynasty of practices in Dutch architectural history–Brinkman; Brinkman

414 "…tot vandaag de dag zijn er nog mensen in Spangen die ons niet geloven wanneer we zeggen dat we cv hebben." (RKS afdeling Tentoonstellingen, 1978, p. 20).

415 (Brinkman, 1920).

& Van der Vlugt, Brinkman & Van den Broek, Van den Broek & Bakema[416]–all of which were key players in the Dutch Modern Movement, positioned the project and its key innovations as important markers in the pre-history of the Dutch Modern Movement.[417]

The second renovation of the building needed to reconcile the classical Rieglian dilemma brought by the rivalry between the diametrically-opposed heritage values and newness ambitions regimes.

The conflict was effectively resolved by the creation of a new narrative: the 100%Mo**nu**ment invention. This strategy neutralised the friction in the shearing layers between the matter and the meaning, the stones and the story, by aligning the ambitions of the use (newness; which largely mirrored that of the 1980s renovation) with a projected prestigious monumental dignity. The 100%Mo**nu**ment approach canonised a very specific myth and framed it as currency. But sacrifices were made in its implementation: it erased much of the building's latter evolutionary history. In the parlance of Lowenthal, the newness of the building became a bias in the viewing of the history of the building. "Heritage diverges from history not in being biased but in its view of bias. Historians aim to reduce bias; heritage sanctions and strengthens it."[418]

The role of the heritage narrative on the evolution of the Justus van Effen monument is illustrated by the influential 1960 article by Bakema, one of the heirs of the practice of Brinkman. Bakema can be credited with catapulting the project back into the limelight. This article, meant to praise the project had an unintended consequence: the aside that the dwellings had become rather small in comparison to contemporary standards was used to argue for the enlargement of the dwellings in the 1980s. One has to wonder what the effect would have been if Bakema had praised the aesthetics of the façade or the authenticity of the interior space plan and design and the technical achievements of the original installations instead? These, equally essential components of the Spangen centraalbouw experiment have faded into obscurity. The museum dwelling created in the 1980s, which presented a reconstruction of a typical interior, was erased during the most recent renovation, despite having featured in the 2001 *Kom thuis in Rotterdam* (At home in Rotterdam) open homes exhibition.[419] In contrast, the ground-breaking gallery access system

416 Today Broekbakema Architects.

417 (Van Emstede, 2015, p. 175).

418 (Lowenthal, 1998, p. 8).

419 (s.n., 2001).

and communality of the original ‘Brinkman’ block have become key aspects in the canonical narrative.

These two competing narratives of newness and heritage are both an ever-receding horizon. The heritage narrative looks towards the legendary genesis of the building; the newness towards the never-nearing horizon of technological progress in 2E+Co. The brilliance of the 100%Mo**nu**ment concept was that it not only aligned heritage values and newness into a single vision: it equated newness with historical innovativeness as an essential quality of this public housing monument. It shifted the heritage narrative from the tangible to the intangible: from the stones to the story. It also linked the heritage narrative to the nowness: living in a public monument was *now* both in terms of ecological and cultural paradigms.

The canonisation of the legend of the housing complex through its inscription as monument was an important moment of mutation, as was its inclusion in the official Dutch UNESCO Top 100 list. The inclusion of the Justus van Effen project in this list despite its poor state of preservation is an indication of the resilience of the story of the place and the historical prominence of the personalities it is associated with. In the case of the ‘Centraalbouw Spangen’/Block VI&VII/Justus van Effen Block/Justus Quartier, heritage learned through a process of modulating of the narrative.

The conflict between the heritage narrative and the promise of newness has been reconciled for now. The 100% Mo**nu**ment slogan gave the renovation project credence and was its currency. But the conflict is not played out yet. The Justus Quarter renovation signifies no more than a temporary truce.

5.7.5 What is in a name?

The evolution of names serves as an interesting supplement to the history of the evolution of the Justus Quarter and the canonisation of its story. Its name officially remained inconspicuous as Block VI & VII, until the change in the name of its custodian, the Rotterdam Woningstichting, which became the Gemeentelijke Woningbedrijf Rotterdam (GWR), synchronically to the implementation of the Bouwen voor de Buurt programme. This heralded a change in perspectives leading to the first renovation cycle, which also saw the building being called the Justus van Effen Block or Complex. In this case, the name change was not used as a directed mechanism to change perceptions of the block. It was simply a way to communicate clearly which building was being discussed. The first mention motion of the complex using the street name, refers to the establishment of a Bouwen voor de Buurt plan team for the *Justus Van Effenstraat*, probably because most of the homes had addresses on this street.

The second name change had a defined aim: branding. The new 100% Mo**nu**ment strategy required a catchy new marketable name. The *Justus Kwartier* was born. The monument-driven integrated second renovation attracted a heritage-aware and environmentally attuned occupant to the project, as consequence of, but also as driver for the renovation. And the memory of the bathhouse is today kept alive by the naming of the contemporary art and culture non-profit that is now housed in the central building of the complex: *Tale of a Tub*.

The renovation of the Kings Wives of Landlust, 2011 (Archivolt Architects Archive, Amsterdam).

TOC

6 Case study 2: Koningsvrouwen van Landlust, Amsterdam

From Existenz-
to Energy minimum

6.1 Introduction

Amsterdam has been referred to as a 'Mecca' of public housing.[1] Approximately 93 000 new dwellings were constructed in Amsterdam between 1918 and 1940. Of these 67 000 were constructed by private developers and another 10 000 by the city itself. The remaining 16 000 were built by public housing associations.[2]

One of the Amsterdam public housing complexes built during this period is today known as the *Koningsvrouwen van Landlust* (King's Wives of Landlust). This complex, that forms part of the larger Landlust neighbourhood, located in Amsterdam West, is the focus of this case study.

1 (Fisher, 1968, p. 23); (Stissi, 2007) & (Glendinning, 2021, p. 41).

2 (Van der Velde, 1968).

Landlust was developed as a master-planned urban expansion area during the 1930s. A portion of Landlust—an area bound by the Willem de Zwijger Avenue, and the Juliana van Stolberg-, Bestevâer-, and the Zeven Provinciën Streets[3]—was developed as part of a single master-planned city expansion project.

FIG. 6.1 The Versteeg-designed AWV zeilenbau public housing at Landlust (SAA: 5293FO002804).

It was here that Amsterdam saw its first, if somewhat tentative, comprehensive large-scale application of the principles propagated by the Dutch branch of the Modern Movement known as *Het Nieuwe Bouwen* to public housing.[4] This movement aimed at achieving a culture in which technology, functionality, openness and hygiene[5] would create a new efficient, rational, prosperous and equitable society. One of the ambitions of the Het Nieuwe Bouwen movement was the implementation of the

3 Renamed in 1947 in honour of the Rear Admiral KWFAM Doorman Street after the Dutch *Schout bij nacht* (naval officer) killed in the Battle of the Java Sea during WWII (s.n., 1947).

4 (Bakker, Van de Poll, & Van Oudheusden, 1992, p. 79).

5 (Hartveld, 1994, p. 37).

urban development principle *zeilenbau*,[6] which was approved for use at Landlust by the Amsterdam municipal authorities as a trial to test this new idea.[7] The project's genesis spanned nearly 10 years between 1932 and 1938 and is historically important as an urban and architectural experiment.

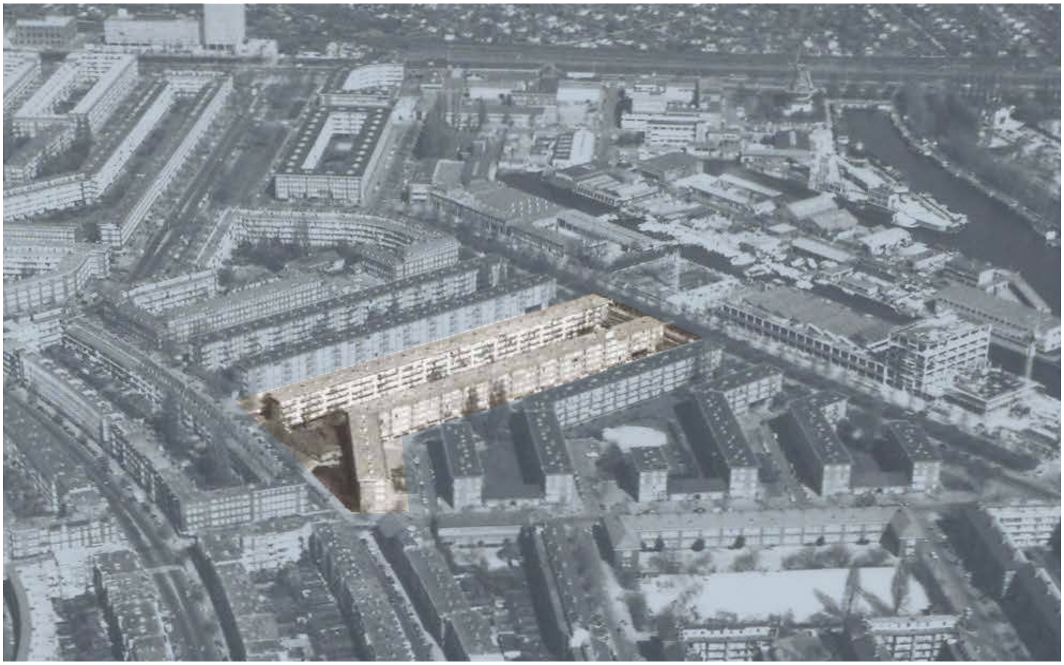

FIG. 6.2 Aerial photograph of the Landlust neighbourhood, with the Versteeg-designed AWV zeilenbau public housing indicated (21 April 1980; adapted from SAA: B00000035472).

The buildings that together make up the zeilenbau experiment for this area were designed by three individual architectural practices for three separate public housing associations. They display a varying level of experimental inventiveness. The northern-most development, built by housing association Het Westen to the design of Merkelbach & Karsten architects, is located between the Juliana van Stolberg- and Louise de Coligny Streets. Facing it, across the Louise de Coligny Street and bound to the south by the Charlotte de Bourbon Street lies the superficially similar-looking project constructed by the Socialist *Algemeene Woningbouwvereniging* (General

6 The Dutch term for the German *zeilenbouw* is *strokenbouw* or linear strip building (Abrahamse & Noyon, 2007, p. 83).

7 (Vorkink, 1938, p. 163).

Housing Association, AWV) to the design of Bureau Versteeg. The southernmost section, a triangle bound by the Charlotte de Bourbon and Karel Doorman Streets and Willem de Zwijger Avenue was constructed by the newly created Labor housing association[8] to the design of JP Vorkink.

The design for the blocks of the AWV Landlust project is often attributed to the person of Gerrit Versteeg, but in fact there were two architects called Gerrit Versteeg, one the father (born in 1872) and one the son (born in 1901). The contribution to the Landlust project of Gerrit jr has to date been overshadowed by the relative prominence of his father. Gerrit jr completed his architectural studies at the Technische Hoogeschool Delft (Delft Institute of Technology) qualifying in 1928. He soon joined his father in practice, under the name Bureau Versteeg (Versteeg Office).

Gerrit jr's title as engineer, 'Ir.' distinguishes him from his father in archival and published material. Because Gerrit sr passed away early in 1938, having been ill for a number of years,[9] it is most probable that the design and execution of the AWV Landlust project was undertaken by Gerrit jr.[10] This conclusion is further given credence by the fact that the Landlust project, then newly completed, is not mentioned in one of Versteeg sr's published obituaries,[11] despite the publication of the project in other magazines at the time.[12] All articles relating to the project published at the time are sighed "Ir. G. Versteeg".[13]

The technological resolution of the AWV (Bureau Versteeg) component of the Landlust zeilenbau development was especially inventive for its time, more so than its sister-complexes. It provided its residents with an exceptionally high level of comfort, notably hot water and space heating from a block heating installation at an economically acceptable price.

8 Labor was created in 1933 by the *Amsterdamse Vereeniging tot het Bouwen van Arbeiderswoningen*, (Amsterdam Association for the Construction of Workers' Housing) founded in 1875, as its public housing development branch.

9 (WB., 1938).

10 This is not generally acknowledged in literature that discusses this building. The Statement of significance for the project (*redengevende omschrijving*) for the project, composed by the Amsterdam City Monuments Care decision (Bureau Monumentenzorg Amsterdam) credits Versteeg sr noting only a possible contribution by his son ('Betreft Monumentenvoorinformatie, Louise de Colignystraat 37 t/m 39' [27 April 2009. Advice 16732. 10322091]. SAA: BMA 2009.389).

11 (WB., 1938).

12 (Merkelbach & Karsten, 1937, p. 155).

13 (Versteeg, 1938b); (Versteeg, 1938b).

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FIG. 6.3 The AWV housing at Landlust. [1] under construction in May 1937. Note the steel skeleton structure (26 May 1937; SAA: 5293FO002784); [2] The Louise de Coligny Street (8 Februari 1938; SAA: 5293FO002802); [3] The Bestevâer Street wing with the semi-subterranean arcade running beneath the balconies (December 1941; SAA: 5293FO002768); and [4] The Louise de Coligny Street seen along the Willem de Zwijger Avenue. (G Versteeg jr, May 1953; SAA: 5293FO002802).

Together with its neighbour, the Het Westen block (Bureau Merkelbach & Karsten), the AWV block designed by Bureau Versteeg was protected as Amsterdam Municipal Monument in the early 1980s. They were first described together during a listing procedure in 1981[14] and listed together as a single municipal monument in 1983 as a "…successful example for the thirties of functional zeilenbau wherein the garden and building locations relate to the street in an equal manner."[15]

14 (Commissie Dooijes (Gemeentelijke Monumentencommissie Amsterdam), 1981).

15 "Een voor de jaren dertig geslaagd voorbeeld van functionele strokenbouw, waarbij de tuin en de bouwstrook dezelfde ligging ten opzichte van de straat innemen." (Commissie Dooijes (Gemeentelijke Monumentencommissie Amsterdam), 1981, Index card, front).

The larger Landlust zeilenbau development, including now also the Vorkink-designed Labor project, was identified as a *Gebied met bijzondere waarde* (area of distinct cultural historical value) as part of the *Monumenten Inventarisatie Project* (Monuments Inventorying Project, MIP), a national programme initiated by the then Rijksdienst voor de Monumentenzorg (Monuments Care Department, RDMZ), to map the so called 'younger' monuments of the country dating to between 1850–1940.[16]The subsequent *Monumenten Selectie Project* (Monuments Selection Project MSP) recommended that Landlust be declared a National Monument in the early 1990s, but this recommendation has not been implemented to this day.

Landlust, including the Versteeg AWV housing, entered the new millennium as little-known and unloved, despite the status of municipal monument of the Merkelbach & Karsten Het Westen and the Versteeg AWV buildings, and the status of an area with distinct value. By the mid-2000s the buildings were in a poor state of repair.

Early in the new millennium the *Woonstichting Eigen Haard* (Own Hearth Fousing Foundation) took over ownership of the poorly maintained and out-dated Versteeg AWV complex in Landlust. By 2007 a large-scale renovation project was in the planning and the block underwent a radical renovation as from 2012 onwards. This renovation already received awards during the planning phase, winning both the city of Amsterdam's first *Groene Speld* (green pin) award and the Eneco *Energietransitie Prijs* (Energy Transition Prize) award, both in 2009, the year before the full renovation was implemented!

After completion the project was conferred the prestigious national Gulden Fenix award for renovation in 2012, partially due to the social component of the project in which inhabitants were extensively consulted, but also because the "combination of environmental aims and the retention of cultural historical heritage" were achieved by the project.[17]

16 (Bakker et al., 1992, p. 79).

17 "combinatie van milieudoelstellingen en behoud van het cultuurhistorisch erfgoed maakt het project extra interessant". (Nationaal Renovatie Platform, 2012).

6.2 Case study themes

Amsterdam became a 'Mecca' of public housing partially through an ever-evolving social subsidy system. Its construction was heavily subsided and subsequent changes depended very much on the availability of subsidies for maintenance and upgrades. The social subsidy system (an Exosystemic factor) itself relates to the paradigm of the times (the Macrosystem). The AWV complex at Landlust has always been managed as a single building, and adapted along mid-term strategy perspectives, driven by subsidy. The evolution of the AWV housing at Landlust, born from a socialist and social paradigm, provides a case study in the influence of the Dutch subsidy system. This case study will serve to link subsidy to paradigm and relate these to the evolution of the building itself.

The high level of technical resolution of the AWV block's design was tied to hygiene, cost and comfort, resultant from an economies-of-scale approach to construction and technical installations. These technical installations were continuously upgraded, while in the most recent mutation, comfort and economy took a central place. Economy, energy and comfort (2E+Co) will be tracked throughout this case as drivers for evolution. The focus will lie on how this evolution was achieved.

The similarities in appearance in the Labor, Het Westen and AWV housing blocks at Landlust, caused them to be confused over time. They were even discussed and described interchangeably, although there are architectural and structural differences between them. Coupled with the preeminent role given to character in the historiography, this muddled history provides an ideal case to assess the role of historiography and the resultant canonised narrative as Exosystemic factor as result of a Macrosystemic paradigm in the evolution of the AR-DNA of a building. Following from the conclusion of the Justus Quarter case study, this case study will also continue investigations into the creation and role of a commonly-held narrative from Exo- to Microsystem.

6.3 Defining learning cycles

Since its genesis, the Versteeg-designed AWV public housing building at Landlust was punctuated by a single moment of evolution: a dramatic so-called *groot onderhoudsbeurt* (large renovation), which was based on a projected further lifespan of 40 years before the next large intervention.[18] This renovation, already referred to in the introduction, was planned from 2007 and executed from 2010 to 2012. Over the preceding period, the building had been continuously inhabited; one inhabitant is on record as having lived in the block from the early 1940s right up to 2012.[19]

The large-scale renovation of 2007–12 was necessary because of a compounding of issues relating to the ageing of the building, changing comfort needs and demographic shifts in the Landlust neighbourhood.

TABLE 6.1 The evolution of the AWV Landlust housing block to the Koningvrouwen van Landlust.

Learning Cycle	Dates	Designation	Phases
1	1932–2007	AWV-block, Landlust	– Genesis: Abstract conceptualisation: 1932–37 – Active experimentation: 1937–38 – Concrete experience: 1938–2007 – Reflective observation: 1938–2007
2	2007–>	Koningsvrouwen van Landlust	– Abstract conceptualisation: 2007–09 – Strategic projects: 2007–2010 – Active experimentation: 2010–12 – Concrete experience:2012 –>

18 (Woonstichting Eigen Haard, 2013).

19 A Mr Blokzijl. Email from Harry Gosen to Horstadvies dated 15 February 2008. ('RE: opmerking over de tuin...'; (Vereniging Eigen Haard, s.a.); (Fontein, 2012).

6.4 Learning cycle 1 (1932–2007)

6.4.1 S•E•T

The context in which the housing at Landlust was designed and constructed was typified by an overall national economic expansion—albeit punctuated by WWI and the global depression following the 1929 Wall Street crash—and equally sustained growth of the urban population of Amsterdam, which called for innovative ways to address the resultant housing shortage.

6.4.1.1 Society

Amsterdam grew fast at the turn of the previous century. The construction of the North Sea Canal between 1856 and 1876 heralded an industrial revolution in the city, leading to what is often referred to as the city's second Golden Age.[20] At the same time, innovation and mechanisation in the agricultural sector contributed to a population increase in the Netherlands and simultaneously the depopulation of rural areas as people flocked to the cities. The resultant increase in the country's urban population led to an acute housing shortage and unacceptable living conditions resulted, especially in the capital Amsterdam, where the population had almost doubled from 270 000 when the North Sea Canal was opened in 1876, to 520 000 in 1900.[21] The lack of a formal process of housing provision moved civil society to try and address the problem even before then through civil initiative from the 1850s onwards.[22] The acute housing shortage was a national crisis: by 1899 more than two-thirds of Dutch families lived in homes with only two rooms.[23] To accommodate the needed urban growth for Amsterdam, numerous expansion plans were developed. The housing in these areas was to be constructed through private initiative. The resultant speculative housing—referred to as *revolutiebouw* (revolution construction) in the Netherlands—capitalised on the

20 1876–1930. Refer to (Bakker & Amstelodamum, 2000).

21 (s.n., 1925a, p. 26).

22 When the first precursors of housing associations were created in Amsterdam, Arnhem and The Hague (Ottens, 2000, p. 25).

23 (Ottens, 2000, p. 19).

urgency of need for living space, but in general the quality of housing, driven by only market forces, was in general, however, sub-par.

The *Woningwet* (Housing Act) of 1901 was a response to these dreadful and unhygienic conditions. Among its provisions, municipalities of cities with populations larger than 10 000 inhabitants were mandated to prepare and adopt expansion plans. It also provided the mechanisms to control housing development. Through the agency of elected municipal councils, the Housing Act repositioned housing production squarely in the middle of a fast-changing political playing field. It also provided municipalities with a mechanism to implement building regulations as by-laws.

The years following the year 1900 can be typified as a period of rapid technological advancement, urbanisation and emancipation in the Netherlands. The domestic duties daughters, wives and mothers were expected to perform started to influence the political debate and modulate architecture. The philanthropic commitment and influence of women like Socialist LCJEW (Louise) van der Pek-Went in housing production and house-and-home keeping education from 1899,[24] highlighted the inequity in denying them the vote. During the tumultuous years of WWI, suffrage was given to all men aged 23 and above in the Netherlands through constitutional reform in 1917. Very soon after in 1919, suffrage was extended to women, but only after the first women had been elected to parliament the year before![25]

In Amsterdam, socialist aldermen and administrators collaborated with socialist architects to advance cheap quality housing and urban environments. Members of the *Sociaal-Democratische Arbeiderspartij* (Social Democratic Workers Party, SDAP) took the initiative. After his election to the Amsterdam City Council as first SDAP council member in 1907, Floor Wibaut became a member of the city's *gezondheidscommissie* (health commission) and was soon known as an outspoken advocate for the municipality to take an active role in housing provision and improvements in city hygiene through, amongst others, slum eradication. Wibaut was the first to comprehend that the Housing Act could be implemented as tool by effectively cross-subsidising rents through direct subsidies and financial guarantees granted to housing projects. After Wibaut was appointed as alderman in Amsterdam in 1914 (the first Socialist to hold such office in the city), he convinced the city council in 1915 to establish its own housing service, the *Gemeentelijke Woningdienst Amsterdam* (GWA). Arie Keppler was appointed to head the new service. Keppler,

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24 (Smit, 2015). She was married to architect JE van der Pek.

25 *Sociaal-Democratische Arbeiderspartij* (Social Democratic Workers Party, SDAP) member S (Suze) Groeneweg was elected to parliament in 1918 while she herself was not yet allowed to vote.

also a member of the SDAP, had been a student activist, was a proponent of *tuindorpen* (garden villages) and was—not unimportantly—co-founder of the housing association affiliated to the SDAP in 1915: the AWV.[26]

In 1919 Wibaut was joined as alderman by social-democrat, Monne (SR) de Miranda. Together with Keppler, De Miranda and Wibaut spearheaded efforts to improve the living conditions, and especially hygienic conditions, of labourer's families in Amsterdam.

Ten years later, in 1929, the struggle to improve living and hygienic conditions continued. De Miranda proclaimed that a "…woman who has the right to vote, should not stand bent over a wash-trough…" He called on municipal authorities to provide central washing facilities, where women would not have to wash and mangle their own washing, but , have it done for them, at a low subsidised price.[27] With an aim "…to simplify the work of the housewife, to ease her heavy duty, to make household life more pleasant and to promote the health of the individual through cleanliness" this social-democrat argued that "a great deal of attention must be paid to efficient construction and a comfortable layout of the home."[28] This was not only an issue of individual dignity, but was part of a larger programme to improve public health, hygiene and a drive to improve the collective morality.

6.4.1.2 Economy

Dutch neutrality during WWI may have saved the country from physical destruction, but the economy was severely affected. The decade of gradual growth in prosperity that followed the cessation of hostilities in 1919 ground to a halt during the global economic depression of the 1930s, heralded by the Wall Street crash of October 1929. The 1930s was a period of economic stagnation, fiscal uncertainty and high unemployment in the Netherlands.

Construction costs, which had skyrocketed during WWI, stabilised at a higher rate following the cessation of hostilities. By 1931 construction costs stood at 155% above the norm of 1914. Then, due the recession, construction costs plunged and came down to 120% above the 1914 norm by 1935. This reduction was especially

26 (Lans & Tabak, 2008, p. 19). Keppler was also Wibaut's brother-in-law.

27 "Een vrouw, die het kiesrecht heeft, behoort niet aan de wastobbe te staan..." (De Miranda, 1929, p. 75; 78–79.

28 (De Miranda, 1929, p. 74).

due to wages falling. By 1936, construction labourers were working for ƒ0,40 per hour, which equates (when work was available) to ƒ16 per week, working eight hours per day. Their 1936 average week wage of ƒ16 per week was poor in comparison to the average net week wage of the average blue-collar worker which had drooped to ƒ21,50. The lower wages meant that families had lower incomes and many families in public housing were desperate to relocate to cheaper homes.[29] By the mid-1930s, there was a great need for cheap homes with a rental of up to a maximum of ƒ6 per week in Amsterdam.

In the meantime, taxes increased to keep municipalities financially afloat. By 1930, municipal taxes levied on public housing units in Amsterdam and other large cities equalled more than half of what a public housing association could ask per unit.[30] New housing production was also taxed higher, with for instance increases in the registration costs for new houses. [31] This hit the public housing associations especially hard. Lower construction wages did not materially influence construction costs, because they accounted for only 10% of the total construction cost. The main financial factors were material and land costs.

With high material costs, limited access to land within municipal boundaries and land speculation further driving up costs, spatial and construction efficiency became key considerations in mass housing design.

Spatial efficiency: Goed en Goedkoop

The Woningwet of 1901 effectively granted citizens the right to a dwelling that met their minimum needs for health, safety and space. The first article of the Act empowered municipalities to set standards for the construction of dwellings, also with regards to urban positioning; height of the ground floor and building height; dimensions of rooms, stairs and circulation spaces; sanitary facilities; availability of drinking water; fire prevention; the prevention of damp in dwellings; structural stability; water, garbage and smoke management and light and air access.[32] Amsterdam was the first large Dutch city to implement its own construction by-laws in 1905.

29 (s.n., 1935a).

30 (s.n., 1935a).

31 (s.n., 1936).

32 (De Vreeze & Berkelbach, 2001, p. 22–23); the Act also gave municipalities the power to set minimum standards that applied to the remodelling of already existing housing buildings, specifically with regards toilet facilities, availability of drinking water, fire prevention and the prevention of damp in dwellings.

Article 30 of the Housing Act made it possible for public money to be spent to support the construction of housing that both conformed to the Act and, importantly, met the pre-set criteria published by municipalities. This mechanism gave municipalities the power to issue building standards for subsidised housing construction.

Spatial efficiency became a design ambition in response to the socio-economic conditions of the time. *Goed en goedkoop* (decent and cheap) was taken up as clarion call.[33] The *goedkoop* (cheap) aspect became more important during WWI. Yet, in pressing times the ambition for *goed* was sometimes abandoned. The Minister for Finances, for instance, in 1918 noted that given the urgency of the [housing] emergency, it was necessary to temporarily settle for bad quality homes.[34]

The country's eastern neighbour was now the Weimar Republic, which was constituted as the successor to the Prussian empire in 1918. Its 1919 constitution went further than the Dutch Housing Act, enshrining the right to a healthy dwelling as a right of all Germans (Article 155). The term *Existenzminimum* (Existence Minimum) was coined to describe the minimum qualities that a house should contain to meet the requirements of the Weimar constitution. This constitutional provision stimulated housing development in Germany. The Weissenhof Estate, built for the Deutscher Werkbund exhibition in Stuttgart in 1927 brought the *Existenzminimum* ideal to international architectural attention. In 1929 the second *Congrès Internationaux d'Architecture Moderne* (International Congress for Modern Architecture, CIAM) meeting in Frankfurt am Main, adopted this ideal as theme; its catalogue presenting minimum dwelling floor plans from its contributors in Europe, including JJP Oud's Kiefhoek housing estate in Rotterdam, then still under construction (1928–30).[35]

Construction Economy – The promise of technology, standardisation and industrialisation

From the middle of the nineteenth century the application of new technologies had transformed industry, travel and virtually all sectors of production in the Netherlands. It also held the promise of improving housing conditions, especially

33 As for instance used by (De Jonge van Ellemeet, 1936, p. 9).

34 "De minister legde er den nadruk op, dat, gezien den noodtoestand, het beter is tijdelijk ook met slechte woningen genoegen te nemen." (s.n., 1918a).

35 (s.n., 1929, p. 6).

with regards to comfort and hygiene.[36] In the 1870s, Amsterdam installed its first sewer, using the pneumatic suction operated Liernur System, which was replaced 30 years later with a water-borne sewerage system. But the integration of new technologies into housing, especially public housing, remained incidental and did not alter architectural form or housing typology dramatically.

Van der Waerden's discussion document for the *Nationale Woningraad* (National Housing Board) conference in Amsterdam in 1918 gave impetus to streamlining construction processes by implementing construction systems as well as the prefabrication of components. Van der Waerden's appeal was to standardise: "… only through standardization can we economize, "en masse" production can only be achieved in this way."[37]

There was also interest in standardizing house plans. The Ministry of Labour publishing a catalogue accompanying an exhibition of 50 housing types that conformed to the requirements of subsidy under the Housing Act specifically as applied in Amsterdam in 1921.[38] These were, however, met with general scepticism from the architectural fraternity, in principle supportive of normalisation of building components, but not the standardisation of housing designs. Yet progressives persisted. In 1923, the *Vereeniging Kunst aan het Volk* (Association Art to the People) mounted an exhibition on *Massa-woningbouw* (Mass Housing) in the Amsterdam *Stedelijk* city museum. The official support for this exhibition was such that Keppler in person presented a walkthrough of the exhibition on a Sunday in his capacity as director of the City Housing Service.[39]

The fear existed, however, that normalisation would lead to uniformity and standardisation to poor quality, especially for workers housing. As HP Berlage put it in his published response to Van der Waerden's discussion document: "Need has caught up with us. And whether we want to use that word or not, housing production has to become mass production; which means building as fast and as cheaply as possible. But precisely that should not mean, that the sole purpose of

36 Refer to Reyner Banham's seminal *Architecture of the Well-Tempered Environment* (Banham, 1984).

37 "…enkel door standariseeren valt te economiseeren, enkel langs dien weg is productie „en masse" te bereiken." (Van der Waerden, 1918, p. 7).

38 The publication led to some concern amongst architects to whom it was not clear if these type designs were prescriptive or indicative. (Nederlandsch Instituut voor Volkshuisvesting, 1921, p. 3).

39 (s.n., 1923c).

mass production should be governed by minimum criteria. No and again no!!"[40] Most architects remained opposed to any limitations being imposed on housing type and design, which they saw as an infringement on their role as designers.[41]

With brick prices soaring timber in short supply, sky-high labour costs and a pressing housing shortage, the Amsterdam Socialists Wibaut, De Miranda and especially Keppler set out to convince the City to experiment with urban form in combination with construction technology. This experiment was a continuation of the various smaller experiments undertaken in Amsterdam North, where land was still relatively cheap. Amsterdam's first *tuindorp* (garden village), Tuindorp Oostzaan, was constructed between 1922–4 in the Noorder-IJ Polder. The city here supported a first experiment using of concrete construction systems in subsidised housing construction. These houses at *Castorplein* were constructed in 1920–1 to the designs by architect JH (Jo) Mulder. Mulder, an architect in the employ of the GWA, applied the 'Winget' construction system: a cavity-wall construction built from concrete blocks manufactured on-site in a press-mould.[42]

Following these early successes, the Amsterdam social democrats now proposed that the new neighbourhood in the recently acquired polder Watergraafsmeer be redesigned following Garden City principles and that a part of it be constructed by the municipality itself as experiment in the application of new concrete construction systems. The rest of the neighbourhood was completed by housing associations using conventional construction systems, with a repetition of standard designs and the application of standardisation to reduce costs. The concrete systems-built neighbourhood quickly received the moniker *Betondorp* (Concrete Village). But with Keppler, Wibaut and De Miranda as champions, it should come as no surprise that Betondorp served as experiment in comfort and hygiene as well. The 325 council-built and -owned labourer family homes each had its own dedicated shower cubicle: a novelty for public housing at the time. They were provided with a waterproof shower floor, drain and cold-water connection, but without water heaters or showerheads.[43] Inhabitants were free to decide if they could or wanted to afford the outlay for a water heating system and associated increased energy costs. To monitor

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40 "De nood heeft ons achterhaald. En of wij dat woord nu willen gebruiken of niet, de woningproductie moet een massaproductie worden; hetgeen dus zeggen wil, dat er zoo snel en bovendien zoo goedkoop mogelijk moet worden gebouwd. Maar juist dat mag niet bedoelen, dat aan het enkele voorwerp dezer massa-productie slechts minimale eischen worden gesteld. Neen en nogmaals neen!!" (Van der Waerden, 1918, p. 22I.

41 (Kuipers, 1987, p. 17).

42 For details on the Winget system see: (Kuipers, 1987, p. 198–9).

43 (De Miranda, 1929, p. 91).

the effect of the comfort and hygiene experiment, the municipality conducted a survey to ascertain how many households used the shower and in which manner.

Despite the fact that may Dutch cities had experimented with concrete construction systems, their application did not enter the main-stream. The recovery of the Dutch economy after WWI, coupled with the resultant lower labour and brick prices, soon put an end to the mainstream experimentation with concrete systems in public housing construction by 1923. The focus of progressive construction industry professionals with an interest in industrialising housing production (as opposed to construction) shifted from the benefits of concrete to the promise held by steel.[44] Steel was seen as the ideal long-lasting material for all manner of prefabricated building components. Not only was it relatively inert when galvanised or well-painted; it was deemed hygienic as well. The British steel company Crittal Windows Ltd was the first to serialise steel framed windows on a large scale when they introduced their 'Universal' window in 1909.[45] FW Braat, an architectural steel works company based in Delft, provided steel windows for the construction of the Peace Palace in The Hague, completed to a design of LM Cordonnier and JAG van der Steur between 1907 and 1913. Braat soon entered into a licensing agreement with Crittall to produce their patented window profiles for the Dutch market. When FW Braat received a huge order for steel windows for the Van Nelle Factory in Rotterdam (Brinkman and Van der Vlugt) in 1928, they established a new independent factory dedicated to the manufacture of steel widow profiles.

Steel skeleton construction had made the high-rise boom in the USA possible. The potential construction economic benefits that it promised in terms of prefabrication, modularisation, speed of erection, and importantly in the Netherlands with its poor geological conditions, lightness and therefore foundation cost savings, as well as space economy (due to smaller structural sections) was of particular interest. A first attempt at the use of mild steel skeletal frame construction in public housing in the Netherlands was by D Roosenburg in his application of the so-called Dorlonco system, at Betondorp during 1923–5. Dorlonco utilised a steel frame, covered in steel mesh over which a 5 cm thick cement layer was sprayed. Totally encasing the steel bearing structure.[46]

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44 Cast iron had a much longer application in construction; in Amsterdam an early example was the Paleis voor Volksvlijt (1859–64), designed by Cornelis van Outshoorn.

45 Even before the Universal window was produced the Dutch State Architect, J van Lokhorst, specified Crittal steel widows for the Algemeen Rijskarchief (General National Archive) in The Hague (1900–03) (Prak, 1991, p. 169).

46 Only four units were constructed using the Dorlonco system as it had proven to be exorbitantly expensive (Prak, 1991, p. 170); (Kuipers, 1987, p. 200–1).

The Wall Street crash of 1929 and following economic downturn reduced demand for steel. The price plummeted, despite efforts of various national cartels to bolster the price by reducing production. Where steel was traded in the Antwerp harbour since 1913 for an yearly average of 104,5 golden shillings per English ton, the price had risen to 115 golden shillings per English ton in 1929. It decreased further to 48 golden shillings per English ton by the first half of 1932.[47] These lower prices made experimentation more affordable**.** Cold-rolled plate steel doorframes for indoor use were manufactured in the Netherlands from 1931 onwards, the same year FW Braat introduced its first prefabricated steel kitchen.[48]

The first realised project utilising steel for high-rise in the Netherlands only came when JF Staal designed a steel-framed skyscraper at Amsterdam for a private property developer: the twelve-storied *12-verdiepingenhuis* (nicknamed *Wolkenkrabber,* 'clouds-scraper'/ skyscraper; 1930–2). Concurrently Jan Duiker in 1930 published a book in which he argued that a height of twelve stories was appropriate for high-rise housing.[49] The interest was further stimulated by the Dutch metal industry, which in 1932 published a book on steel as construction material. The author and civil engineer EA van Genderen Stort claimed that the speed of construction and the fact that various trades could work in parallel, could result in up to a 10% saving in costs for a six storied building.[50]

Civil engineer W van Tijen led the charge in Rotterdam, first with the luxury steel-skeleton Parklaanflat (1933, designed with Jo van den Broek), followed by the affordable housing nine-storied Bergpolderflat (1933–4, designed with Brinkman and Van der Vlugt) both projects were spearheaded by Auguste Plate. These were high-rise precursors to his three-storey walk-up public housing apartment building at the Frans Bekker Street, also in Rotterdam, in which he experimented further with standardisation and pre-fabrication of building elements, including galvanised steel façade panels. All of the above were private developments. A trade journal, *Staal : maandblad voor staaltechniek* (Steel : monthly magazine for steel technique) was published from 1935–41; editors EA van Genderen Stort en RLA Schoemaker, both affiliated to the Delft Institute of Technology.[51]

47 (T.H., 1932).

48 (Prak, 1991, p. 171).

49 (Duiker, 1930).

50 (Van Genderen Stort, 1932, p. 66).

51 Publication ceased in 1941 when steel became unavailable for civilian construction. Both Schoemaker and Van Genderen Stort were promoting steel high-rise construction in the journal *Het Bouwbedrijf* from 1929 onwards. (Van Genderen Stort, 1929, nos 11–13; 1930, nos, 3–6; 1931, nos 44–6 and 1932, no 3); (Schoemaker, nos 3 & 4).

6.4.1.3 Technology (in service of society)

Technology was seen to hold the promise to improve the hygiene, economy and comfort of public housing. One of the issues that dominated the housing debate in Amsterdam in the 1930s was the question if washing facilities could best be provided communally or per individual family. This was seen as an issue of not only hygiene, comfort and economy, but also one of dignity.

Instant hot water and convenient heating was still out of the reach of most labourer's families. Bathhouses offered an affordable alternative (Amsterdam opened its first municipal bathhouse in 1911) but the lack of privacy in these facilities was seen as a social problem.

The bathhouse was efficient, but not ideal. As De Miranda remarked, it was only when each family home had its own functioning bathing facility that family members "... and especially children [will] receive the physical care, of which the bourgeoisie has already come to see the enormous benefit."[52] The need for a private bathing facility was a matter of both dignity and development of the individual. But the cost of hot water provision was a hurdle that needed to be crossed. The City of Amsterdam following up on its monitoring of its experiment in the Betondorp neighbourhood concluded, that only 18% of families saw their way clear to spend money on a water heater for the provided shower space. Only a further 26% of families used the shower space for washing. The remainder used the shower cubicle for storage, or–so urgent was the housing crisis–as additional sleeping space.[53]

Despite these somewhat disappointing results, the ever-progressive idealist De Miranda forged ahead:

"As far as possible, the municipality should provide assistance so that every new home to be built is fitted with a bathing facility in order to reach, as soon as possible, the ideal for the people: a bathing facility in one's own home. Added to this, the municipality should provide a geyser and bathtub or shower, the costs of which can be fully or partially recuperated through the rental."[54]

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52 "Dan pas kunnen huisgenooten en vooral kinderen de lichamelijke verzorging krijgen, waarvan de bourgeoisie het ontzagelijk nut allang begrepen heeft." (De Miranda, 1929, p. 90).

53 59 of 325 dwellings (De Miranda, 1929, p. 91).

54 "Zooveel mogelijk dient de gemeente te bevorderen, dat in iedere nieuw te bouwen woning een badgelegenheid aangebracht wordt, teneinde zoo spoedig mogelijk voor de bevolking het ideaal: een bad gelegenheid in eigen woning, te bereiken. Het zal dan aanbeveeling verdienen, dat de gemeente een geyser en badkuip of douche verstrekt, waarvan de kosten geheel of gedeeltelijk in de huur kunnen worden verrekend" (De Miranda, 1929, p. 92).

In 1930, a joint commission of the *Bond van Nederlandsche Architecten* (Association of Dutch Architects, BNA), the *Nederlandsche Coöperatieve Vrouwenbond* (Dutch Cooperative Women's Association) and the *Nederlandsche Vereeniging van Huisvrouwen* (Dutch Association of Housewives) published an influential report that recommended that dwellings should have either a bathroom or shower room, serviced through communal heating, hot water and laundry installations.[55]

Housing associations were not blind to the possible economies of scale benefits that combining hot water provision with block heating through the use of large-scale technologies could bring to their tenants' and their own balance books. In Amsterdam, four housing associations joined forces in 1929 to construct 1 000 dwellings with hot water, either bath or shower and block heating in the Stadionbuurt in Amsterdam South.[56] After the municipality refused to grant them a bulk delivery rate for gas for hot water, the associations together set up the *Centrale Warmwatervoorziening* (Collective Hot Water Supply Foundation). This was effectively an independent energy company. Through collective action, they managed to reduce tenants' energy-bills by 50 cents per week–a significant amount at the time.[57]

Despite all the efforts of city and housing associations, they were outdone by a commercial property developer with a strong social ethos, H van Saane. After having been granted the lease for land on the Tugela Avenue in Amsterdam East by the municipality in 1928, Van Saane presented his ambitions for the project to alderman De Miranda: not only would the apartments be communally heated and provided with hot water, the shower cubical would be fully tiled. Each apartment would also have a radio distribution point! Van Saane's Krugerhof housing apartment proved on completion in 1929, that high levels of comfort could be provided economically.[58] He followed through on his successes with the gargantuan 1933 Geuzenhof housing complex at Landlust, which also provided tenants with hot water and block heating, amongst others.[59]

Van Saane had set the standard for affordable housing in Amsterdam. He proved above any doubt that providing decent ablution facilities was feasible in subsidised

55 (Van Overbeeke, 2001, p. 109).

56 Zomers Buiten, De Dageraad and the AWV participated (Van Overbeeke, 2001, p. 65).

57 (Van Overbeeke, 2001, p. 130). In this regards Amsterdam was lagging behind: In Utrecht the *Provinciaal en Gemeentelijk Utrechts Stroomleveringsbedrijf* (PEGUS) started to construct a city heating system in 1925 (Van Overbeeke, 2001, p. 67).

58 (Van Overbeeke, 2001, p. 65; (Prak, 1991, p. 175).

59 (Fisher, 1968, p. 20–2; 32–3).

workers housing. The City of Amsterdam responded by updating its building regulations in 1933 to prescribe at minimum a shower cubicle per dwelling.[60] However providing hot water and space heating provisions remained the prerogative of the developer.

High densities resulted in impingements of privacy. Apart from the sounds of daily living, the grammophone and radio became unmissable, even in labourers' families. Acoustic insulation became a comfort topic for technological investigation. The issue of sound transfer between living units led to a number of Dutch cities, including Amsterdam, to adopt building regulations as early as 1933 to minimise structure-borne contact noise transfer.[61] That Amsterdam was one of the first cities to tighten its acoustic requirements should come as no surprise. This was put in place by the city's building and housing inspection department (*Bouw- en Woningtoezicht*), charged amongst others with setting construction standards and headed by MEH Tjaden. Tjaden also chaired the Delft based *Geluidstichting* (Sound Foundation).[62]

There was much debate on the means to attain these minimum standards.[63] In 1935 the Geluidstichting published a booklet entitled *Grondslagen der bouwacoustiek* (Principles of building acoustics), the first publication on the topic in the Netherlands. This included, as addendum, tables listing the sound absorption coefficients of tested patent installations and other consecution materials available in the Netherlands.[64] A year later the influential architect, JB van Loghem, published an extensive handbook on acoustic and thermal construction.[65]

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60 (Van Overbeeke, 2001, p. 26).

61 The application of this regulation led to questions in the Amsterdam City Council, when at Landlust, the housing corporation Zomers Buiten, constructed 400 units to the design of architect Zeger Gulden, with the ceiling in contact with the floor joists (s.n., 1933).

62 (Limperg & Verschuyl, 1936, p. 292.

63 ("Geluidsisolatie van vloeren," 1933).

64 (Boot, 1935).

65 (Van Loghem, 1936).

6.4.2 Abstract Conceptualisation (1932–1937): The Landlust public housing development

6.4.2.1 Urban Genesis

The City of Amsterdam started to develop expansion plans long before it was mandated to do so by the 1901 Woningwet. A succession of three such plans were developed during the latter half of the nineteenth century by the city's chief engineers: JG van Niftrik, J Kalff and, CLM Lambrechtsen van Ritthem. The first, Plan Van Niftrik of 1867 was rejected by the city council, which declared it inexecutable. Plan Van Niftrik was followed by the Plan Kalff in 1876, succeeded by the likewise aborted 1899 Plan Lambrechtsen van Ritthem for an expansion of the city southwards. The latter had been designed for a portion of land to the south of the centre, that until 1896 had been under control of the neighbouring Nieuwer-Amstel municipality. Amsterdam's city council was not content with the results the past civil engineering approaches in town planning had delivered and, in a notable break with tradition that heralded higher aspirations for Amsterdam's development, appointed architect HP Berlage as aesthetic urban design advisor in 1900 to rework Lambechtsen van Ritthem's *Plan Zuid* (Plan South).[66]

Berlage revised the Plan Zuid in 1904 and it was adopted by the City in 1905. This first attempt proved to be too costly to execute and he was commissioned to rework it. His second Plan Zuid, completed in 1915, was adopted by the City in 1917. It was a continuation of the urban idiom of the first plan, based in a differentiation of main and secondary thoroughfares combined with squares and public green spaces, composed to achieve maximum picturesque effect in combination with a monumental urban environment.[67] Building blocks for high-density housing were projected as oblong perimeter-blocks—as was then the norm.

Building blocks for high-density housing were projected as oblong perimeter-blocks—as was the norm at the time.

The City of Amsterdam needed more buildable land to provide accommodation to its inhabitants to fulfil its obligations under the Woningwet. The city ramped up efforts to annex neighbouring areas from other municipalities, sometimes even entire

66 (Kuipers, 1987, p. 11).

67 (Polano, 1988, p. 166).

municipalities. The first area annexed was a part of the neighbouring municipality of Watergraafsmeer in 1896. Watergraafsmeer adopted an urban plan for its entire remaining area, designed by P Vorkink and J Wormser to try and keep control over its own territory over 1906–7.[68] Even before the specific section of the polder was officially transferred to Amsterdam, the city's *Dienst Publieke Werken* (public works service, DPW) commissioned Gratama & Versteeg architects–at the time already developing a proposal for housing for the AWV in Watergraafsmeer–to rework the urban design for a section of Watergraafsmeer as *tuindorp* earmarked for public housing. Like Wibaut, De Miranda and Keppler, Gerrit Versteeg (1872–1938) was an active member of the SDAP, which aligned him well with its affiliated housing association, the AWV. Gerrit Versteeg first practiced in the Dutch city Arnhem and later moved to Amsterdam where, from 1914 until roughly 1930 he practiced in partnership with architect Jan Gratama. Versteeg designed a number of projects for the AWV, including the Watergraafsmeer projects. He was also co-responsible for three urban designs for Amsterdam: Watergraafsmeer, Transvaalbuurt and the Plan West expansion plan later in his career.

FIG. 6.4 Tuindorp Watergraafsmer, with at its centre Betondorp, photographed in 1928 when the neighbourhood was about a decade old (1928; SAA: , A04139001741).

68 This urban development plan for a city of 200 000 inhabitants was commissioned by the municipality of Watergraafsmeer as a measure to counter Amsterdam's expansionist aspirations.

While Gratama and Versteeg completed the redesign of what was to be known as *Tuindorp Watergraafsmeer* for the DPW, it has a radial urban structure of primary streets focussed on a central common with semi-detached double-storey housing defining closed street edges. Behind the housing, private gardens opened up to communal green spaces, creating a highly urbanised unity in a park-like environment. Much of the housing here was constructed by the GWA as the aforementioned second concrete workers housing experiment, hence the moniker *Betondorp.* Not all the housing was constructed of concrete: Gratama & Versteeg also designed to conventional brick-built housing for the AWV and Eigen Haard housing associations. The close integration of the urban and architectural at Watergraafsmeer was possible because Tuindorp Watergraafsmeer was developed by various actors in close collaboration.[69]

Amsterdam soon cast its expansionist eye westwards as well to a section of the neighbouring municipality Sloten's territory closest to Amsterdam: the Sloter Polder. The Sloten municipality adopted an urban layout in 1906, subsequently revised in 1916 to a design by HA Rübenkamp. Under the provisions of Article 6 the Housing Act,[70] no approvals for constructions could be given by a city, if they did not conform to the provisions of approved expansion plans. When the City of Amsterdam took over control of the Sloter Polder area in 1921, the 1906/16 plan remained in force as legally binding development framework,[71] and some construction had already taken place following this plan. The head of the division for buildings of the city's DPW, Allard Hulshoff, concluded that this plan was outdated and commissioned Gratama & Versteeg to develop an expansion plan for the area in collaboration with the DPW. Their new plan was adopted in 1922 as *Plan West.*

The Garden Cities inspired Dutch Tuindorp movement had influenced a number of urbanist housing experiments in Amsterdam, mostly driven by housing cooperatives, such as Tuindorp Oostzaan. A more urban housing project located on Kraaipan Street, in an area called the Transvaal Neighbourhood (urban plan by Gratama & Versteeg in collaboration with Berlage), had also been completed in 1920 by Gratama & Versteeg for the housing association AWV.Yet, for this dense urban plan, which projected predominantly workers' housing, Hulshoff, Gratama & Versteeg reverted to a perimeter-block structure. For the construction of the first phase, the southern part of plan West, the design team was given a high level of control over the area's development, designing street profiles and silhouettes. A central commission,

69 A history of Betondorp is presented in (Kuipers, 1987).

70 Numbered as Article 5 until the 1931 amendment of this act.

71 (Ernst et al., 1980, p. 72); (Gemeente Amsterdam Bureau Monumenten en Archeologie, 2014, p. 4).

which included the urban designers, was established to fast-track plans approvals. The floor plans of all the housing blocks were pre-designed by architectural practice Gulden & Geldmaker. Individual architects were commissioned to design their façades. This manner of working accelerated construction to such an extent that the first phase of Plan West was completed by a single developer–Heere van der Schaar who owned much of the land there–in a record-worthy time of only two years between 1925 and 1927![72]

The success of this coordinated approach strengthened calls for the city to create its own town planning division. In the summer of 1924, the *Nederlands Instituut voor Volkshuisvesting en Stedebouw* (Institute for public housing and urban development) hosted the *Internationale Stedebouw Congres* (International urban development) in Amsterdam's *Stedelijk Museum*. With delegates from 28 countries and notable speakers it was a resounding success. The first session, chaired by Wibaut included presentations by Raymond Unwin, Charles Purdom and MJ Granpré Molière, all of which cautioned against a chaotic and unplanned urban development.[73] These ideas resonated with Amsterdam's past experiences, going back to the first failed attempts at expansion plans from the 1860s onwards, followed by the success of the coordinated centralised approach for the southern section of Plan West.

The City Council in 1928 voted to create a new section for urban planning under the DPW, the *Afdeling Stadsuitbreiding en Stadsontwikkeling* (translated to English by the City of Amsterdam as "a special section for townplanning"[74]). Cornelis van Eersteren, who had lobbied for the position, was appointed to head up the section. Van Eesteren was an early proponent of De Stijl and Modern Movement principles, served as chairman of the CIAM, which had been founded in the same year as the Planning Department of Amsterdam, from 1930–47. Van Eesteren's Planning Department was tasked with designing the next phase of Amsterdam's growth, the *Algemeen Uitbreidingsplan* (General Expansion Plan, AUP), which included the most northern portion of Plan West as first phase.

The first detail designs for the northern part of Plan West by Van Eesteren's town planning section date to July 1930. In character, it continued the Berlagian tradition of monumental continuous street façades surrounding perimeter blocks, accentuated by axes and urban perspectives as further developed by Hulshoff, Gratama & Versteeg in the first phase of Plan West. However, by September 1930, sketch

72 (Dijkstra et al., 1990, p. 40).

73 (Schram & Doevendans, 2018, p. 109).

74 (Department of Public Works and Housing, 1950, p. 45).

proposals for the detailed urban structure of the northern area of Plan West already included a street block on which zeilenbau was projected,[75] illustrating that city officials were open to application of this urban type.

The various DPW services had in fact studied the zeilenbau experiments of the Netherlands' eastern neighbours. Travel-bug Keppler visited Frankfurt am Main in 1920 and/or 1921, and DPW staff followed up with repeat visits to Germany from 1928 onwards—including a 1930 visit by a delegation headed by WA de Graaf, then director of the DPW—to study the new housing and urban projects there.[76] A project that drew a lot of attention was Ernst May's Frankfurt am Main housing development where approximately 300 dwellings were constructed per year during the course of 1925 to 1930. This project was widely publicised in the Netherlands at the time. The merits and demerits of the new zeilenbau urban typology were a constant topic of correspondence integrally in the DPW. Its application, however, remained pending.

One of the city's hurdles in developing the northern part of Plan West, was that much of it was owned by private parties. A portion was however already owned by the municipality and its surface had already been prepared for construction by pumping a thick layer of sand over it.[77] This area, a sickle-shaped territory bound on the east by the city's market harbour was called Landlust, after a former farmstead. It was bound in the west by the Admiraal de Ruyter Street and stretched all the way to the Haarlemmertrekvaart canal in the north.To reduce the complexity of the planning and political approvals process, this area was squirrelled off from the larger Sloten area for development as a stand-alone expansion plan. A stand-alone *deelplan* (section plan) was developed for this area, called *Plan Landlust*. Plan Landlust was the first plan completed by the Town Planning Section and submitted to the city council and its various committees for approval.

Amsterdam and her architects had been experimenting with alternative urban and housing typologies for more than a decade. Some of these projects, including Tuindorp Oostzaan, and Tuindorp Watergraafsmeer, eschewed the traditional perimeter-block model. The urban design developments in Germany, especially the Existenzminimum zeilenbau housing estates designed by Ernst May and Mart Stam

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75 (Mens, 2019, pp. 43–55).

76 Private study journeys were also undertaken, including by property developer H van Saane, to Vienna to assess the success of the experiments in *Existenzminimum* housing there. This experience was to have a profound effect on the housing his company built during the 1930s, starting with the Krugerhof of 1929 (Fisher, 1968, p. 20).

77 (Mens, 2019, p. 45).

in Frankfurt am Main, proved to be examples too potent to ignore.[78] Despite the fact that the traditional elongated perimeter block as urban form, was by now under sustained critical attack, the Town Planning Section's 1931 design for Landlust continued with the pattern of perimeter-block planning of the city's Plan Zuid and Plan West. The reason for the Town Planning Section's continuing with the narrow perimeter-block was simply pragmatic. Few private developers would be willing to take on projects as large as would require for deep courtyard blocks such as the Krugerhof. Likewise, the Section for Town Planning was being cautious, in full knowledge that the municipality was not prepared to adopt an untested typology such as zeilenbau for large-scale application, especially for an expansion plan where most of the construction was expected to be undertaken by private property developers, supported through the Housing Act public subsidy system.[79]

Unsurprisingly, the presentation of the plan to the provincial *Vaste Commissie voor Uitbreidingsplannen in Noord-Holland* (Permanent Commission for Expansion Plans in North Holland)[80] resulted in a scathing assessment of the plan's "romantic" layout. The Commission expressed its preference for "modern solution" such as "…Zeilenbouw or blocks with deep courtyards",[81] possibly referring in the latter instance directly to Van Saane's Krugerhof, which had become famous in its own right, and was often visited by city officials and other delegations.[82]

This reticence of the DPW to experiment with either types was defended by director De Graaf, referring to new urban models, that: "Although these systems deserve special attention, it would seem that they have not yet gone beyond the experimental stage. Their application on a larger or smaller scale in Amsterdam will therefore not be considered until in-depth comparative studies have been carried out on a specific case for different development possibilities and the resulting consequences in terms of town planning, habitation and finance."[83]

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78 The Preadvies uitgebracht door de ver. arch. kern "De 8" te Amsterdam en de ver. "Opbouw" te Rotterdam over: organische woonwijk in open bebouwing relies heavily on these examples to promote the idea of zeilenbau (Boeken et al., 1932).

79 (De Graaf, 1933).

80 This commission functioned from 1925–43 (Lantink & Temminck, 2014, p. 110).

81 (Dijkstra et al., 1990, p. 45); (Van Rossem, 1993, p. 267).

82 (Fisher, 1968, p. 22).

83 De Graaf in March 1931: "Hoewel deze stelsels bijzondere aandacht verdienen, schijnt het, dat men hier nog niet boven het stadium van proefnemingen is uitgekomen. Toepassing hiervan op grootere of kleiner schaal in Amsterdam zal dan ook eerst worden overwogen, wanneer voor een speciaal geval diepgaande vergelijkende studies voor verschillende verkavelingsmogelijkheden en de daaruit voortvloeiende gevolgen uit stedebouwkundig, bewonings en financieel oogpunt zijn opgezet. " Quoted from (Mens, 2019, pp. 46–47).

FIG. 6.5 The 1931 Plan Landlust (Duiker, 1933, p. 165).

The Town Planning Section had in fact anticipated opposition to the 1931 Plan Landlust because of its continued narrow perimeter-block typology. When submitting the plan to the municipal council for approval, the Town Planning Section issued a rather extraordinary explanatory note indicating that while the street layout was fixed, the development of a different layout for Landlust was a possible future option.[84] This forethought saved the plan politically and it was adopted by the City Council, but with the disclaimer that the design of both the urban structure and the building typologies could be changed in certain areas in future.[85] Planning for housing construction could begin, but because of tight market conditions, a portion of the adopted plan was earmarked to be developed by the municipality itself. Van Saane was one of the few private developers who was willing to invest in these financially trying times: his Geuzenhof workers housing project followed the deep courtyard perimeter-block plan and was completed by 1933. The national

84 (Van Rossem, 1993, p. 278).

85 (Maatschappij tot Bevordering der Bouwkunst; Bond van Nederlandsche Architecten, De Bie Leuveling Tjeenk, & Versteeg, 1931).

association of architects, BNA,[86] took note of the adopted plan of the Landlust area and responded with a letter to the mayor and aldermen of Amsterdam in April of 1931. The letter, co-signed by Gerrit Versteeg as acting secretary of the BNA and published in the architectural journal *Bouwkundig Weekblad* in May of the same year, called upon the city to "...make good use of this freedom [provided in adoption of the Plan Landlust] to, as far as possible, ensure good access to good day lighting and ventilation, which is unachievable with normal perimeter block construction."[87] The BNA called on the municipal authorities to ensure the transfer of large enough portions of the Landlust area to private developers. This would enable architects to develop joined plans in collaboration, not possible on a parcel-size piece of land. In doing so the BNA–including its acting secretary Gerrit Versteeg, acclaimed architect and urban designer whose co-authorship of the perimeter-block first phase of Plan West, Transvalerbuurt and Garden City Tuindorp Watergraafsmeer had proven his mettle–effectively expressed their support for a zeilenbau experiment.

But the BNA didn't stop there. It also requested that the call for an architectural competition for the 6000 dwellings that the municipality itself planned to develop in Landlust to further advance urban planning and workers housing. The aim of such a competition would be to develop an answer to the question of providing high quality economic housing through a combination of efficient urban design and effective construction systems.[88]

The BNA was not the only body agitating for experiments in new urban form and housing typologies. Progressive architects envisaged the future possibilities for high-rise housing in areas where land was limited or expensive. As early as 1919 AH Wegerif prefaced his book on middle-income housing with a watercolour illustrating a 16-storey high-rise future.[89]

Now, a decade later, J Duiker and JG Wiebenga placed high-rise construction on the agenda of Amsterdam architecture collective *De 8* (The 8). They were the driving force behind a petition to the Amsterdam City Council requesting an investigation into the potential of high-rise construction for affordable housing. In 1929 the

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86 The Maatschappij ter Bevordering der Bouwkunst, Bond van Nederlandsche Architecten (Society for the Advancement of Architecture, Union of Dutch Architects).

87 "...dat van deze vrijheid gebruikt zal worden gemaakt om zoveel mogelijk een goede lucht- en lichttoetreding tot alle wonignen te verzekeren, wat met den normalen gesloten blokbouw niet bereikt kan worden." (Maatschappij tot Bevordering der Bouwkunst; Bond van Nederlandsche Architecten et al., 1931).

88 "...een zoowel oeconomisch als woontechnisch zoo gunstig mogelijke verkaveling, indeeling en bouwsysteem te verkrijgen." (Maatschappij tot Bevordering der Bouwkunst; Bond van Nederlandsche Architecten et al., 1931).

89 The watercolour by MCA Meischke (Wegerif, 1919).

city appointed a *Commissie voor den Hoge Bouw* (Commission for High-rise Construction). This commission concluded that high-rise workers housing would be too costly. Its report did, however, not address low-rise zeilenbau.

FIG. 6.6 MCA Meischke's projection of a high-rise Dutch future from Henk Wegerif's 1919 book on middle income housing *Bouw van middenstandswoningen* (Wegerif,1919, preface).

De 8 and the progressive Rotterdam architecture collective *De Opbouw* successfully lobbied the *Nederlands Instituut voor Volkshuisvesting en Stedenbouw* (Dutch Institute for Workers Housing and Urban Design) to investigate zeilenbau. Their *Preadvies* (Recommendation) on the *Organische wijk in open bebouwing* (Organic neighbourhood in open urban structure) was adopted by the Institute and published in its series of pre-advice publications.[90]

90 (Boeken et al., 1932).

The 1933 Amsterdam Goedkope Arbeiderswoningen competition

The BNA suggestion to have the urban layout for a portion of the Plan Landlust redesigned by competition was not outright successful. The authors of the request pre-empted such an eventuality. In a publicly published letter to the city, the BNA already proposed an alternative to the Landlust redesign. It recommended that the city issue a design competition on a fictional site to develop economical, functional urban and housing models for affordable workers housing. The Amsterdam Municipal Council was easily convinced and called an architectural competition for cheap workers housing: the *Prijsvraag voor goedkoope arbeiderswoningen* (Competition for cheap workers' housing) in April 1933.[91] The fictional site for the competition measured 300x240 metres and was bound by a main thoroughfare to the north and east and secondary roads to the west and located between two throughways proximate to a shipping canal. The competition was not prescriptive as far as the number of housing units were concerned, but prescribed a specific mix of unit-types. Submissions had to provide for 50 commercial spaces, two primary and one high school per 1000 housing units.

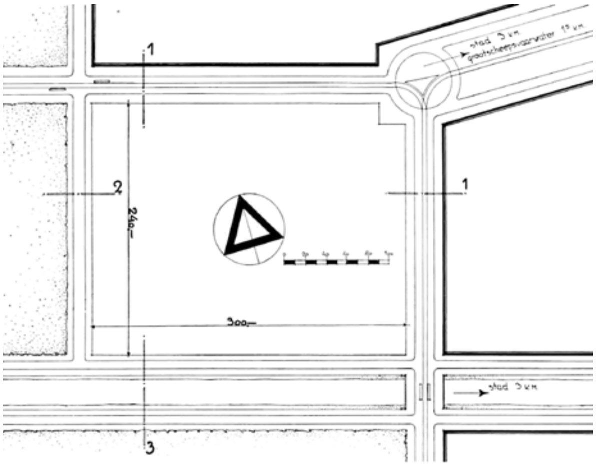

FIG. 6.7 The imaginary site for the 1933 Amsterdam *Prijsvraag voor goedkoope arbeiderswoningen* (Competition for cheap workers' housing) with, to the south, a canal (s.n., 1935, p.11).

91 Low-cost workers housing competition. The translation in the text is from (Bosma & Andela, 1983, p. 28); See also (s.n., 1935b).

The entries were adjudicated by 1935 and a selection of 40 proposals was published in an edited compendium in 1936, along with the jury citations.[92]

The jury, included Keppler, as Director of the Amsterdam Municipal Housing Service, JL Flipse, the secretary of the same department, architect Gerrit Versteeg Sr and C Woudenberg, board member of the AWV. Architect Jan Duiker, also a jury member passed away in February 1935. He was succeeded by Rotterdam-based Mart Stam (who incidentally also entered the competition with a design for four-storey building blocks in zeilenbau configuration called ‘f 4,75’).

The jury reported its findings in 1936, concluding that not a single one of the entries provided an acceptable answer to the problem of *cheap and adequate* (“goedkoop en goed”) workers housing.[93] Of the 92 anonymously submitted plans, only 40 were deemed good enough to warrant closer scrutiny.

Many submissions were progressive. Some proposed zeilenbau, many others continued the perimeter-block typology. Ten of the proposals projected buildings with load-bearing steel skeleton structures.[94] The adjudicating committee was unsure of the economics and efficiency of steel skeleton construction and costs of communal installations such as block heating, lifts etc. A sub-committee was formed, to develop construction and use-costs of both high-rise skeleton-steel based construction and the communal installations that high-rise housing required. The subcommittee itself chose norms for general use beyond the needs of the adjudicators, publishing these as an industry standard. In the end the competition adjudicators concluded that for high-rise, the benefits (high density and subsequent improved economy in relation to the land lease costs, as well as improved services) were outweighed by the costs of construction coupled with the required service installations—especially that of mechanical lifts.[95]

Among the forty anonymous competition entries shortlisted were designs by architects that were to design housing at Landlust: Charles Karsten and Ben Merkelbach developed an entry with Alexander Bodon and Johan Groenewegen,[96] the latter like Merkelbach and Karsten, a graduate of the Haarlem *School voor de Bouwkunst* (Technical High School). Gerrit Versteeg jr entered a design under his own

92 (Ottenhof, 1936).

93 (s.n., 1935b, p. 4, p18).

94 (Ottenhof, 1936) [appendix].

95 (s.n., 1935b, p. 15).

96 Entered in under the name “Bodon, Groenewegen, Karsten, Merkelbach.” (Ottenhof, 1936, p. 46).

name and not under the name of his and his fathers' practice, Bureau Versteeg. This may have been the only way in which the he could participate, as his father was not only co-instigator for the competition but also a member of the adjudicating panel.[97]

The competition entries were developed between 1933 and 1935, the same period that Bureau Versteeg and Merkelbach & Karsten were developing their Landlust projects. Both design entries for the competition showed similarities to the respective projects of those practices at Landlust. Unfettered by realities of clients and subsidy requirements, they act as mirror to the ambitions these practices held for Landlust.

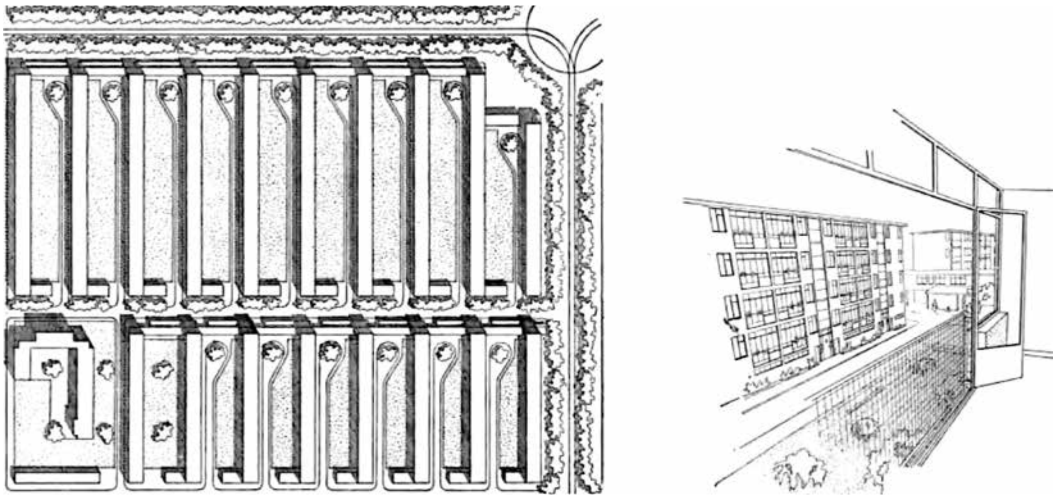

FIG. 6.8 Site plan and perspective drawings of the Bodon, Groenewegen, Karsten and Merkelbach entry for the *Amsterdam Prijsvraag voor goedkoope arbeiderswoningnen* (Ottenhof, 1936, p. 39).

The project of architects Bodon, Groenewegen, Merkelbach & Karsten was entered under the motto '1254'. It resonates strongly with the Merkelbach & Karsten design for Landlust. Both four-storeyed zeilenbau strips are located in a strict orthogonal layout, with low-rise housing located perpendicular at the end of the main building strips, creating a semi-enclosed inner courtyard. The competition project also featured French-balconies, later applied in a very similar fashion at Landlust. Their design comprised a range of dwelling types, including homes for the aged at ground floor level, facing the street, as would later be projected for and

97 (Ottenhof, 1936, p. 47).

constructed at Landlust. In the text accompanying their entry, they stated that they proposed conventional construction methods, arguing that technical experiments had no place in affordable housing.[98] They also specifically mentioned that they chose not to apply a block heating system; opting instead for a coal-burning stove which in turn required coal storage on the balcony of each dwelling. They motivated that they chose the stand-alone heating system because block heating would compel all residents to pay a fixed heating fee, which might not always possible, for instance when the breadwinner was unemployed or sick.[99] In a post-competition essay, included in the published compendium of designs, Ben Merkelbach further argued against the application of block heating in workers housing. He motivated that residents would have more direct control over their expenses compared to a fixed weekly fee as applied for a centralised system.[100] Merkelbach suggested that block heating had not been technically developed to the extent where it could be applied in public housing, despite the fact that eighteen years had passed since the first application of block-heating in public housing in Rotterdam at Michiel Brinkman's Spangen project (1918–22) and the successful application in affordable workers' housing, for instance in Van Saane's Krugerhof and at the Stadionbuurt in Amsterdam.[101]

The Gerrit Versteeg jr competition entry, with motto 'Ske-bo' (an abbreviation for *skeletbouw* or frame construction), was in contrast technologically daring. Versteeg proposed steel-framed high-rise housing blocks consisting of 12 stories; the same height that Duiker had promoted in his 1930 book on high-rise housing, applied by Staal in the Wolkenkrabber in Amsterdam in 1932. Versteeg's proposal was also clearly influenced by Van Tijen and Brinkman & Van der Vlugt's Bergpolderflat in Rotterdam.[102] It presented steel-framed building blocks positioned in a parkland environment, constructed with a semi-basement and apartments heated through a communal block heating system. His was one of only three projects shortlisted for publication in the competition catalogue to utilize a steel framework structure[103] and the only true high-rise proposal to do so. Versteeg went to great effort to calculate the costs for the project as proof that high-rise construction could be a successful and affordable option.

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98 (Ottenhof, 1936, p. 47).

99 (Ottenhof, 1936, p. 47).

100 (Merkelbach, 1936, p. 20).

101 (Merkelbach, 1936, p. 20).

102 (Duiker, 1930), Grinberg also sees a direct influence of the 1933–4 Bergpolderflat apartment building in Versteeg's entry (Grinberg, 1982, p. 126).

103 JH van den Broek's entry 'Optimum' and A Staal, S van Woerden and GH Holt's entry "&" being the other two.

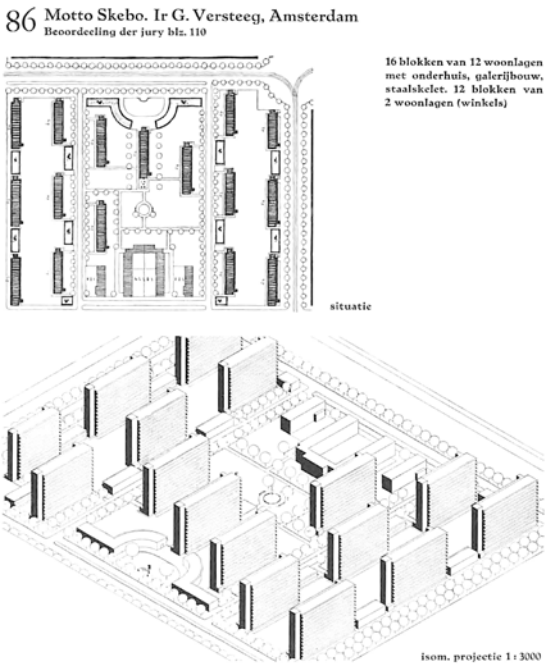

FIG. 6.9 The Ir Gerrit Versteeg's entry for the 1933 *Amsterdam Prijsvraag voor goedkoope arbeiderswoningnen*, including (left) site plan and isometric aerial view and (right) floor plans, including lift and stairwell (Ottenhof, 1936, pp. 96–7).

Versteeg's high-rise proposal was presented in a time when consensus was that four stories where the economic optimum height for public housing.[104] The jury of the competition came to the same conclusion as the 1929 City of Amsterdam high-rise construction commission had, that high-rise construction was not a feasible housing typology:[105] "…the jury concludes that high-rise construction for normal workers housing cannot be recommended."[106]

Plan Landlust Revised

Two years after adopting the Landlust expansion plan with its traditional perimeter blocks in 1934, the Amsterdam City Council approved an adaptation to two areas, which were now earmarked for zeilenbau. This was possible once it became clear that large enough portions of the Plan Landlust would be developed by public institutions, (the most northern part to be developed as public housing by the city and the central

104 (Van Tijen, 1936) .

105 (Bosma & Andela, 1983; Ottenhof, 1936, p. 24).

106 "… acht de jury,aan de hand van de ingediende plannen, hoogbouw voor de huisvesting van normale arbeidersgezinnen niet aangewezen." (Ottenhof, 1936, p. 35).

part by housing associations). This opened the way for collaboration on a large enough scale to justify the experiment in zeilenbau, the City Council and Provincial Planning Commission had called for. The city developed its own zeilenbau proposal for the northern-most portion of the Landlust Plan, spearheaded by Flipse of the City Engineering Department and Duiker was commissioned to develop an architectural proposal. Further to the south, three housing associations, Het Westen, the AWV and Labor collaborated to develop their own zeilenbau neighbourhood.

This reassessment of the urban layout was spearheaded by the Housing Association Het Westen and their young architects, Ben Merkelbach and Charles Karsten. Both were avid proponents of zeilenbau and co-authored the *De 8 en Opbouw Preadvies* (The 8 and Construction Recommendation) of 1932. Merkelbach served as assistant to Mart Stam when he realised his zeilenbau project in Frankfurt am Main and the Merkelbach & Karsten entry to the Amsterdam housing competition was selected, one of the four best entries. However, the proposal to reassess the plan came from the chairperson of Het Westen, Abraham Staalman.[107] The appointment of the young firebrands Merkelbach and Karsten by Het Westen to design such a large housing project, despite the fact that the young architectural practice had no real housing experience in the Netherlands, indicates that the housing association was keen to explore zeilenbau for public housing.

It is highly unlikely that the boards of the three housing associations granted neighbouring pieces of land were not in communication regarding the potential of collaboration on zeilenbau: a board member of the AWV had after all been adjudicator of the Amsterdam housing competition along with an architect who was a long-time associate of the AWV: Gerrit Versteeg sr The AWV appointed Bureau Versteeg as its architect for the Landlust development. Equally fortunate was the choice of Pieter Vorkink, architect of housing association Labor, who knew Merkelbach and Karsten. Vorkink lectured at the Haarlem Technical High School where they studied architecture.[108] The stars had aligned. Vorkink would later recall on altering the 1931 Landlust plan that: "[p]ersuading the service [Town Planning Section] was not difficult as some of the principal civil servants [of this service] were possibly already convinced [of its flaws] when they prepared the [1931] plan; the less convinced could defend themselves with the label 'experiment'."[109]

107 (Merkelbach & Karsten, 1937a, p. 133).

108 (Rebel, 1975, p. 697).

109 This reference to "some of the principal civil servants" is probably a veiled reference to Keppler. "Deze dienst te overtuigen was niet moeilijk, sommige hoofdambtenaren waren misschien al overtuigd toen ze zelf het plan opstelden, minder overtuigden konden zich met het etiket "proef" dekken." (Vorkink, 1938, p. 136).

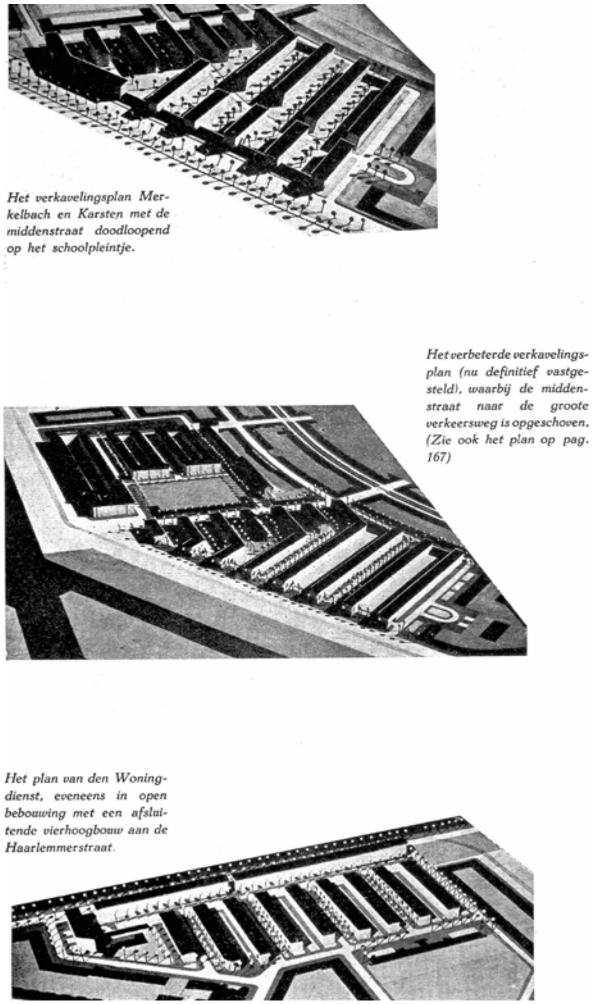

FIG. 6.10 The first zeilenbau proposal as refined by Merkelbach & Karsten (Duiker, 1933, p. 166).

The three architects of the three housing associations collaborated in the development of a new urban proposal. It was further worked out in detail by Merkelbach & Karsten pro bono in close collaboration with director of the GWA, Keppler.[110]

110 (Merkelbach & Karsten, 1937b); (s.n., 1938).

The proposal retained a north-south street that ended in an open space giving entrance to a school. It cut the long zeilenbau blocks in two and proposed low-rise housing and shops along most of the short ends of the housing strips (a device included in the Merkelbach Kasten, Bodon & Groenewegen's Amsterdam affordable housing competition entry).

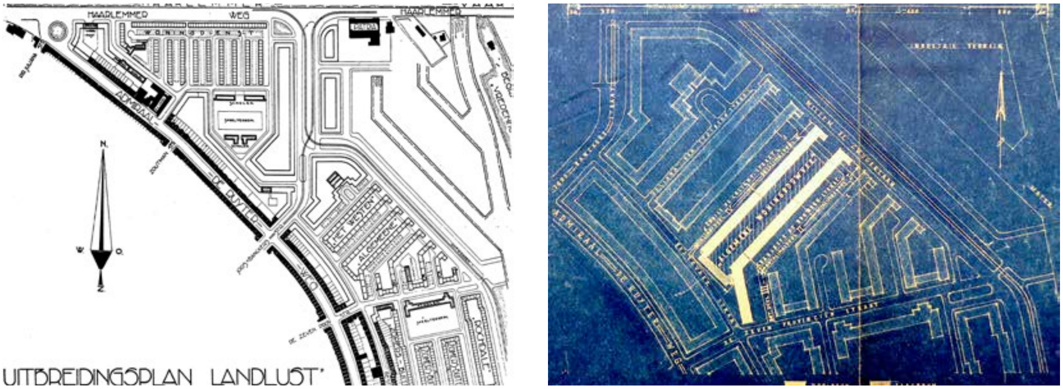

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FIG. 6.11 The adapted plan for the Landlust expansion area, with to the north, zeilenbau to be designed by Jan Duiker, and–centre right–marked "Het Westen" and "Algemeene" the zeilenbau designed by Merkelbach & Karsten, Bureau Versteeg and Pieter Vorkink, published in the *De 8 en Opbouw* 16 September 1933 (De Graaf, 1933, p. 167); [2] The AWV Versteeg housing block located in the final approved Plan Landlust (SAA: BWT/1990_2000/364 (4277)).

This urban plan was, however, noticeably modified by the City Engineers Department in collaboration with van Eesteren's Section for Town Planning. The already planned Anna van Buren Street was relocated to the eastern end and positioned to pass under the continuous building blocks. The reason for this remains unclear as it was against the provisions of the 1931 city council decision that allowed for modifications within the approved street structure. The southern portion of the plan (Labor) was also modified to connect buildings into longer strips. This reduced construction costs and resulted in fewer block-end apartments, but resulted in longer buildings blocks and fewer end-walls.

The adopted plan, approved by the Amsterdam City Council on 19 July 1933, [111] was, in effect, the result of design-by committee. Altogether, the revisions resulted in a significant change in the character of the Landlust neighbourhood plan. It was now typified by overly-long buildings, something Versteeg later remarked on: "Even though circumstances have led to the building blocks becoming somewhat long, we should be grateful to Merkelbach and Karsten for the great improvement they realised when compared to the original parcellation."[112] Merkelbach also lamented the fact that the lengths of the building blocks were longer than he had wanted them to be.[113]

The zig-zag zeilenbau design developed along the Haarlemmerweg and Nieuwpoort-straat for the city by Duiker[114] was never executed, despite the design having been approved. Duiker's death in 1935 may have been the reason why this plan was abandoned. It could also be that the City found the plan too expensive, or may have decided against taking the risk of experimenting on such a large scale if other parties, the three housing associations, were willing to do so at their own risk.[115]

6.4.2.2 Architectural genesis

The AWV commission to Bureau Versteeg to design its Landlust housing block dates to December 1932.[116] The commission was, however, not only for buildings at Landlust, but also to design a housing prototype: a design that would be economically repeatable and meet high technical and comfort demands (possibly measured against the Van Saane achievements). Landlust was the experiment to prove the prototype.

It took four more years after the revised Landlust urban plan was approved in 1933 before construction of the AWV building commenced. This delay was due

111 (De Graaf, 1933).

112 "Hoewel door de omstandigheden de bouwblokken wat lang zijn geworden, mogen we Merkelbach en Karsten dankbaar zijn voor de groote verbetering door hen verkregen t.o.v. de oorspronkelijke verkaveling" (Versteeg, 1938a, p. 255).

113 (Merkelbach & Karsten, 1937, p. 163).

114 (Mens, 2019, p. 48 notes that this design may have been inspired by the zig-zag housing designed by Ernst May in Frankfurt, completed in 1926).

115 Keppler was forced to retire in 1937 under a 1936 decision of the Amsterdam Municipal Council forcing all civil servants over the age of 60 to retire. Keppler's appeals to remain in his post were in vain.

116 (Versteeg, 1938b, p. 376).

to the difficulties of securing government subsidies. Versteeg jr made good use of this long incubation period to research technical aspects of the project such as the application of a block heating system and other material aspects.[117] The building had to be economical to construct due to both the economic downturn and the high land costs at Landlust and in Amsterdam in general. It had to be both affordable to tenants and at the same time be of as high a quality as possible.

The technical detailing and innovate nature of the Versteeg AWV building is where it shows its true colours as an experiment as both reproducible architectural model for public housing and test-case for efficient systems and durable affordable finishes. That does not mean that all the materials and techniques employed in the construction were revolutionary: being revolutionary was clearly not the aim. Rather, the prototype project was a test case for the application of new materials, systems and installations, where these potentially held benefit for the housing association and tenants.

Versteeg developed this generic design for the AWV for execution at Landlust at the same time as he was working on his entry for the 1933 Amsterdam affordable housing competition (as were Merkelbach & Karsten). His Ske-bo competition entry and the Landlust design made use of a steel frame construction and provision for centralised hot water and heating. Calculations he made for his Ske-bo entry clearly influenced the design of the Landlust block.

The Versteeg design consisted of three volumetric components: the two main housing strips, like its neighbours, reaching four stories; each with a single storey, near-double volume shop facing the busy Willem de Zwijger Avenue with free-standing single storey pitched tiled roof dwellings for the elderly on the opposite side.

The main strips were to be constructed on a semi-submerged basement on timber pile-foundations, possibly following the lead of Van Saane's Krugerhof and Geuzenhof. A section of this basement had two levels. The lower basement was designed to house a coal-fired heating installation and coalbunker for the block heating and hot water system.

The façades were to be constructed of yellow face brick; the large glazed openings filled in with steel frame casement windows. A waterproofed timber roof, with horizontal overhangs covered the building. *Hijshaken* (lifting hooks),

117 (Versteeg, 1938a, p. 256).

prescribed by the city building bylaws, projected from under the soffit of the roof at regular intervals.

The structural system was a composite of load bearing brick walls and a load-bearing steel portal structure. These I-section steel portals alternated with load-bearing brick walls, which also acted as firewalls. The steel structure extended outwards to carry the continuous balcony along the inner façade of the block. The steel portal structure carried internal masonry work, thereby avoiding eccentric loading of the building structure. The alternating brick walls acted as firewalls. The steel structure cantilevered outwards on the inside-facing façades of the block to carry a continuous balcony, with steel and wire-mesh infill balustrades. These were punctuated by timber airing cupboards, aligned vertically. The steel frame structure carried internal masonry work, thereby avoiding eccentric loading of the building structure. Timber beams, resting on the steel frame and lateral brick walls, carried the timber floor, except in the case of the wet cell (shower and toilet) where the floor was pre-cast concrete on asbestos-cement sheeting, in turn resting on two steel joists.

In the original design, eight apartments were served from a stairwell. The doors to these stairwells were located with direct access to the street, shielded by a cantilevered concrete overhang. The stairwells also connected the apartment internally to the basements where the bicycle and household storage units were located. Two apartments shared one of the four landings.

The development contained 244 apartments, comprising four one-bedroom dwellings for elderly couples, three four-bedroom, 122 three-bedroom and 115 two-bedroom dwellings. Due to the semi-basement the ground floor dwellings are located 1,7 meters above street level. A single storey semi-submerged concrete columned arcade ran along the internal perimeter of the block, serving as covered bicycle access to the basement.

He could however capitalise on low material prices, especially the depressed steel price, to afford the steel skeleton structure, steel door frames and extra thick steel window sections.[118] The ground floor dwellings were located 1,7 meters above street level due to the semi-basement. A single storey semi-submerged concrete columned arcade ran along the internal perimeter of the block, to serve as covered bicycle access to the basement.

118 (Versteeg, 1938a).

Each apartment in the AWV complex was provided with a radio connection just like at Van Saanes Krugerhof. One can imagine that this was especially important for the socialist AWV. The radio was, after all, an essential modern communication medium serving to uplift the people. The SDAP, and by association the AWV, were closely affiliated with the Socialist radio broadcaster, the VARA.[119] Other similarities included the application of the semi-basement, called an ‘*onderhuis*’ in Dutch, for both cycle and general storage by both Versteeg and Merkelbach & Karsten.

Another striking similarity was the use of French balconies in both designs of Merkelbach & Karsten and Vorkink at Landlust. The Merkelbach & Karsten design utilised a similar traditional combination of load-bearing walls. Where walls were projected eccentrically, they were carried by steel beams. This applied also to steel beams to spanning large façade openings and the timber bearing beams that carried floors.[120]

Merkelbach & Karsten, in their short 1938 text presenting the construction of their Landlust housing project, focussed on the way they attempted to address two perennial problems with zeilenbau: obscuring drying washing on balconies from view and limiting the number of dwellings per stairwell. Here they also looked at Van Saane’s Krugerhof, projecting two sets of separate stairs in each stairwell,[121] meaning that each stair only served four homes. Passing mention was made of the use of steel windows and doors, and the design of the kitchens.[122] Merkelbach & Karsten’s floor plan design utilised a peculiar shower cubicle set-up: a separate shower room accessible from both master bedroom and the corridor. This device was employed by Versteeg at Landlust as well and had its origin in the Versteeg Ske-bo competition entry.

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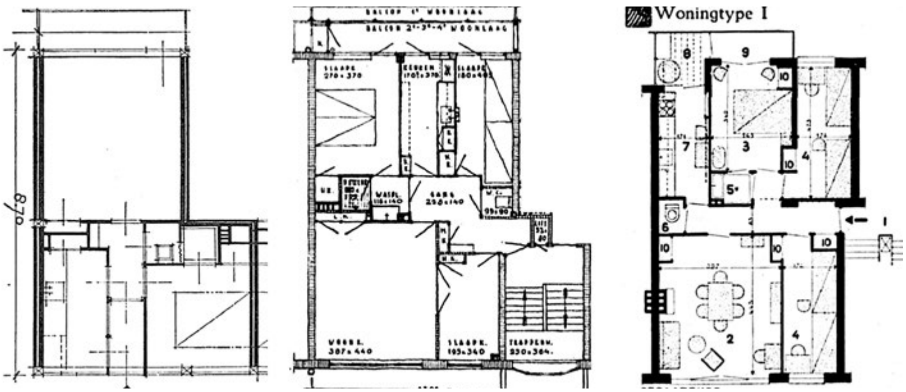
119 The *Vereeniging van Arbeiders Radio Amateurs* (association of labourer radio amateurs) See (De Jong, 2019).

120 The statement of significance (*Redengevende omschrijving*) composed by the then Bureau for Monuments and Archaeology in Amsterdam in 2007 for the three Landlust projects erroneously states that the Merkelbach & Karsten block also utilised a steel portal framework. ‘Redengevende Omschrijving : Strokenbouw in Landlust’ ('Betreft Monumentenvoorinformatie, Louise De Colignystraat 37 T/M 39 [27 April 2009, Advice 16732. 103220912]; SAA, 2009, 2009.389).

121 (Fisher, 1968, p. 19.)

122 (Merkelbach & Karsten, 1938).



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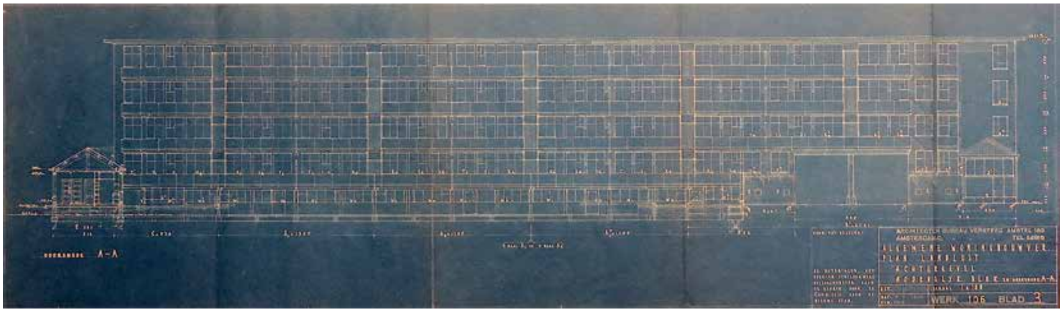

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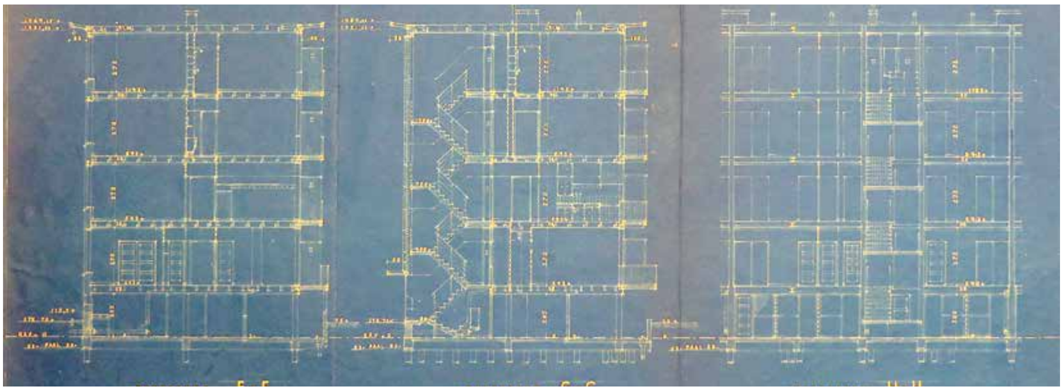

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FIG. 6.12 [1] A comparison of the Versteeg Ske-bo floorplan with double-entry shower. Both his design for the AWV housing and that of Merkelbach & Karsten for the Het Westen at Landlust, employ this device (Ottenhof, 1936, p. 97; Versteeg, 1938, p.377; Merkelbach en Karsten, 1938, p. 379); [2] Elevation and [3] cross-sections of the Versteeg-designed AWV housing at Landlust. Submission drawings dated July 1936. (SAA: BWT/1990_2000/364 (4277)).

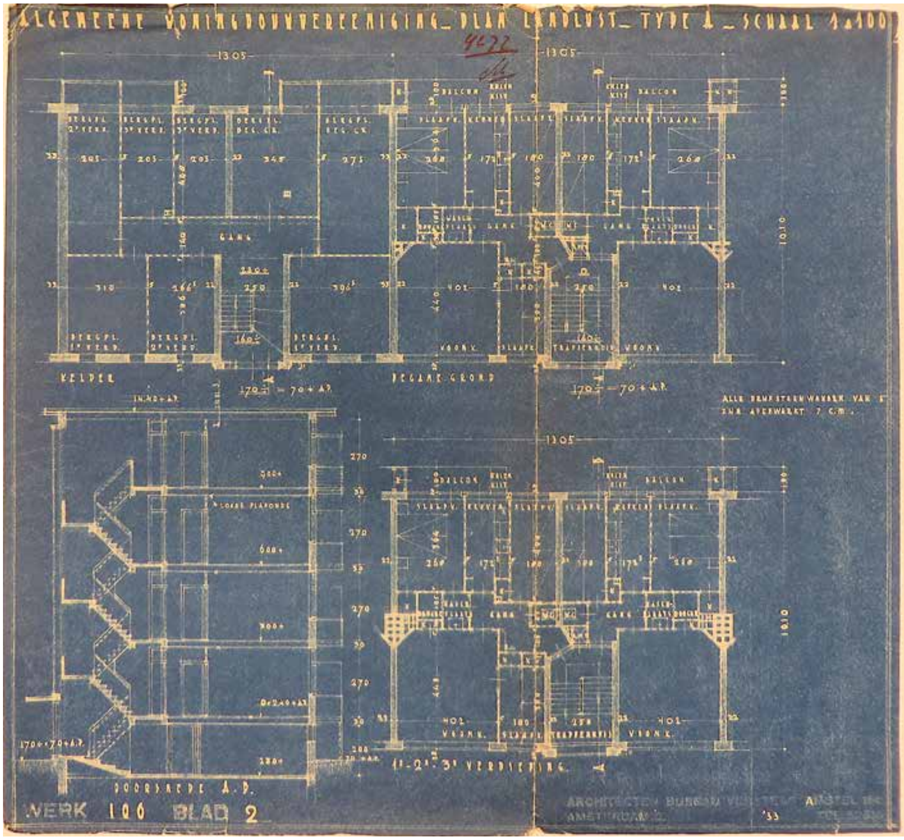

FIG. 6.13 Cross-section and plans of the Versteeg-designed AWV housing at Landlust. Submission drawings dated July 1936. (SAA: BWT/1990_2000/364 (4277)).

6.4.3 Active Experimentation (1937–8)

Based on the approved Plan Landlust, the AWV submitted drawings for the proposed development on 1 April 1936, followed by a final proposal dated 3 June 1936, which included the rental control class for the proposed development.[123] By April 1936, the Council had not yet taken a final decision on granting the leasehold,[124] but approved

123 The two dwellings with a shop each were to be constructed for rental class eight and 242 dwellings for class six.

124 Council decision on leasehold still to be taken (*Raadsbeskuit erfpacht nog te nemen.*) ('Erfpacht'; SAA: BWT/1990_2000/364 (4277)

the architects' drawings on 1 February 1937 after the AWV was granted the land.[125] Street numbers were assigned on 23 September of the same year.[126]

The tender for the construction of the project was already awarded to contractor D van Schaik on 21 August 1936, a full six months before the city gave the plans their final approval.[127] The volatile economy quickly created financial challenges for the AWV: a few weeks after the construction contract was signed the Dutch guilder was devalued and the contract sum had to be increased by 10%.[128]

Construction of the 244 housing units AWV block was completed by May 1938. Versteeg reported that the steel portal frame structure, erected to the full height before the walls were drawn up, greatly facilitated the construction process.[129]

The use of a steel framed structure for the project block was not the only aspect in which the construction was an act of active experimentation: Versteeg reported the successes and challenges of a number of new materials.[130]

One example was the application of new wall-finishing systems. Stairwells were finished, to the height of a person, in so-called concrete enamel *beton-emaille* (enamelled concrete), a layered finishing plasterwork system, with as main constituent, white cement). Beton-emaille was first advertised in the architectural press in 1937, and from 1939 often under the trade name Maduroplast.[131] It was to have wide application in housing, especially in stairwells and showers as a cheaper alternative to ceramic tiling.

The floors of the stairwells were constructed of reconstituted granite (*kunstgraniet*), with carbodundum (silicon carbide) as anti-wear additive. This material had been introduced into the construction industry in the mid-1920s.[132] Versteeg in an article in the weekly *Bouwkundig Weekblad Architectura* magazine reported excellent results after testing the wear resistance of the floors with an *Amsler*-wear test machine.[133]

125 ('Gemeentelijk Bouw- en Woningstoezicht', SAA: 1583, BT. 1936. GAS, BWT/1990–2000/364, (Inv. BWT. 4277)).

126 ('De 'Algemeene' Woningbouwver. Plan Landlust. Plattegrond'; SAA: BWT/1990_2000/364 (4277)).

127 (Versteeg, 1938b, p. 376).

128 (Versteeg, 1938b, p. 376).

129 (Versteeg, 1938a, p. 257).

130 (Versteeg, 1938b).

131 (Bot, 2009, p. 143). Bot states that the earliest use dates to 1937.

132 (Bot, 2009, p. 351).

133 (Versteeg, 1938b).

Versteeg also applied what he called ‘plastic’ paint to the interior walls of dwellings. It is not clear what was meant by the term *plastic* paint. The full-scale production of acrylic paints only commenced in Germany 6 years previous to the awarding of the tender for the AWV block.[134] If this was indeed the paint used at the Landlust AWV block, it may have been one of the earliest applications of acrylic paints in the Netherlands.

The Versteeg design for the AWV complex was also used to illustrate ‘modern’ living and housekeeping to the masses. The housing association Labor took the lead, commissioning Ida (Liv) Falkenberg-Liefrinck to furnish a model home in its new (and for this new association its first) housing complex in 1937. The AWV followed suit and commissioned Falkenberg-Liefrinck to furnish a presentation apartment in its Landlust project in 1938.


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FIG. 6.14 The living and dining areas of the model AWV housing unit, fitted out with off-shelf items by Ida Falkenberg-Liefrinck (Falkenberg-Liefrinck, 1838, p. 17).

Falkenberg-Liefrinck was known as furniture designer and advocate of progressive architecture and urban design. At the time she served as editor of the *De 8 en Opbouw* journal and was also a convinced socialist. Falkenberg-Liefrinck was of the firm opinion that advances in urban design and architecture would fail if not accompanied by a total societal re-orientation, starting with the way people lived, or as phrased by the editors of the *De 8 en Opbouw* in a call to the directors of housing associations in 1938: “You should also elucidate your members on the furnishing of the home, and by doing so, how to live in it.”[135] The same edition of this journal included an article by Falkenberg-Liefrinck with photographs and floor plans for the

134 (Bot, 2009, p. 511).

135 “De inrichting van de woning en daarmede de wijze van bewoning dient U ook aan Uw leden duidelijk te maken.” (De Redactie, 1938, p. 11).

two model homes exhibited at Landlust. Both were furnished with off-shelf affordable items. The model interiors attracted great interest.[136] Falkenberg-Liefrinck concluded that, "[i]n any case, the great interest of the visitors has proven that the residents of 'workers' houses' are not at all as conservative as what the salespeople of stores hold them to be—on the contrary, they are open to innovations and improvements, provided they have the opportunity to get to know these. And the design of a model home has also shown that this is a good way to learn to appreciate the benefits of new home construction."[137]

The common garden between the two buildings was designed by G Bleeker (1882–1956), with a strict bilateral-symmetrical layout: a perimeter paved walkway with a central fishpond. At the Willem de Zwijger Avenue end, the garden ended in a semi-circular brick bench. The sculpture panel featured as well on this landscape as those that adorned the ends of the blocks, were made by Theo Vos[138], an Amsterdam sculptor associated with the Amsterdam School.

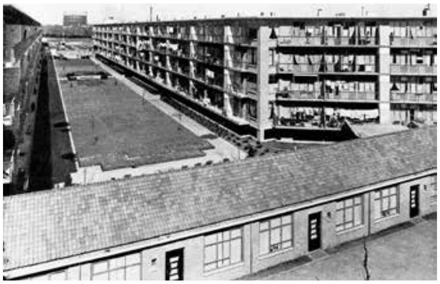

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FIG. 6.15 [1] The AWV Landlust housing garden in strict symmetrical layout (Versteeg, 1938, p. 378); [2] One of the reliefs on the Willem de Zwijger Avenue block ends of the AWV Landlust housing, sculpted by TA Vos (2011).

136 (Falkenberg-Liefrinck, 1938, p. 15).

137 "In ieder geval heeft de groote belangstelling van de bezoekers bewezen dat de bewoners van 'volkswoningen' volstrekt niet zo behoudend zijn, als waar de verkoopers van volkswinkels hen voor houden - dat ze integendeel open zijn voor vernieuwingen en verbeteringen, indien ze maar in de gelegenheid gesteld worden deze te leeren kennen. En de inrichting van een modelwoning heet ook geleerd, dat dit een goede manier is om de voordeelen van de nieuwe woningbouw te leeren waardeeren." (Falkenberg-Liefrienk, 1938, p. 16). By 1941, Petra Clarijs concluded that "...these furnishing projects showed that a decent whole could be achieved with relatively ugly furniture ("...dat er bij de inrichting getoond wordt hoe er met betrekkelijk lelijke meubels toch een behoorlijk geheel ontstaan is".) (Clarijs, 1941, p. 192–39).

138 (Versteeg, 1938b, p. 262).

6.4.3.1 The 2E+Co of the AWV public housing block's genesis

The prototype block designed by Versteeg for the AWV was a balancing act between economy and innovation. It was unfettered by lofty idealistic considerations and its technological resolution was especially inventive for its time, more so than its sister-complexes. The Bureau Versteeg, following in its own socialist-inspired tradition, searched for practicable and technologically appropriate solutions to the urgent problem of constructing good and cheap (*goed en goedkoop*) workers housing, to which Versteeg jr brought the ecology of ideas on the application of technology to the betterment of living conditions being taught at the Delft Technical College. It was a well-considered case study for normalisation in housing production.

Many of the devices employed by Versteeg (and Vorkink and Merkelbach & Karsten) were based on contemporary models,[139] often pioneered for workers' housing by Van Saane, most recently at the Landlust Geuzenhof, a building with 640 apartments and a nursery school,[140] completed in 1933. Van Saane was able to, at a pinch, reduce the rental of an apartment in his project to the *ƒ* 5,50 per week as demanded by the Ministry of Housing in The Hague before they would release any subsidy for this private initiative. This called for careful engineering and investment by Van Saane,[141] but it confirmed the possibilities of centralised facilities in providing affordable, comfortable and hygienic housing.

Van Saane's project cast a particularly long shadow over the lower quality of the housing that housing associations were able to deliver. Van Saane often utilised innovative devices, such as the *droogloop* (an internal covered arcade at ground floor, giving access to the ground floor storage units and stairwells). It was first applied in Van Saane's 1930 Krugerhof housing development in Amsterdam's Transvaal Neighbourhood, for which Gratama & Versteeg had designed the urban plan. His double-stairwells served as model for Merkelbach & Kartsten's Landlust stairwell design.

The Krugerhof arcade was a particularly innovative device. At Geuzenhof, Van Saane raised the dwellings a full floor height, utilising the ground floor for an internal

139 (Stissi, 2007, p. 344–45). Despite the fact that Stissi finds the Versteeg building even more *zakelijk* than that of Merkelbach and Karsten he lays the praise for the innovation squarely at the feet of the latter. Seeing the level of innovation in the Versteeg block, this statement can be challenged. However, Stissi is also the only author to make the distinction between father and son Versteeg, noting that Gerrit jr was in fact the architect of the project.

140 Van Saane developed the floor plans in-house. The façades of phase 1 were designed by J Dunnebier, the second phase façades by JF Berghoef.

141 (Fisher, 1968, pp. 30–1).

arcade and storage.[142] The droogloop not only provided protected access to the storage units, but for example even buggies could be parked here. It was also a place where children could play [143] outside the small apartments during inclement weather and the semi-private garden provided space for housewives to socialise. Van Saane's experiment was so successful that the city was politically in the position to change its building by-laws, which up to that point mandated attic-space for storage per home.

FIG. 6.16 The Van Saane Geuzenhof housing development at Landlust with children's play area and arcade (N Swaager, October 1930; SAA: 5293FO000734).

Vorkink, Bureau Versteeg and Merkelbach & Karsten all applied a semi-basement. Only Versteeg employed the courtyard arcade, mirroring the typology of Van Saane.[144] (It should be remembered that the Gratama & Versteeg practice also constructed housing (for the AWV) in the Transvaal Neighbourhood ten years before, where Van Saane first applied the arcade at the Krugerhof).

142 (Pot, 1938b).

143 In a cross-section diagramme for the 1929 Krugerhof, this ground-floor gallery is labelled as *speelgalerij* or play-gallery' (Fisher, 1968, p. 21).

144 This device was also applied at the De Eendracht block by JH van den Broek in Rotterdam, completed in 1934.

There are other notable similarities between the Van Saane and Versteeg buildings at Landlust apart from the use of the covered arcade and block heating system. Both contained continual internal balconies with a broom- and dustbin cupboard.[145] The full-height glazing of the stairwells is profiled as bay window—a much-occurring device in the Van Saane housing blocks—which provided for greater views outwards, high levels of day lighting ingress and a feeling of spaciousness.

But the Van Saane block was designed as a bespoke building for a specific urban land parcel. The years leading up to the design of the AWV block had shown the production potential in an assembly line system, from the growth of mass-produced motorised vehicles to mass-produced kitchens and doors, making previously expensive goods and services accessible and affordable to working classes. The AWV housing was developed as a rationalised prototype for mass-production in housing through repetition. Versteeg embraced normalisation (prefabricated door frames; ceiling panels etc) and the way he wrote about the building, describing these prefabricated elements in detail, was meant to highlight this.

The Landlust AWV prototype was a search for economic and energy efficiency on dwelling and building scale, improved hygiene on an urban scale and mass-produced affordable comfort on an industrial scale. The design aimed at efficient construction: the steel structure streamlining the construction process.

The design also aimed at efficient habitation, from the efficiency of locating the storage in the semi-basement (both for bicycles, buggies and household goods, limiting haulage to attics) to limiting circulation space in the individual dwellings through clever planning of for instance, the bathing facilities. Large glazed openings, made for efficient daylighting. The block heating liberated the house wife from the onerous task of managing a coal supply, dealing with smoke, soot and ashes and making her home-keeping task more efficient. The kitchens of the AVW block were well-lit, well-ventilated and designed for efficient operation and cleaning. The ventilation system was designed to extract airborne particles form the kitchen when cooking, reducing the need to clean, and the extraction hood, manufactured from glass and steel, not only provided daylight over the hob; it was designed to make cleaning easy and show up dirt. The Versteeg design exhibited a functional rationalism, resonant with the Existenzminimum ideals. Key concepts included efficiency and hygiene.

145 Merkelbach was very critical of the Van Saane block at Landlust, publicly ventilating his disdain in the *Bouwkundig Weekblad Architectura* (Merkelbach, 1938, p. 102) only to be corrected on certain points of criticism in the same issue by Pot (1938a).

Economy

The AWV block was constructed at a price of ƒ 9,09/m^3, of which 90% was on loan at 4% per year from the national government *Volkshuisvestingfonds* (workers housing fund). The remaining 10% was budgeted for by the AWV, who in turn calculated an interest rate of 2% per annum. The installation of block heating at the AWV complex was made possible through an exception in the rules relating to the spending of the funding from the Volkshuisvestingfonds, which did not in general extend to such installations. The ƒ3 000 that this installation cost had to be repaid at 4% interest over a period of 25 years.[146]

On completion the rentals for apartments in the AWV block cost on between ƒ 3,75 for a single bedroom apartment (there being ground floor units for the elderly located as a single-storey row adjacent to the main building blocks) and ƒ 6,10 for the largest four-bedroom apartment. The weekly contribution for block heating and hot water ranged between ƒ 1,10 and ƒ 1,65, depending on the size of the apartment. These apartments provided affordable modern comfort at a rate of around ƒ 6, an amount that was affordable by the general working population.

Versteeg jr and the AWV achieved this economy through careful engineering. The Versteeg experiment in steel skeleton frame construction for public housing was made possible by low steel prices at the time, and was an attempt to reduce construction economy through speed of erection.

The AWV block heating was designed to prove that centralised heat provision was both cost effective and delivering higher levels of comfort. Versteeg undertook a detailed study into both the technology and efficacy of block heating systems during the lacuna of the years 1933–6[147] concurrent to the development of his 1933 affordable housing competition entry.

With the AWV, Versteeg embarked on a large-scale experiment at Landlust on various modes of implementation of the block heating system. In half of the apartments a radiator was installed in only the main living room. In the other half an additional small radiator was installed in the entrance foyer, potentially providing more comfort, but at a higher installation and operating cost. Ample heating capacity was provided to both cases. The efficacy and economy of the block heating in the building was closely monitored for at least one year. A survey undertaken in 1939 indicated

146 (Versteeg, 1938b, p. 376).

147 (Versteeg, 1938a, p. 256).

that the residents were pleased with, and gladly paid for the block heating system. No difference in use appreciation was between the two variants that the homes had been provided with.[148] Versteeg did not wait for these results to come to a conclusion regarding block heating and hot water. Soon after completion of the AWV Landlust housing block, he stated that the block heating installation was both cost effective and heating-effective and he recommended without hesitation that future Housing Act housing be developed with similar installations.[149] This conclusion was diametrically opposed to views held by his contemporaries, including his collaborator at Landlust, Ben Merkelbach, who still doubted the economic appropriateness of a centralised system in workers housing.[150]

Energy

To ensure that the block heating system operated optimally, its efficacy had to be ensured with the application of a well-thought-out insulation package. Again, Versteeg and the AWV used the Landlust building to test insulation technologies.

Instead of selecting only one ceiling insulation material for the top floor from the many new products on the market, another experiment was designed. For the most part, the roof was insulated with 30mm thick impregnated (probably with bitumen) cork panels, located in the roof cavity. Three other products were also installed in top-floor dwellings. In this way, the performance of four insulation materials were comparatively tested. One of these was Heraklith wood wool-cement panels (25mm). These cementitious wood fibre panels were first imported to the Netherlands from Austria by the firm H Visser of Amsterdam, in 1929[151] and soon found widespread application. The soffits of the ground floor slabs overhanging the arcade were also provided with 25mm Heraklith panels. Vorkink also applied Heraklith in his Landlust project.[152]

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148 (Van Overbeeke, 2001, p. 65).

149 “zonder aarzeling” (Versteeg, 1938b, p. 260).

150 (Merkelbach, 1936, p. 20).

151 (Bot, 2009, p. 425. The system had already been patented in 1908, but production only commenced in 1924 (Heraklith GmbH, [s.a.]).

152 (Vorkink, 1938).

The second, Iboma, was a patented lime mortar produced by the N.V. Dordrechtsche Asphaltfabriek te ‘s-Gravenhage,[153] applied to expanded steel mesh *(ribbenstrak).* The fourth insulation material installed at the AWV block was a product Versteeg identified as *Siltematten*. Very little is known of this rock-wool-like blanket product,[154] except that two types of Silte blanket, Silte A and B, were utilized by architect Sybold van Ravesteyn in his 1939 building *De Holland van 183*9 (The Holland of 1839) in Dordrecht.[155]

Versteeg’s choice for block heating instead of the more traditional coal-fired stoves also had an aesthetic consequence: the living room windowsills could not be projected as low as at the blocks of his neighbours due to the positioning of heating radiators, reducing the potential heat gains by solar ingress.[156] He was, however, able to provide 60% façade glazing on his south-facing façades.

Comfort

Versteeg was acutely aware of the problem of structural-borne sound transfer as a comfort-issue. He addressed the problem of structure-borne sound transmission in a cheap and simple and effective manner. One-centimetre-thick cork pads were sandwiched between all steel posts and beams as well as between floor-beams and ceiling battens to minimise contact sound transfer. His plans are dated April of 1936, the same year Van Loghem published *Thermisch en acoustisch bouwen* (Thermal and Acoustic Construction). Van Ravesteyn applied a similar system in his De Holland project in 1939 and published about it with pride.[157] Again, Versteeg was technically ahead of the pack. In the AWV complex all service runs that penetrated dividing floors and walls were acoustically insulated with felt-fibre. The brick-built central boiler chimneys, that rose up through the Louise de Coligny Street block, was insulated on the outside with a thick cork skin, to avoid unwanted heat transfer to the adjacent dwellings.

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153 (Wattjes, 1943, p. 101) & (Limperg & Verschuyl, 1936, p. 61). The thermal conduction coefficient is listed as 0,0069 Cal/hour/meter °C which equates to a thermal transmittance of 0,00802 W/m^{2}K at unknown thickness.

154 (Weijs, 2012, p. 29).

155 (Van Ravesteyn, 1939, p. 386).

156 Inversely and ironically, the choice for the more traditional coal fired heating system in the Merkelbach and Karsten block allowed them to design a fully glazed façade which resulted in a more modern aesthetic.

157 (Van Ravesteyn, 1939).

All these measures were of course aimed at providing residents with a high level of comfort at an affordable price. Comfort also included unlimited hot water and space heating without needing to haul coal up from the basement. The aim of many of these choices was to reduce the labour burden of the housewife.

A simple comfort device was the so-called grocery-lift: a small manually powered lift that ran up behind the back wall of the stairwells.[158] This was not a new device, as it was in use from the 1920s onwards. Merkelbach & Karsten, Vorkink and Bureau Versteeg all incorporated a little grocery lift into their designs.[159] The grocery-lift of Merkelbach & Karsten took the form of an open basket running between the stair-railings. In the case of the Versteeg block this lift was more conventionally located in an enclosed lift-shaft opening onto the landing.[160]

The grocery-lift in combination with an electronic door-opener connected to the call-bell of the apartments (a notable luxury for affordable housing at the time!), meant that deliverymen could pop deliveries into the lift on the ground floor and the housewife could collect them at her landing, saving deliverymen from onerous journeys upstairs.

The grocery lift was also a device to improve the efficiency of the housekeeping task of the home-maker: providing the family with a clean, well-run home, focussed on the kitchen as her main domain of operation. The twentieth century interest in housekeeping and the role of the housewife in the Netherlands can be traced back to the late ninetieth century. In 1898 a national exhibition on women's labour, the *Nationale Tentoonstelling van Vrouwenarbeid* (National Exhibition of Womens' Labour), was held in The Hague. It highlighted the often-unpaid work women performed in and outside the home. Three years later a *Nationale Vereeniging voor Vrouwenarbeid* (National Association for Womens Labour) was established, with a bureau to study, expand and improve the working life of women. This in turn led to the creation of the *Nederlandsche Vereeniging van Huisvrouwen* (Dutch Association of Housewives, NVH) in 1917.

Christine Frederick's 1919 publication, *Scientific Management in the Home : Household Engineering*[161] galvanised interest in home econimics. The efficient kitchen became an important ambition in the late 1920s with regards to efficiency,

158 In the Merkelbach and Karsten block, these were placed between the handrails of the alternate stairwell-rises.

159 (Hekker, [s.a.]) incorrectly states that the Merkelbach and Karsten Landlust project was the first to include such a grocery lift in Housing Act dwellings.

160 This would become the standard in post-war walk-up ('portiek') housing in the Netherlands.

161 (Frederick, 1919).

comfort and hygiene and the education of the housewife in modern housekeeping became a general social topic.[162] The NVH had already expanded its role to include education of the housewife through its branch, the *Instituut tot Voorlichting bij Huishoudelijke Arbeid* (Institute for the Information on Domestic Work), byt the time that Frederick's book was published in Dutch under the title *De denkende huisvrouw* (The thinking housewife) in 1928.[163]

Scientific Management in the Home : Household Engineering was already publisjed in German in 1922 and it is therefore no wonder that the *avant garde* architects who were invited by the German Werkbund to patriciate in the development of the *Weissenhofsiedlung*, including JJP Oud and M Stam, were given guidelines on proper kitchen design. These were prepared by Erna Meyer, undoubtably informed by Frederick's book. Oud's kitchen design, a model that allowed the housewife to keep an eye on the children in the sitting room while cooking, was Meyer's preferred entry.[164]

Frederick's instruction to the housewife in the 1928 Dutch edition was clear: "Iedere vrouw kan den last van haar taak verminderen door haar werk beter te regelen, een doelmatiger systeem toe te passen en haar arbeid door studie en proefnemingen te standaardiseren".[165] Locally, the Hague branck of the NVH commissioned architect Jetze Janzen, to design a model kitchen for (and with) the NVH. The result, the so-called *Holland Keuken*, was presented in 1929. It was mostly a derivative of the more famous Frankfurter Küchen,[166] designed by Margarete Schütte-Lihotzky, and installed in Ernst May's Frankfurt Siedlung.

The kitchen became a yardstick for housing quality in the Netherlands. Van Saane's Krugerhof apartments were fitted out with the 'Frankfurter' kitchen, and later commissioned the firm Bruynzeel to prefabricate kitchens for his Geuzenhof project. Both AWV and Het Westen projects developed cutting-edge kitchens. Merkelbach & Karsten sourced the expertise of Janzen, who by then was seen as a kitchen design specialist (and informally carried the stamp of approval of the NVH).

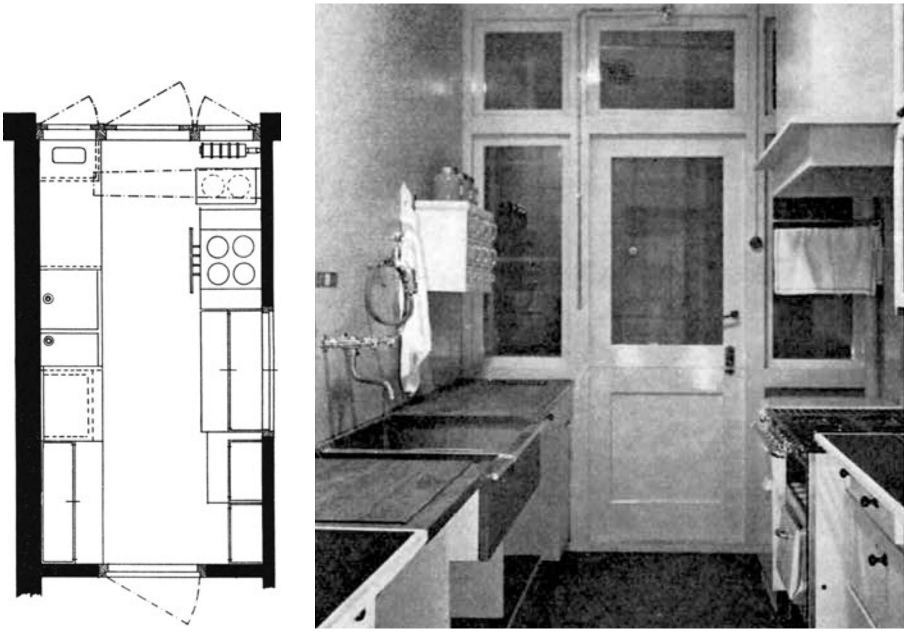
162 In the local Nieuw-Landlust neighbourhood newspaper featured weekly articles instructing housewives on, for instance, the most efficient way of cooking potatoes (Carla, 1936)

163 (Frederick & Resink, 1928).

164 (Lupton, Miller, & Center, 1992, pp 148–49).

165 "Every woman can reduce the burden of her work by regulating her work better, applying a more efficient system and standardising her work through study and experimentation." (Frederick & Resink, 1928, p. 28).

166 (Bot, 2009, p. 629–30); (De Rijk, 2001, p. 41).



1 2

FIG. 6.17 The Janzen-designed Holland Kitchen: [1] plan and [2] photograph of this luxury kitchen with double wash trough, a larger cooker and plenty of storage space (Berlage, 1936, p. 23 & 53).

The *Modelkeuken der Nederlandsche Vereeniging van Huisvrouwen* (Model kitchen of the Dutch Housewives' Association) developed for the staff housing for the Philips company at Eindhoven in 1934,[167] also had an extraction hood and *potlicht* (cooking light), but this extraction hood was of a timber manufacture, resembling hoods in traditional kitchens.

That the principles of efficiency and hygiene permeated Versteeg's desing is evident in the kitchen he desinged for the AWV prototype. The countertops and sinks were of terrazzo: a clear choice for hygiene. Hot water was provided by a tap over the sink. Versteeg designed an extraction hood over the stove; manufactured of patterned glass and angle profile steel sections. He positioned the stove next to the outer wall and provided a small pivot window–located in the wall of the cooker hood–with potlicht. When opened it let air in, which after mingling with the hotter cooking fumes, was drawn out through a chimney, constructed of pre-fabricated hollow slag-concrete blocks. Versteeg reports that this proved to be a very successful

167 See (De Rijk, 2001, p. 44).

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construction system.[168] The whole formed a clever stack buoyancy ventilation system, which, through the strategic positioning of the pivot window, eliminated droughts which could result due to the extraction of air above the stove-area.

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FIG. 6.18 [1] The kitchen designed by Merkelbach & Karsten with Janzen for the Het Westen Housing at Landlust with a gas burner (B Merkelbach, June 1938; SAA: 5293FO004548); and [2] the Versteeg kitchen for the AWV. The residents of this home cooked on parafin stoves (Eva Besnyö; G Versteeg, 1938a, p. 258).

As comparison, the first really commercially successful prefabricated modular kitchen in the Netherlands–which was introduced by Bruynzeel in 1938,[169]–did not provide the luxury of an extraction device as standard option. Yet the ingenuity of the Versteeg AWV kitchen, which was clearly designed with the ideals of health, hygiene and comfort in mind, has not been recognised as such. Quite recently it

168 (Versteeg, 1938a, p. 260).

169 This is the famous kitchen designed by Piet Zwart. The FW Braat steel kitchen of 1931 was not a resounding commercial success. Van Saane commissioned Bruynzeel to design bespoke kitchens specifically for his Geuzenhof project, which may have led to the firm developing its own line. Zwart was already active for the Bruynzeel Company. The first plans for efficient kitchen designs furnished with standard cupboards date to 1936 (Kuipers, 1997, p. 129, note 50).

was even labelled as being “sober” in comparison to the Merkelbach & Karsten with Janzen kitchen which, it has been said, presented a greater finesse and scientific underpinning.[170]

1 2 3

FIG. 6.19 The AWV Versteeg kitchen, photographed in Charlotte de Bourbon Street 34 in 1981. Note the [1] glazed extraction hood; [2] the pull-out counter; and [3] the pivot window and *potlicht* (H Veen; SAA: [1] 010122052677; [2] 010122052678; [3] 010122052679).

The opposite is true. The authorship of the kitchens has been confused! A ‘Landlust’ kitchen is included in the permanent collection of the Amsterdam Museum as an early example of a ‘rational kitchen’ and attributed to Merkelbach & Karsten and Jetze Janzen.[171] However comparison to photographs published at the time of completion of the projects at Landlust reveals that the kitchen in the collection of the Amsterdam Museum is in fact the kitchen designed by Versteeg!

6.4.4 Concrete experience (1938–2007): gradual evolution

The AWV Versteeg prototype was replicated after its proven success at Landlust, but only once. A second block was constructed following the Versteeg design at Bos en Lommer, an adjacent extension area between 1940–2.

170 “Redengevende Omschrijving: Strokenbouw te Landlust”. ('Betreft Monumentenvoorinformatie, Louise De Colignystraat 37 T/M 39' [27 April. Advice 16732. 103220912]; SAA: 2009, 2009.389); (Stissi, 2007, p. 341).

171 This kitchen, on long-term loan from The Hague Municipal Museum, was on permanent display in the Amsterdam City Museum between 1999–2013 and is now in storage. (Van Gent, 2015); Objects KB 2460 and KB 2457 in collection of the Amsterdam Museum. (Amsterdam Museum, [s.a.]).

A major change was made to the design: the block heating installation was omitted. This also meant that no second level basement was constructed. The possibility for funding from the *Volkshuisvestingsfonds* (workers' housing fund) for such comfort-installations was revoked by the new minister of Home Affairs, Hendrik van Boeijen in 1937, who thought that subsidised dwellings in Amsterdam were becoming too luxurious. This was because the city altered its buildings regulations in 1933, to mandate that all new dwellings were to have either a bath or a shower.[172]

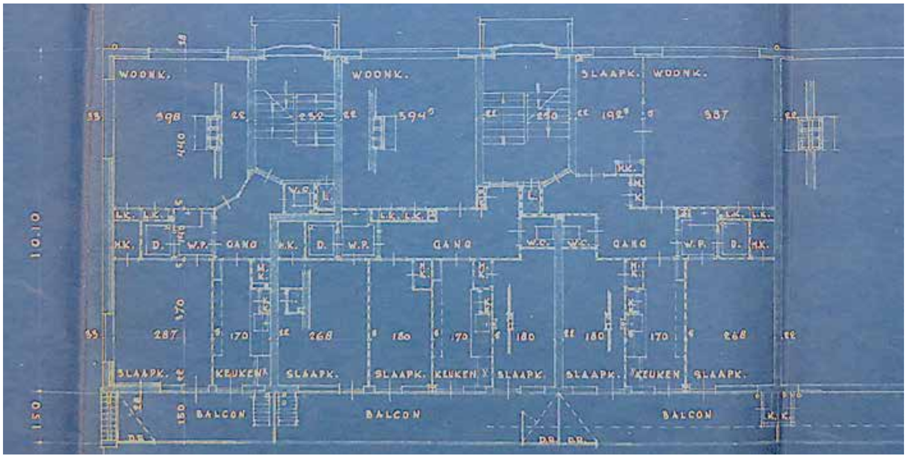

FIG. 6.20 Floor plan for the AWV block at Bos en Lommer, dated 28 August 1939, with chimneys added in on plan in the lounge ("woonk.") and a coal hopper on the balcony (SAA: BWT/1990_2000/373 (8582)).

The AWV had to revert back to heating by individual coal fire places. Hot water for showers was provided by electrical. The drawings submitted for approval show that this was a late alteration to the design for this block, the fireplaces and chimneys roughly drawn in, over already completed plans. The construction at Bos en Lommer must have been fraught with difficulties, specifically with regards to obtaining construction materials. The Dutch capitulation to the German army on 15 May 1940 was achieved through large-scale destruction. A Reconstruction programme was very quickly initiated through the *Wederopbouwbesluit* (Reconstruction decree) of 21 May. Construction projects could now only continue with the express approval of the *Regeringscommissaris* (Government commissioner) JA Ringers. Construction materials became very scarce.

172 (Van Overbeeke, 2001, p. 26).

The building industry was tasked with developing alternatives for construction timber and to reduce the use of iron and steel already in August 1940. In 1941, 80% of all the concrete production in the Netherlands went to the *Wehrmacht* (German Army) for the construction of air fields. Unlike for its older sibling, the construction of the Bos en Lommer AWV block was not published in the architectural press. This was the result of a dedicated strategy: construction works were not publicised at the time, so as not to alert the German authorities of the reconstruction that was taking place.[173]

1

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FIG. 6.21 The Landlust AWV block [1] shortly after completion photographed in 1943 (SAA: 5293FO006025); and [2] with mature garden after WWII (undated; SAA: 5293FO008786).

After completion the achievements of the AWV blocks at Landlust and Bos en Lommer, soon faded into obscurity. The publication of the more radical and large-scale Amsterdam General Expansion Plan (AUP) in 1934, its finalisation in 1938 and final implementation through royal decree in 1939 overshadowed the, by comparison, small Landlust project.

Landlust with its neighbour Bos en Lommer, developed into a typical Amsterdam workers neighbourhood, with a collective character. The AWV block continued to be gainfully inhabited, with small changes made to the dwellings: kitchens and bathrooms were upgraded when new residents moved in; the electrical installation improved, etc.

173 (Siraa, 1989, pp. 26–27).

By 1971 the neighbourhood had a high rate of elderly inhabitants[174] and from the 1980's, they started to make way for an immigrant population. It entered the new millennium as a little-known and unloved housing block.

6.4.4.1 Reconstruction and urban renewal in post-War Amsterdam

The post-War Reconstruction of the Netherlands initially focussed on the construction of new dwellings. In Amsterdam the AUP, already approved before the War, was the most important spatial tool in steering the city's expansion.

The Dutch post-War reconstruction initially focussed only on the repair of war-damage and new-build urban expansion. Consequently, the nation's city centres decayed and demolition and rebuild schemes commenced in historic centres in 1963. The 1969 *Nota Stadsvernieuwing* (Urban Renewal Policy) refocussed attention on inner-cities and stimulated restructuring and upgrade through demolition and a complete re-invention of existing infrastructure. Amsterdam became the *Mecca* of Dutch urban renewals.

These dramatic interventions in peoples living environments led to civic protest. In Amsterdam matters came to a head on 24 March 1975 when the city instructed a force of 800 police officers to clear *krakers* (squatters) from the inner-city Nieuwmarkt area.[175] A running battle ensued. This dramatic day heralded shift towards a bigger voice for residents in redevelopment plans. The loss of urban identity as result of the large-scale urban restructuring projects also mobilized a conservation movement in support of civic opposition movements. In the midst of the urban renewal process of the late 1960s, the city decided to create an inventory of conservation-worthy buildings, for protection under the 1961 Monuments Act. A special commission, under the leadership of Dick Dooijes (hence its name Commission Dooijes) was established in 1967 to systematically identify, assess and propose buildings older than 50 years for listing.[176] As demolition was not a viable option for listed municipal and national monuments, by 1973, subsidies were being made available to renovate listed urban monuments and ensembles.[177] This did not, however, turn the general modernising tide.

174 (Sociale Wijkopbouworgaan "Landlust-Bos en Lommer" i.o., 1971, p. 12).

175 In 1966 this area had also been at the center of civic unrest when builders revolted against a proposal to reduce their vacation-payouts.

176 The commission was active until 1979. (Wijndelts, 2003), however, notes the dates 1968–93.

177 (Van Dun, 2004).

Continuity through change was coming to be seen as a way to keep the historic city relevant and useful. The closing conference of the 1975 European Architectural Heritage Year, with as theme *A Future for our past* was hosted by civic conservation societies in the Netherlands. The highlight of the event was the adoption of the Declaration of Amsterdam. The declaration presented principles for integrated conservation, which focussed in the main on the continuity of larger scale urban morphology through a process of 'dynamic conservation.'[178] The national *Nota Stadsvernieuwing* (Policy on Urban Renewal) of 1977 took this approach further, providing subsidies for urban renewal. This national policy established planning and programming cycles for housing maintenance and upgrades.[179] The focus of urban renewals policies remained on historic inner-city centres, for now. The 1981 version of the *Nota Stadsvernieuwing* explicitly stated that: "Houses, buildings, streets, canals and squares of cultural-historical value are continually found in the oldest parts of the city."[180]

Urban conservation had become an inseparable aspect of urban renewal when the 1985 law *Wet op Stads- en Dorpsverniewing* (City and Town Renewal Act) made public money available to urban regeneration according to a formula, which included the so-called *historische factor* (historical factor). This meant that areas with historical value would receive higher subsidies than other neighbourhoods. The historical factor weighted the subsidy according to the number of monuments in a neighbourhood and the number of pre-War dwellings and rental houses predating 1931.[181]

Following on the 1985 Wet op Stads- en Dorpsverniewing, the next step towards acknowledging the heritage value of the entire urban landscape was the 1991 *Beleid voor Stadsvernieuwing in de Toekomst* (Policy of Urban Renewal in the Future, BELSATO). BELSATO was initially a limited period programme, butr was converted to a programme with an indefinite timeframe in 1995 further supported by the *Nota Stedelijke Vernieuwing* (Policy on City Renewal) of 1997. This latter policy further institutionalized urban renewal processes with a focusing on the metropolitan scale and made remodelling the social composition of the extant urban areas possible through either building renovation or demolition and new-build. One of the main ambitions of this policy was to increase the level of dwelling differentiation in Dutch housing.[182]

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178 (Kuipers, 2015).

179 (Ministerie van Volkhuisvesting Ruimtelijke Ordening en Milieubeheer, 2002).

180 (Beelaerts van Blokland, 1981, p. 11).

181 (Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer, 1997, p. 46–47).

182 (Clarke, 2016 p. 57).

Dwelling differentiation was mooted as a strategy for improving urban vitality since at least the 1950s when the subject was already debated in the Dutch Parliament[183] and remained an ideal when renovating public housing projects and in urban renewal processes. The aim was quite simply to provide a greater mix of housing types in areas. It was a direct reaction to pre- and post-War housing provision, driven by a severe lack of housing and limited economic means which led to huge numbers of dwellings being realised as Existenzminimum dwellings.[184] Despite much criticism of the potential negative impact of dwelling differentiation—especially at the end of the 1970s[185]—the ideal of differentiation has remained en vogue for half a century. The restructuring of neighbourhoods went further than only typological changes. Whole neighbourhoods had to be approached in an integral manner, and the 1997 Nota Stedelijke Vernieuwing sought to stimulate innovation in the construction sector, sustainable renovation, improved dwelling management systems, connectivity and densification of functions.[186] The *Wet ter Stimulering van Integrale Stedelijke Vernieuwing* (Law for Stimulating Integral Urban Renewal) of 2000 provided subsidies to large Dutch cities for urban renewal to counter unemployment, poor housing quality and divestment.[187] These strategies mostly aimed to improve low-rental neglected areas with high rates of unemployment and inhabited by single-person households.[188]

After WWII, general awareness of public health issues and environmental conservation were slowly increasing. The general population became aware of the dangers and consequences of combustion causing acid rain and one of the dangers to public health in older buildings: concealed asbestos. That asbestos could be detrimental to human health was already known in the 1930s. Asbestosis was identified as an occupational disease in Great Britain by ERA Merewether in 1930.[189] In the Netherlands Jan Stumphius proved in 1969 that asbestos could lead to a deadly cancer of the lungs or peritoneum, and called on the Dutch government to take action.[190] Applying asbestos insulation in the form of a spray was banned by 1978. The use of asbestos in construction was banned in 1993. A complete

183 (De Jonge, 1954, p. 16).

184 (De Jonge, 1954, p. 16).

185 See for instance (Meijer, 1979); (Patijn, 1976) & (Stuurgroep Huisvesting alleenstaanden en tweepersoonshuishoudens Amsterdam, 1978).

186 (Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer, 1997, p. 52); (ECORYS Nederland, 2006, p. 11).

187 (Overheid.nl, [s.a.]c.)

188 (Ministerie van Volkhuisvesting Ruimtelijke Ordening en Milieubeheer, 2002, p. 45).

189 (Merewether, 1930).

190 (Stumphius, 1969).

asbestos ban in all economic sectors followed with the *Productbesluit Asbest* (Asbestos Product Decision) law of 2005,[191] and the *Asbesteverwijderingsbesluit* (Asbestos Removal Decision) law of the same year.[192] Asbestos had gone from wonder-product to the enemy of the people. It became a headache for owners of existing buildings.

The 1979 energy crisis served to enforce the conclusion of the *The Limits of Growth* report of the Club of Rome, published in 1972.[193] At the same time acid rain caused by industrial pollution came to public attention in Western Europe through the efforts of German scientist Bernhard Ulrich. The publication of his team's findings on the *Chemical changes due to acid precipitation in a loess-derived soil in Central Europe*,[194] concluded with the spectre of *Waldsterben* (forest death): the death of European forests within five years, unless drastic measures were taken to reduce air pollution. The spectre of waldsterben galvanised popular imagination and became a call to action.

Public rallies were organised.[195] Many European countries took quick action to reduce air pollution; the Dutch in 1984. The emissions of sulphuric oxide had to be reduced by 70%, nitrogen oxide by 30% and ammonium emissions were to be halved by the year 2000. A public awareness campaign *Stop zure regen* (stop acid rain, including posters with slogans such as *Zure regen. Onze eigen schuld. Onze eigen zorg* (Acid Rain. Our own fault. Our own care) ensued.[196]

Energy use reduction became one of the aims of renovations and from the mid-1980s subsidies were granted to rental housing landlords to insulate their building stock.

191 (Overhied.nl. [s.a.]a).

192 (Overhied.nl. [s.a.]b).

193 (Meadows & Rome, 1972).

194 (Ulrich, Mayer, & Khanna, 1980).

195 (De Vries, 2019).

196 (Breed, 2019, p. 16).

FIG. 6.22 The AWV housing at Landlust, the Charlotte de Bourbon Street façade with aluminium window frames to both apartments and stairwells (A Holslag, 6 March 1992; SAA. NWS00019000023).

Examples include the *Ministerie van Volkhuisvesting Ruimtelijke Ordening en Milieubeheer* (Ministry of Workers Housing, Spatial Planning and Environmental Control), 1984 MG 84-36 subsidy for energy-reduction and the 1986 MG 86-32 subsidy for insulation of privately-owned rental housing.[197] These subsidies also aimed at reducing emissions from combustion of fossil fuels to combat acid rain.[198]

Such was the public awareness of the impacts of energy use on air quality amongst the general Dutch population that the resultant national *kierenjacht* (the hunt for cracks and chinks) became the subject for popular satire. The ever-popular Van Kooten & De Bie broadcast a sketch where opinionated protagonist Cor van der Laak tapes over all manner of gaps, including the opening between the fence and the garden gate, with duct tape, while postulating about the energy-savings this would achieve (all this, while his wife watches from an open front door…).[199]

197 (Gemeentelijke Dienst Volkshuisvesting, 1988, s.n.).

198 (Kingdom of the Netherlands, 2001).

199 (Movieking149, 2007).

1 2

FIG. 6.23 Satirical character Cor van der Laak (actor Kees van Kooten) taping over a mail slot, and highlighting the gap between a rainwater downpipe and house wall, soon to be taped over in an overzealous attempt to reduce energy use (Movieking149, 2007).

6.4.4.2 The 2E+Co of the gradual evolution

Technological advances during the Versteeg-designed AWV housing at Landlust's first life cycle mostly remained hidden from sight; the most dramatic changes made were upgrades to the block heating boiler-infrastructure, which in response to improved technology and access to new energy sources underwent its own gradual evolution. The heating system in the double-basement was initially coal-fired, which required a rather cumbersome and dirty process of delivery, storage, feeding and after combustion, removal of ash. Gas replaced coal in the mid-1960s[200] and the coal-bunker lost its function. But this only affected the heating installation in the second basement. The heating delivery installation in the building and the dwellings was not changed.

In response to the energy crisis of the late 1970s and early 1980s, the building was subject to a round of window replacements in 1984 when new double-glazed aluminium windows were installed,[201] possibly afforded through the 1984 MG 84-36 subsidy for energy-reduction. This window replacement was directly financially beneficial to the AWV by reducing the block's heating load and cost. This was the

200 (Van der Tol, 2009).

201 To the design of architects H Franco, BNA and J van der Tol, in collaboration, commissioned by the AWV Amsterdam. Project no. 18284. Digital copies of drawings from archive (Archivolt B.V. [s.a.]a). The windows of the Het Westen Merkelbach & Karsten block were replaced in 1990. ('Notitie t.b.v. overleg Dir.BWA/Hfd. Bureau Monumentenzorg.' [02 December 2012]; SAA: 2009, BMA 2009.389).

only large-scale upgrade to the project until 2007. During this period of gradual evolution, general maintenance and ad-hoc upgrades in the form of so-called *klein onderhoudsbeurten* (small maintenance events) were continually undertaken, often implemented just before new tenants moved into apartments.[202] This led to light fitting replacements and sometimes even new kitchens installed and sanitary facilities upgraded, etc.

The gradual evolution of the complex between 1938–2007 brought about a limited number of 2E+Co mutations (Table 6.1).

TABLE 6.2 Drivers for energy upgrades over the first lifecycle of the AWV block at Landlust.

Aspect	2E+Co driver	
	Primary	Secondary
Skin: Insulation (Thermal), doors and windows upgrade	Economy Energy Use	Comfort
Services: (Heating installation)	Economy Energy Use	
Stuff	Comfort	

6.4.5 Reflective observation

Despite its innovative character, the larger Landlust project did not attract much commentary until the early 1980s. It may well be that the project was exhibited at the 1937 World Exhibition in Paris where, amongst others, "…B Merkelbach en Ch J F Karsten… G. Versteeg, P Vorkink" were awarded gold medals. The medals were notably awarded in the category Architecture even though there was also a category for Urban Design.[203] Due to their unique association at Landlust, it is unlikely that these medals were for anything else than the Landlust housing projects. The three Landlust housing projects were included in the publication *Beter Wonen* to celebrate the 25th anniversary of the *Nationale Woningraad* (National Housing Board) in 1938 (although the Vorkink and Versteeg floor plans had been switched in this

202 What is referred to in the Netherlands as *bij mutatie* or at the moment of mutation.

203 'Stedebouw'. (s.n., 1937) The biographies for Merkelbach are mute on this award. This is especially curious seeing as Van Tijen, who wrote an obituary for Merkelbach in 1961 and mentioned his many achievements was also a recipient of a gold medal at the Paris World exhibition in 1937 (Van Tijen, 1961). It may be that these Gold Medals were not thought of as being prestigious?

publication).[204] Of course WWII brought great social upheaval, but like the rest of Amsterdam, Landlust survived WWII physically unscathed and grew into middle age.

The first post-WWII discussion of the Landlust housing projects was penned by Willem van Tijen who wrote an overview of Ben Merkelbach's oeuvre in 1956. Van Tijen derides Merkelbach & Karsten's housing project at Landlust (and by association that of Versteeg and Vorkink's) as no more than an example of the "sober cheap masonry and timber construction of those times."[205] A couple of years later in 1961, Van Tijen was to author an obituary for Ben Merkelbach, in which he presented the only merit of the Landlust urban design and the Merkelbach & Karsten housing project to: "…the fearless acceptance of the miserable social and architectural reality of the thirties while, concurrently, breaking through in a direction of openness and humanity."[206] Van Tjien omitted the contributions of Arie Keppler, Bureau Versteeg and Pieter Vorkink, possibly due to an association with the Amsterdam School, and what he refered to as its "…worthless formalist obsession",[207] but rather curiously made personal mention of a contribution of Cornelis Van Eesteren to the zeilenbau urban design.[208]

By 1970, interest in so-called younger monuments of the period 1900–40 was awakened by an article in the journal *Plan* presenting a list of important architectural works from this period, that included the Merkelbach & Karsten housing at Landlust, but failed to mention the buildings by Bureau Versteeg or Vorkink. Both Van Tijen's and the *Plan* article incorrectly the zeilenbau urban design to Van Eesteren.[209] The contribution of Van Eesteren's Section for Town Planning to the zeilenbau variant of Plan Landlust was to revise the design, resulting in overly-long buildings blocks.

The contributions of Versteeg jr and Vorkink at Landlust were soon near-forgotten. No overview of the life or works of Versteeg jr was ever published. Tracing his career post-WWII has also proven to be rather difficult. No work by Bureau Versteeg dating from after WWII has yet been identified and the Bos en Lommer housing project, which replicated the Landlust prototype, may very well have been the practice's

204 (Van der Wal, 1938, p. 112).

205 "…de nuchtere goedkope metsel- en houtbouw van die dagen…" (Van Tijen, 1956a, p. 347).

206 "Het vreesloos aanvaarden van de armzalige sociale en bouwkundige werkelijkheid van de jaren dertig en het toch doorbreken daarvan in de richting van openheid en menselijkheid." (Van Tijen, 1961, p. 1399).

207 "…waardeloze vormverlangen van de nadagen van de Amsterdamse school." (Van Tijen, 1961, p. 1399).

208 (Van Tijen, 1961, p. 1399). It was in fact the Section for Town Planning under Van Eersteren that had composed the 1931 perimeter block design: a detail Van Tijen either willingly oversaw or was unwilling to acknowledge.

209 (s.n., 1970, p. 270).

last. At some point during or after the war Versteeg entered public service. It is curious that not more has been published about him or his career, especially as he was listed living in The Hague in 1968 as retired former Chief Architect of the *Rijksgebouwendienst* (National Public Works Department).[210]

6.4.5.1 Valourisation

In 1980–81 the *Subcommissie voor de Jongere Bouwkunst* (subcommittee for younger architecture) of the national *Monumentenraad* (Monuments council) designated the Landlust ensemble as 'evident monument' of *jongere bouwkunst* but it was not listed as national monument because it had not reached the minimum age of 50 years, then required by law for protection. Working chronologically, the Commission Dooijes had reached the 1930s and assessed the Landlust neighbourhood. The Commission recommended that the former AWV building block be listed as municipal monument. But the Commission's recommendation was in part due to an error. Despite quite obvious differences between the AWV and Het Westen complexes, the Commission mistakenly combined the AWV block together with the Het Westen building. The authorship of this Gerrit Versteeg jr designed portion of Landlust was ascribed to Merkelbach & Karsten and was promptly recommended for municipal monuments status.[211]

The motivation for listing of the AWV (along with the Het Westen housing) complex at Landlust was to the point. It was, quite simply put "… for the 1930s, [a] successful example of functional strip building, where the garden and the building block take in the same position with relation to the street."[212] The Commission's description of the AWV block omits a number of important aspects, such as the arcade and the way in which it gave the garden-side access to basement storage units and stairwells, and the second basement containing a block heating plant for the whole Versteeg-designed complex. The erroneous association with Merkelbach seems to have been decisive in the Commission recommending that the building should be listed as Municipal Monument.

210 "Oud-hoofdarch. Rijksgeb.dienst. Rijksgebouwendienst" (Koninklijk Instituut van Ingenieurs, 1968, p. 581).

211 (Commissie Dooijes (Gemeentelijke Monumentencommissie Amsterdam), 1981). A correction is pencilled in on the card, indicating that it was in fact constructed by the AWV: the note reading: *Behoort bij Alg.*

212 "Een voor de jaren dertig geslaagd voorbeld van functionele strokenbouw, waarbij de tuin en de bouwstrook de zelfde ligging ten opzichte van de straat innemen." (Commissie Dooijes (Gemeentelijke Monumentencommissie Amsterdam), 1981).

GEMEENTELIJKE MONUMENTENLIJST VAN AMSTERDAM

adres Willem de Zwijgerlaan 329; Louise de Colignystraat 1 t/m 53; Bestevaerstraat 230 t/m 222; Charlotte de Bourbonstraat 70 t/m 2.

kadastrale aanduiding *sectie*
gemeente Amsterdam *nummer*

situering Complex arbeiderswoningen in het uitbreidingsplan "Landlust", bestaande uit een aantal lange, eenvormige bouwstroken (z.g. strokenbouw).

typering Er zijn twee bouwstroken te onderscheiden: a) Willem de Zwijgerlaan 331; Juliana van Stolbergstraat 1 t/m 51; Bestevaerstraat 238 t/m 232 Louise de Colignystraat 54 t/m 2. b) Willem de Zwijgerlaan 329; Louise de Colignystraat 1 t/m 53; Bestevaerstraat 230 t/m 222; Charlotte de Bourbonstraat 70 t/m 2.
b) Louise de Colignystraat 1 t/m 53 bestaande uit vier bouwlagen opgetrokken in gele baksteen onder plat dak met overstek. Per trappenhuis acht woningen. De glas-in-staal ramen vormen grote glasoppervlakken in de wanden (licht-en luchtfilosofie). Boven de houten voordeur met stenen afdak het glas-in-staal trappenhuis, waarvan de structuur van buitenaf goed zichtbaar is. Het trappenhuis geeft een verticaal accent aan de eenvormige, horizontale geleding der bouwlagen. Aan de achterkant zijn stalen balkons, die de mogelijkheid geven om de kijktuin te overzien. Charlotte de Bourbonstraat 2 t/m 70 is identiek. Bij het poortgebouw aan de kant van de Willem de Zwijgerlaan inspringende hoekbalkons. Dit poortgebouw met stalen balken en vier dragende kolommen verschaft onderlinge doorgang tussen de straten. Ter afsluiting van de bouwstrook lage winkelhuizen onder schilddak. Bestevaerstraat 222 t/m 230 omvat vijf woningen

opmerkingen met alleen begane grond, opgetrokken uit gele baksteen onder schilddak. Deze huizen vormen de begrenzing van de kijktuin en staan haaks op de bouwstroken geprojecteerd. In het midden een ingang naar de kijktuin.

motivering Een voor de jaren dertig geslaagd voorbeeld van functionele strokenbouw, waarbij de tuin en de bouwstrook dezelfde ligging ten opzichte van de straat innemen.

architect/bouwkundige B. Merkelbach i.s.m. Ch. Karsten

bouwjaar/periode 1933-1936

opdrachtgever Woningbouwvereniging "Het Westen" Amsterdam

bestemming – *oorspronkelijke* gestapelde woningen
– *huidige* "

bescherming – *betreft de gehele kadastrale eenheid*
– ~~onderdeel~~

beschrijving d.d. 3 juli 1981

FIG. 6.24 The 1981 Dossier Card of the Commission Dooijes, in which the AWV Versteeg complex is attributed to Merkelbach & Karsten architects (Commissie Dooijes, 1981).

The block was only listed as Municipal Monument in 1983, during a period of renewed (architectural) public interest in the Dutch Modern Movement stimulated by a number of key exhibitions and publications contributed to. From 1982, when Donald Grinberg published his *Housing in the Netherlands, 1900–1940*[213] the larger Landlust project slowly started receiving more, though not always accurate, attention. The Landlust project was included in an exhibition during the first half of 1983, which formed part of a larger programme at reassessing the legacy of the Dutch Modern Movement, Het Nieuwe Bouwen. The Amsterdam section of the project resulted im an exhibition entitled 'Het Nieuwe Bouwen, Amsterdam 1920–1960' at the Stedelijke Museum Amsterdam. The exhibition was accompanied by a catalogue, which presented the project as important from an urban design perspective, mentioning that G Versteeg and P Vorkink also designed housing there in passing, and illustrated the urban plan and the Merkelbach & Karsten complex.[214] The exhibition ran from 11 March to 1 May 1983 and on 08 July of the same year,

213 (Grinberg, 1982, p. 126). While Grindberg notes the influence of the Bergpolder project on the Versteeg entry for the 1933 Amsterdam affordable housing competition, he fails to make the distinction between father Gerrit (who was an adjudicator) and son Gerrit, whose entry is included in Grindberg's publication.

214 (Bosma & Andela, 1983) also don't make a distinction between father and son Versteeg.

the AWV complex (still attributed to Merkelbach & Karsten) was inscribed by the city of Amsterdam as municipal monument.[215] The Vorkink block received no conservation protection.

It would not be unfair to say that the whole of Landlust has a history of confusion regarding the authorship of the individual components. A photograph of the interior of the Versteeg-designed AWV building was published in 1975 as being of the Het Westen building designed by Merkelbach & Karsten.[216] The 1985 book *70 jaar Beter Wonen 1915–1985* swopped the Vorkink and Versteeg floor plans of the Landlust project.[217] Even the former Rijksdienst voor de Monumentenzorg erred in this manner, where in a pamphlet entitled *Volkswoningbouw, 1850–1940*, the Versteeg block with its balconies, "…in cases running the full length of the façade and with vertically alighted airing cupboards" was again credited to Merkelbach & Karsten.[218] Still, the adage 'there is no such thing as bad publicity' meant that further awareness was created by the project's inclusion in standard architectural guidebooks of Amsterdam.[219]

6.4.6 Learning Cycle 1: Actor Factor Set Ecosystem

The social-economic conditions and political atmosphere in the Netherlands, but Amsterdam specifically, after WWI were greatly determinant in the genesis of the AWV block at Landlust. The Socialist movement in Amsterdam was a determinant factor. This Macrosystemic paradigm was greatly influenced by the idea of progress. It is in this context in which the AVW complex at Landlust was conceptualized and further developed. Progress relied on innovation, rather tempered by a sense of responsibility than by reticence.

The application of zeilenbau at Landlust was often portrayed as a break-through in the face of opposition: a classic event-based history (*histoire événementielle*). When reappraised through the lens of the *longue durée*,[220] it becomes the consequence

215 (Commissie Dooijes (Gemeentelijke Monumentencommissie Amsterdam), 1981).

216 (Prak, 1972, p. 32).

217 (Hameleers & Ruyters, 1985, p. 112).

218 "… balkon (soms over de volle breedte en onderbroken door vertikaal gekoppele droogkasten)" (Hekker, [s.a.]).

219 (Groenendijk & Vollaard, 1996), first published in 1987.

220 As posited by Fernand Braudel, who proposed a history emergent from large scale socio-economic factors. (Braudel & Wallerstein, 2009).

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of a well-considered decision, influenced by urgency, past experiences and developments and a shared appreciation amongst decisionmakers of the potential this then new urban typology might hold. May's Frankfurt Siedlung is an important Exosystemic factor in the urban conceptualization of the Landlust project as was the much-publicized Frankfurter Kitchen. Closer to home the influence of the successes of the projects and innovations in the commercial housing developments by Van Saane should not be underestimated.

The 1933 Amsterdam housing competition was an important learning moment in that it provided the opportunity to develop and reflect on new ideas, many of which, such as zeilenbau were already commonly appreciated, if with reservation on the long-term effects. The construction of the AWV Landlust complex became a natural extension of this competition, which should be seen as an important Exosystemic factor in the genesis of the complex.

Economy, especially the subsidy system, was definitive in the genesis of the AWV Landlust complex. Low steel prices were specifically mentioned by Versteeg, as was the *Rijksvoorschot* (national loan system). The search for a balance between comfort and the dignity it brought inhabitants, and construction- and home economy, led to interest in technical developments. At the AWV, Versteeg jr's technical expertise served the *Existenzminimum* ideal well. This technical expertise and interest in acoustic and thermal matters was sourced in an ecology of ideas, many of which were academically formulated at the Delft Institute of Technology where Versteeg received his architectural education.

The high level of affordable comfort provided by the Versteeg prototype constructed at Landlust, was not achieved at the Bos en Lommer replication, due to changes in subsidy regimes made in the Exosystem. The evolution of the AWV complex during its first lifecycle was marked by economy, notably further subsidy decisions. The changes to the heating installation were an economic decision related to cost of fuel and manpower. The subsidies, such as the MG 84-36 subsidy, were in response to attitudes and ideologies of culture, seated in the Macrosystem. Subsidies for building renovation were notably the reaction to the economic consequences of the energy crisis of 1979 and the spectre of acid rain in the early 1980s. The resultant subsidies brought about an evolution of the skin of the building.

The valourisation of the complex was the result of the evolution of the Exosystem: the reaction to the urban renewal projects of the 1970s and 1980s and the changes these had on the Macrosystemic appreciation of the architecture and urban design of the twentieth century. A common misconception regarding the Versteeg designed housing is that it was 'traditional' leading to it being lumped in with its Landlust

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contemporaries.[221] Yet the Versteeg jr project set itself apart with what lies under the skin–the skin being the resultant expression of a pure Modern Movement rational technology-driven process and not an aesthetic desire. The skin-deep mistake made by the Commission Dooijes in 1983 when ascribing the Bureau Versteeg blocks to Merkelbach or Merkelbach & Karsten is not surprising in the light of the lifelong dominance of Ben Merkelbach in architecture and urban history, not only in Amsterdam, but also in the Netherlands in general. It became a relative common occurrence to identify the three blocks as one project.[222] In turn the predominance of Van Eesteren in the architectural historiography of the Netherlands has meant that the Landlust project was attributed to him as well,[223] which has further added to the protection of the Landlust AWV housing block.

6.5 Learning cycle 2 (2007–>)

The 70-year period of concrete experience from 1938–2007 saw the Versteeg-designed building at Landlust providing affordable and efficient housing for working class tenants, with success. This is evidenced by limited changes being made to the building over this time. One probable explanation for the low rate of maintenance and upgrade interventions is the high technical resolution of the building and the progressive levels of comfort provided the inhabitants by the block heating and, for housing of its time, an unusually high level of envelope insulation of the building when completed.

After 70 years, the usual defects had developed for example in Complex no. 1173: it did not comply with contemporary comfort, [fire-] safety and energy norms, and the lack of dwelling differentiation was seen as a problem.[224] After 70 years of indoors-comfort increases in Dutch housing and with a maintenance backlog, the building inhabitants' complaints were to be expected: draughts, noise nuisance from upstairs

221 (Groenendijk & Vollaard, 1996, p. 38).

222 See for instance, (Van Tijen, 1961). (Bakker et al., 1992) only mentions Merkelbach and Kasten while illustrating the entry with a photograph of the Versteeg block. (Wattjes & Warners, 1944, p. 332) lists it as by "G. Versteeg (†)", an incorrect reference to only G Versteeg senior, negating the role of the son, as does (Komossa, 2010, pp 184–87), likewise does not mention the contribution of Versteeg jr.

223 See (Molema, 1996, p. 56–57).

224 (Archivolt B.V., 2012, p. 1).

neighbours, and a rat, mouse and pigeon infestation. Added to this were the new problems of dampness and fungal growth brought about by the energy-reduction-focussed 1984 window installation, which had decreased the natural ventilation of the dwellings, increased humidity and created the ideal conditions for fungus to thrive.

At some point after 1992 the project was transferred from the AWV to the Woonstichting Eigen Haard.[225] At Eigen Haard the complex received the name Complex no. 1113, later renumbered to Complex no. 1173. Both owner and tenants were feeling the pinch of increased energy costs,[226] in part due to raised comfort norms, which had progressively grown since the project was completed seventy years before. The building was, by now, almost exclusively inhabited by an immigrant population. Twenty-one different home languages sounded in its apartments.[227] A number of social problems became manifested in the now cramped and out-dated dwellings in what had become a "problem neighbourhood".[228]

6.5.1 S•E•T

The societal concern that the fossil fuel industry was leading to unwanted side-effects did not abate and continued to influence national policy. In 1989 the first *National Mileubeleidsplan* (National Environmental Policy Plan, NMP1) was implemented, identifying 'a strong increase in fossil fuel use' as one of the four key problems it aimed to address. The solution: energy reduction. The subsequent MNP2, 3 and 4 expanded the aims of the policy to, in the NMP2 (1993) to create conditions that would stimulate stakeholders to take full responsibility, and in the NMP4 acknowledging environmental vulnerabilities as a global problem.[229]

The effects of these various policies were becoming visible in changing the image of Dutch cities: by now much of the Amsterdam Ring '20–'40 had received at least one round of upgrades, which in most cases had led to the replacement of single-glazed timber framed windows installation with double-glazing in aluminium window-frames. Conservationists decried the visual impact.

225 (Paulen et la.,1992) still list the project as belonging to the 'De Algemene'.

226 Personal communication, project architect Frederike Kuipers, 21 March 2016.

227 Personal communication, Cees Stam, manager: Renovation and Large-scale Maintenance (Renovatie en Groot onderhoud). Woonstichting Eigen Haard. 17 March 2016.

228 "Probleemwijk" (Van der Tol, 2009).

229 (Milieufocus, 2008).

In an attempt to undo the far-reaching visual damage, the result of subsidized energy-savings and comfort-improving interventions, Amsterdam created yet another subsidy in 1990 to stimulate building owners to reinstate historic details during maintenance or maintenance projects. The *Beter Verbeteren* (Improved Improving) subsidy made funds available specifically for the city's nineteenth and early-twentieth-century neighbourhood, including the Ring '20–'40; effectively the Hulshoff, Gratama & Versteeg Plan West. The aim was to maintain and restore the architectural qualities of these neighbourhoods. Until the year 2000, individual building owners were free to apply for this subsidy, which would assist them financially to restore the brickwork and pointing in building façades or replace aluminium windows with new timber framed double-glazing that mimicked the original. A supervisor was appointed by the city to assess projects and engage building owners and architects.[230]

Following on the MIP, the *Monumenten Selectie Project* (Monuments Selections Project, MSP) commenced in 1991.[231] Through the MSP so-called 'younger' buildings and ensembles were recommended for listing as national monuments.

The MIP and MSP had put the pre-War areas on the conservation-map. In 1999 the city monuments care department concluded that for these areas "…repair of the original situation and the underlying principles [was to be aimed for], so that the public space, including the public-communal garden, as well as the architecture, can radiate the powerful mutually enhancing image of yesteryear."[232]

As a continuation of the MIP and MSP, Amsterdam's monuments care department compiled *waarde kaarten* (municipal value maps) for the Ring '20–'40 (the product of twelve years of research). It published these valuation maps in 2000. In these maps each individual building was given a grading category, based on the City's *Nota Welstandsbeleid in de Gordel '20–40'* (Policy Guideline for the Ring '20-40') to aid the city's *Commissie voor Welstand en Monumenten* (Commission for Aesthetics and Monuments). The policy presented specific architectural guidelines regarding for instance, replacement of windows, visible ventilation elements and the maintenance of the typical Amsterdam rooftop lifting beams.[233] In the policy note, Category I

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230 (Bolhuis et al., 2000, p. 39–40).

231 (Monumentenzorg, 1991).

232 "…herstel van de oorspronkelijke situatie en het daaraan ten grondslag liggende gedachtengoed, dat zowel de openbare ruimte, inclusief de semi-openbare gemeenschappelijke tuinen, als de architectuur weer het krachtige, elkaar versterkende beeld van weleer uitstralen." (Bureau Monumentenzorg Amsterdam, 1999).

233 (Bolhuis et al., 2000, p. 58–61).

[the highest] was reserved for formally listed national monuments, or buildings in the process of being listed. The designation as Category III level and lower was a planning tool that aimed at urban morphological control. In short, category III buildings could be demolished, but the new buildings were to mimic the pre-existent urban morphology, proportions, material, size, detailing and colouring.[234]

From 2000 onwards the Beter Verbeteren subsidy was reserved for specific pre-defined urban renewal areas. Individual boroughs could nominate projects for the subsidy, which would be granted after evaluation of the Commissie voor Welstand en Monumenten.

All the while, the number of energy-savings related subsidies, including innovation subsidies, increased along with the growing public awareness of the environmental impact of human activities. The Ministry of Economic Affairs announced the *Unieke Kansen Regelin*g (Unique Chances Arrangement, UKR) subsidy programme in 2004, which aimed to stimulate innovation in *duurzame energiehuishouding* (sustainable home energy use) through innovative combinations of biomass; new gas/clean fossil fuels and efficient use of gas; and an increase in industrial energy efficiency.[235]

The approach to public housing provision was also constantly evolving: a milestone was the adoption in 2000 of the national *Nota Mensen Wensen, Wonen* (People, Wishes, Living Policy), which outlined national policy for ten years and providing a vision for the extended future. An important aspect of this policy was a deliberate shift in ambitions for housing: the focus shifted from quantity (housing) to quality and living experience. The Nota Mensen Wensen, Wonen put inhabitants and their wishes central to decision-making, aiming to developing a housing stock that offered people freedom of choice in combination of energy use reduction by combining market forces with central policy. This policy also stimulated dwelling differentiation, to also accommodate vulnerable individuals.

6.5.1.1 Further valourisation fumbles…

From the mid-1990s onwards, the wider public was enlightened on the significance of the Landlust zeilenbau neighbourhood through the popular press as an important legacy of Het Nieuwe Bouwen under the banner of “light, air and space”.[236]

234 (Bolhuis et al., 2000, p. 59).

235 (Minister van Economische Zaken, 2004, Article 3).

236 (Herweijer, 1995).

The Landlust zeilenbau development, including the AWV and Labor blocks, was identified as a *Gebied met Bijzondere Waarde* (an area of distinct cultural historical value)[237] as part of the MIP.

The MIP publication on Amsterdam ignored the Vorkink and Versteeg contributions even if Landlust is illustrated with a photograph of the AWV block. Curiously the description spoke of steel-framed glazing in both windows and stairwells of the AWV building, despite the accompanying photographs clearly showing the much thicker white aluminium frames.[238]

The subsequent municipal *Monumenten Selectie Project* (MSP) recommended that the Landlust zeilenbau (including all three housing complexes) be declared a National Monument; a recommendation which has to date never been implemented. Here again, the AWV project was erroneously attributed to "Merkelbach, B en Ch. Karsten".[239]

In 1999 the *Bureau Monumentenzorg* (BMZ, at the time the Amsterdam municipal monuments care section) concluded for the Landlust zeilenbau area that:

"…the key question of how to deal with this important legacy, which will soon be listed as a National Monument, can in fact only be answered with a 'high-road' approach that is above all aimed at restoring the original situation and the underlying ideas in such a way that both the public space, including the semi-public communal gardens, and the architecture once again radiate the powerful, mutually reinforcing image of yesteryear. It should be an honour to be able to live in Landlust, and that is essentially where the challenge lies…"[240]

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237 (Bakker et al., 1992, p. 79).

238 The photographer was Hans van Gool (Bakker et al., 1992, p. 79).

239 (Momumenten Inventarisatie Project, s.n.)

240 "De hamvraag hoe nu met deze belangrijke en binnenkort als Rijksmonument te boek staande erfenis om te gaan kan volgens BMZ eigenlijk alleen beantwoord worden met 'heel hoog inzetten' op een aanpak die voor alles gericht is op een zodanig herstel van de oorspronkelijke situatie en het daaraan ten grondslag liggende gedachtengoed, dat zowel de openbare ruimte, inclusief de semi-openbare gemeenschappelijke tuinen, als de architectuur weer het krachtige, elkaar versterkende beeld van weleer uitstralen. Het zou een eer moeten zijn om in Landlust te mogen wonen en daar ligt in wezen de uitdaging." ('Bureau Monumentenzorg Amsterdam, 1999', p. 2. SAA: BMA.17879).

The BMZ also found that "A thorough inventory of the essential elements in the original design–ranging from the typical asymmetric street profiles to the slender steel profiles of the curtain walls in the Merkelbach building section–is indispensable for this, as is the listing of all conceivable restructuring, housing improvement, monument and Beter-Verbeteren subsidies.

In view of the existing housing size, the technical state of the housing and the desired differentiation, horizontal and/or vertical amalgamation are absolutely conceivable and probably even necessary to make the intended approach possible; of course, without this leading to elaborate solutions and clear changes in the façade appearance."[241]

In its description the BMZ acknowledged the contributions of De Graaf, Keppler, Vorkink and "architect G. Versteeg", but failed to make the distinction between the father and the son.

The following year the publication of the *Atlas Ring '20–40'* identified and listed the Landlust urban structure as being protection worthy. In the accompanying maps, the names of the designers were indicated in shorthand as "Vorkink 1937", "Versteeg 1937" and "Merkelbach 1937" (omitting Karsten). All were assigned the designation Order I buildings, a status that presupposes a restorative approach for any future façade renovations.[242]

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241 "Een grondige inventarisatie van de essentiële elementen in het oorspronkelijke ontwerp - variërend van de typische asymmetrische straatprofielen tot de ranke staalprofielen van de vliesgevels in het bouwdeel van Merkelbach - is daartoe onontbeerlijk, evenals het op een rij zetten van alle denkbare herstructurerings-, woningverbeterings-, monumenten- en Beter-Verbeterensubsidies.
Gelet op de bestaande woninggrootte, de woontechnische staat en de gewenste differentiatie zijn horizontale en/of verticale samenvoegingen zondermeer denkbaar en waarschijnlijk zelfs noodzakelijk om de beoogde aanpak mogelijk te maken; uiteraard zonder dat dit leidt tot gewrochte oplossingen en duidelijke wijzigingen in het gevelbeeld." ('Bureau Monumentenzorg Amsterdam, 1999'; SAA: BMA.17879).

242 (Bolhuis et al., 2000, Orderkaart 3). This map fails to include the municipal monuments status of the AWV and Het Westen blocks. The Vorkink complex remained (and still remains) unlisted as either municipal or national monument.

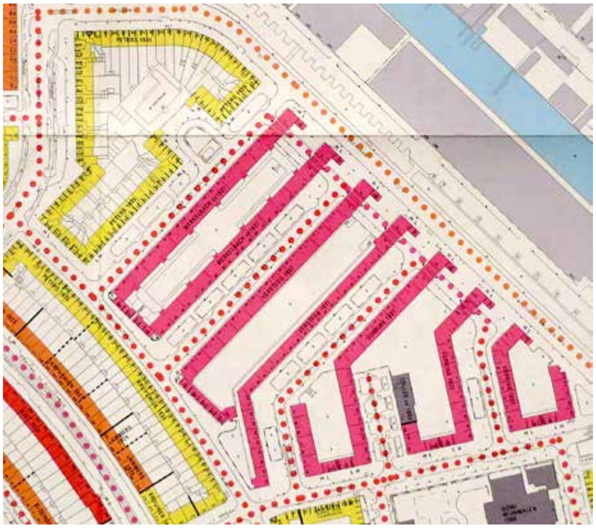

FIG. 6.25 Section of the 'Ordekaart 3' of the *Atlas Gordel '20-'40*, with pink indicating Order 1 buildings (Bolhuis et al., 2000, map insert).

The draft statement of significance in support of listing as a National Monument of the Landlust zeilenbau complex[243] typifies the dominating role of Merkelbach and Van Eesteren hold in the historical narrative today. Not only was the zeilenbau layout attributed to the initiative of Merkelbach alone,[244] whose idealism to achieve a better world and especially better public housing, it noted, was difficult to appreciate in 2007, when according to the author, the world is typified by cynicism and self-enrichment.[245] Versteeg sr was mentioned as having made a notable contribution to public housing, especially in Arnhem. His son was only mentioned in passing as possibly having contributed to the design of the AWV building and then further called "totally forgotten".[246]

The unnamed author of this statement could not imagine why the Versteeg-design had not included French balconies like the blocks of Merkelbach & Karsten and Vorkink had, but did not even consider that the progressive block heating system's

243 Contained in a decision of the BMA communicated to the architect Marloes van Haaren on 6 February 2009 ('Bureau Monumenten en Archeologie, 2009'; SAA: BMA.2009.17879).

244 "… came into being on initiative of Ben Merkelbach" ("kwam tot stand op initiatief van Ben Merkelbach…") ('Bureau Monumenten en Archeologie, 2009', p. 7; SAA: BMA.2009.384)

245 "Anno 2007, in een tijdperk van cynisme en excessieve zelfverrijking, is het moeilijk om het idealisme van een architect als Merkelback nog te doorgronden." ('Bureau Monumenten en Archeologie, 2009', p. 8; SAA: BMA.2009.384).

246 "Zijn zoon is inmiddels zelfs geheel vergeten." 'Advies Bureau Monumenten & Archeologie' [Advice 16732.102200912, 6 February 2009], 'Betreft Monumentenvoorinformatie, Louise de Colignystraat 37 t/m 39', pp. 7–8; SAA, BMA 2009.389.).

radiators mandated parapets under the living room windows. The author also laboured under the misconception that the Het Westen and Labor buildings were both also constructed using a steel skeletal structure and that the floor plans were significantly similar. In a surprising theory as to the reason for this supposed similarity, the author postulated that the idealistic altruistic Merkelbach–who incidentally, the document notes, set great score to collaboration–had unselfishly designed floor plans and structural system for Vorkink and Versteeg as well as for Het Westen! This remarkable argument continued to the kitchen and the back façade. The author praised the great attention that Merkelbach and his advisor Janzen had given to the kitchen for Het Westen, striving for a level of finesse and dismissed the AWV kitchen as demonstrating only the sobriety of the Amsterdam affordable housing of its day.[247] The continuous garden-façade balconies of the Versteeg design were, according to this reading, the result of a postulated inability of the architect to counter the will of their client. To add insult to injury the author further derides them by stating that Van Eesteren would have judged them as "banal"![248]

This author closed their remarkable assessment with the conclusion that the progressiveness of the entire Landlust urban design experiment was attributable to Merkelbach alone and that it was to him that the honour should go for having convinced the other housing associations and their architects to participate in achieving his enlightened vision.[249]

6.5.2 Abstract Conceptualisation

The *Nationale Woonbond* (National Housing Union) awarded Woonstichting Eigen Haard their annual *Zwarte Bokaal* (black goblet) award for the poor communication between Eigen Haard and its tenants in Amsterdam in 2005. This included the tenants in Complex no. 1173 at Landlust (the Versteeg designed former AWV building). In response to this clarion call, Eigen Haard undertook a feasibility study to sketch future scenarios for Complex no. 1173 in 2007. The investigation concluded that demolition of the block with reconstruction on the original footprint and in the original volume would be the most cost-effective solution. This strategy was then often applied in other urban renewal areas where the urban design was the reason of the cultural historical valuation of a neighbourhood, including other

247 ('Bureau Monumenten en Archeologie, 2009,' p. 8; SAA: BMA 2009.389).

248 ('Bureau Monumenten en Archeologie, 2009,' p. 9; SAA: BMA 2009.389).

249 ('Bureau Monumenten en Archeologie, 2009,' p. 9; SAA: BMA 2009.389).

AUP neighbourhoods like Slotermeer in Amsterdam.[250] However the feasibility study had to conclude that demolition was not viable because of the pending national monument status for the building.[251] The project stalled.

Soon after, in 2007, the European Foundation for Living (EFL)—a forum with a diverse membership that aims to create sustainable living environments—contacted one of their members, Eigen Haard with the request to undertake a joint pilot renovation project. The link was easily made, simply because the EFL shared the offices of Eigen Haard in Amsterdam at the time. [252] The EFL's ambition was to show that it was possible to renovate public housing for large energy use reductions, possibly even achieving *passivhaus* (passive house) standards. A Ministry of Economic Affairs subsidy, the *Unieke Kansen Regeling* (Unique Opportunities Scheme, UKR) offered the financial opportunity to make such a passivhaus renovation affordable. The UKR was structured along so-called 'main routes' with sub routes, called 'transition routes'.

A project team was brought together, which to meet the UKR requirements, included Eigen Haard, the EFL and EFL-member Van der Ley Contractors. To be considered for the UKR subsidy, the project needed to be designed to be replicable on a larger scale. Eigen Haard, was one of the largest housing corporations in the Netherlands in 2008. It owned approximately 50 000 dwelling units, 32 000 of which were so-called *portiek* (walk-up) apartments, typified by small apartments with thermally weak façades, constructed of face brick, technically diffident and with out-dated fittings and finishes.[253] The UKR process also required that the partners define the learning ambitions for the project. For Eigen Haard the long list included:

- learning which technical, organizational, communicative and financial approaches could be used in the renovation of its homes;
- gaining practical experience with various energy technologies;
- learning how systems could be deployed and maintained in even more efficient applications at the level of walk-up clusters, including fuss-free technical maintenance;
- exploring opportunities to also reduce user-related energy consumption, learning how resident participation could help to create support and increase the quality of the project;

250 (Amsterdam FM, 2012).

251 Personal communication, Cees Stam, manager: Renovation and Large-scale Maintenance (Renovatie en Groot onderhoud). Woonstichting Eigen Haard. 17 March 2016.

252 Personal Communication, Cees Stam. 17 March 2016.

253 (Horst, 2008, p. 1).

- learning how to inform a very varied group of residents about technical matters, about behaviour and about the appropriate use of a home;
- understanding how to inform a very varied group of residents about the relationship between rent, energy bills and the concept of "total housing costs" and information about this how theme could contribute to achieving acceptance among residents;
- showing how Eigen Haard could contribute to improving the quality of poor neighbourhoods through renovation projects.

A final ambition was to learn how to address problematic social issues 'behind the front door' through a renovation project.[254]

The EFL as multi-party foundation hoped that its members could learn from the innovations developed and the experience gained in the project and how to transfer knowledge between members effectively.[255]

It just so happened that at the time Complex no. 1173 at Landlust was at the top of Eigen Haard's list of priority projects for large-scale renovation.[256] It was not the Zwarte Bokaal that brought Eigen Haard to the insight that ad-hoc repairs were not feasible in this complex any more but that a large-scale renovation project was called for.[257] It was rather the presence of asbestos sheeting in the building—in small quantities under the in situ cast shower floors—that had for years made technical maintenance of the drainage system particularly difficult that forced Eigen Haard to adopt a comprehensive renovation strategy.

Complex no. 1173 was selected for an experimental pilot project to investigate the sustainable upgrading of walk-up (*portiek*) housing,[258] funded from the UKR EGG Energy Saving Built Environment Transition Route. The *Efficiënt en Groen Gas* (Efficient and Green Gas, EGG1) transition route was aimed at:

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254 (De Koningsvrouwen van Landlust, 2008, p. 2).

255 For Van der Ley Contractors, the project would teach them to use innovative renovation projects to develop new services and products; how innovative renovation projects could provide input for their internal training program and teach the construction company's employees which practical aspects play a role in renovation projects with a high energy ambition. (De Koningsvrouwen van Landlust, 2008, p. 2).

256 At the time the EFL had their offices in the headquarters building of Eigen Haard. Personal Communication, Cees Stam. 17 March 2016.

257 Personal communication, Cees Stam, manager: Renovation and Large-Scale Maintenance (Renovatie en Groot onderhoud). Woonstichting Eigen Haard. 17 March 2016.

258 (Archivolt B.V., 2012).

- reducing the use of fossil-based energy in housing and buildings;
- through an optimal system design and efficient conversion systems; or
- through the use of residual heat from industry.[259]

It was thought that the Municipal status and pending National monumental status of the block would add to the value of the lessons that could be drawn from the project.[260]

In support of the UKR application, the project team defined ambitions for the project: a monumental appearance, healthy and comfortable living, cost reduction for residents and a drastic reduction of the energy-use and CO_2 emissions.[261] The project aimed to show that 'monumental walk-up housing can be renovated not only in an energy-efficient manner, but also in a comfortable, healthy, affordable and aesthetically appealing way'.[262]

Complex no. 1173, it was concluded, would prove to be a very useful trial for further renovations. The project was to:

- improve their tenants living comfort;
- ensure that housing expenses remain affordable to tenants through a reduction of energy costs;
- contribute to the reduction of CO_2 emissions;
- add value to their housing stock through ensuring their dwellings would conform to the growing demand for low energy use dwellings; and
- innovate, especially with regards to insulation technology, the use of renewable energy sources and changing the energy use patterns of their tenants.[263]

In all, Eigen Haard hoped to upgrade Complex no. 1173 to equal new-build dwelling energy standards in the year 2020.[264]

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259 (De Koningsvrouwen van Landlust, 2008).

260 (Eigen Haard. 2008).

261 (De Koningsvrouwen van Landlust, 2008).

262 'Een dergelijk project laat zien dat monumentale portiekwoningen niet alleen energiezuinig, maar ook comfortabel, gezond, betaalbaar en esthetisch aantrekkelijk gerenoveerd kunnen worden.' (De Koningsvrouwen van Landlust, 2008, p. 1).

263 (Horst, 2008, p. 1).

264 (Horst, 2008).

Eigen Haard appointed architect Marloes van Haaren to lead the renovation of this municipal monument. Van Haaren was not only chosen as architect due to her years of experience in renovation of public housing in Amsterdam (especially of the Ring '20–'40), her standing with the municipality and conservation professionals,[265] but also because she was the official supervisor for the City of Amsterdam's Beter Verbeteren building renovation subsidy.[266] This meant that she was well versed in energy reduction renovations acceptable to the *Welstandscommisssie* (Aesthetics Committee) in Amsterdam, required in getting the project approved for construction. By early 2008, in anticipation of a pending retirement from practice, Marloes van Haaren's architectural practice merged with Archivolt Architects and the project continued under the name of the latter.

To assist Van Haaren, later Archivolt, the energy consultant Ecofys was appointed as advisor for the technical energy-related aspects of the renovation project. By October 2008, Eigen Haard had instructed Ecofys to develop an energy-concept through a process of elimination: all possibilities were to be explored and, based on the experience of the project team, whittled down to possible options for energy systems for the planned renovation.[267]

At the same time the headache presented by the intractable residents was addressed. They were fairly hostile towards Eigen Haard, having become belligerent through continuous confrontations over failing infrastructure and poor living conditions.

For any renovation project to be undertaken (which required 70% of the inhabitants' approvals) the project team needed to reset the relationship between Eigen Haard and its tenants. A new identity was called-for. One of the first steps taken by the project manager for Eigen Haard, Frans Horst, was to rename and rebrand Complex 1173.[268] The block was given the prestigious-sounding name 'Koningsvrouwen van Landlust' (King's Wives of Landlust), referring to the street names of the neighbourhood that commemorate the four wives (in succession) of William of Orange (Willem de Zwijger). William was in fact never a king and calling

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265 She was known as *welstandsvrouw* in other words, a person who knew how to navigate the processes of approvals with the City's Aesthetics Committee. (Personal communication, Cees Stam, manager: Renovation and Large-Scale Maintenance (Renovatie en Groot onderhoud). Woonstichting Eigen Haard. 17 March 2016). Van Haaren was soon to publish, as lead author, the publication 'Het beste verbeterboek : architectuurherstel als cultureel ambacht' (2008: Bussem: THOTH), based on her experience with renovation of interbellum housing in the Netherlands.

266 She was appointed Beter Verbeteren supervisor in 1999 (Ten Cate, 2008, p. 58).

267 (Van de Bree, 2008, Foreword).

268 Personal communication, Cees Stam, manager: Renovation and Large-Scale Maintenance (Renovatie en Groot Onderhoud). Woonstichting Eigen Haard. 17 March 2016.

the complex the ‘Kings Wives’ is therefore factually a misnomer. The name was also chosen to resonate with the substantial resident immigrant group from Morocco, because at the time it could be construed to have refered to both the popular and beautiful Moroccan queen Princess Lalla Salma[269] and Dutch princess Maxima alike.[270] A new logo and font were designed. All of this was done in order to create the support required for the project.

FIG. 6.26 The renovation logo for the Kings Wives project (De Koningsvrouwen van Landlust, 2008).

In planning the renovation of the Versteeg AWV building, Eigen Haard was aware that any increases, or rumour of potential rental increases subsequent to the renovation project would be fatal to the ideal of a ‘broad social approach’, souring relationship with their tenants, and endangering the renovation project. Eigen Haard did not hope to benefit financially from the project. From the very start it was expected that the housing association would have to invest own resources into the experiment, more so than for a standard housing upgrade. Return on investment was a secondary concern for the owner, but additional funding, over and above the UKR subsidy was sought to lighten the load.[271]

Eigen Haard hoped to engender a social renovation of the complex by maximally engaging the residents, adamant about the need for technical improvements to their homes,[272] in the process. The project team initiated and supported as many as five residents’ commissions to represent the inhabitants’ interests. By the end of 2007, engagements had led to agreement that a renovation would be undertaken.[273] These engagements ran parallel to strategic partial demolition and renovation of pilot projects in the complex.

269 Personal Communication, Cees Stam. 17 March 2016.

270 Later attempts at branding the project in the design of garden fences proposed the use of a recognizable silhouette of then Princess Maxima in the fence. (Archivolt B.V.,Archive (Project 0901 BWT-01), Amsterdam).

271 (Horst, 2008, p. 3).

272 (Eigen Haard, 2010, p. 4).

273 (Eigen Haard, 2010, p. 5).

6.5.2.1 Strategic projects

Strategic project 1: Leading residents to learning

As with the EFL, Eigen Haard's and Van der Ley's learning ambitions depended on the collaboration of the residents of the housing complex. To achieve this, the project team created a guided learning process for the residents. The main aim of this cycle, nested in the larger project, was to show the residents the benefits of living in an energy-efficient house regarding comfort and health. To achieve optimal results, residents had to be taught how to make optimal use of their houses, including aspects such as heating and ventilation, also in relation to efficient household appliances.

The engagement was aimed at residents and was initiated by a phase called 'travelling together', which aimed at turning suspicion into trust.[274] To ensure good communication with the residents, a newsletter, edited by a committee of three to five residents assisted by a professional journalist, was issued once every two months during the renovation project. The newsletter was especially important to ensure that the residents understood the aims of the renovations, narrating some of the history and significance of the building, presenting the reasons for decisions, highlighting progress throughout the renovation and allowing residents to reflect on their personal experiences.

Another ambition of the project team, underlying the engagement of residents, was to learn how they could become a "constructive partner in the renovation process". A key aspect was to change the way in which residents thought: not in terms of basic rental prices but in terms of total housing costs including energy costs.[275]

The social plan agreed to between the residents and Eigen Haard included agreements on rental and service costs for returning tenants at 90% of the MHR (or maximum fair rental; being a calculation of the basic rental price to which the floor area, energy label and location is included) and 100% for new tenants. The rental had to remain within the social domain.

274 (Van de Bree & Horst, 2013, p. 16).

275 (De Koningsvrouwen van Landlust, 2008, p. 2).

Tenant energy expenses played an important part in the decision making around the renovation project. From 1987 leading up to the 2009 global financial crisis energy costs increased continuously. The price of oil is indicative, having reached an all-time high of near US$ 150 per barrel in July 2008. The continuous steep increases in the price of energy translated to an annual increase of ten to twenty per cent in the cost of household energy. These increases stood out in stark comparison to a one to two per cent annual increase in rental costs that Eigen Haard could implement. Eigen Haard predicted that the energy bills for residents in the Versteeg block would equal their monthly rental within three years,[276] or as worded by the project leader: 'if Putin were to tighten the gas valve three more times,' the energy cost would surpass rental costs.[277] The reduction in energy costs could be balanced against the increase in rental post renovation, with the added incentive of renewed, and often enlarged dwellings for the inhabitants.[278] The Koningsvrouwen van Landlust newsletter, in July 2010, promised an € 80 reduction in monthly energy expenditure per household.[279]

To further grow mutual trust, a range of commissions and councils was established to give the residents a voice in the renovation process. A Residents' Commission of between six and ten inhabitants met once a month as contact group with the project team. A Renovation Council of 15 to 30 members met once a month to discuss specific issues relating to the renovation project itself. The Renovation Council was supported by a specialist selected by the council and paid for by Eigen Haard. During the first phases of the project this was a building physicist; during the execution of the project, a specialist from the *Amsterdams Steunpunt Wonen* (Amsterdam Support Centre for Living) was appointed.[280] Eigen Haard also arranged excursions for residents to investigate specific themes such as instance heating systems at first hand.

276 (Horst, 2008); (Van der Tol, 2009).

277 Frans Horst: "Binnen drie jaar zouden de energielasten zelfs hoger zijn, zeker als Poetin nog drie keer de gaskraan dichtdraait." (Van der Tol, 2009).

278 (Van der Tol, 2009).

279 (s.n., 2010a).

280 (Van de Bree & Horst, 2013, p. 12).

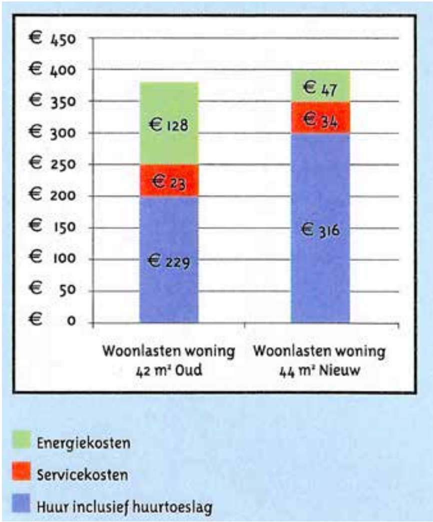

FIG. 6.27 Graph from the December 2010 issue of the Koningsvrouwen van Landlust newsletter, showing the increase in rental for enlarged 44msq apartments offset against a reduction in direct energy costs. [Green: Energy costs; Red: Service costs and blue: Monthly rental] (s.n., 2010a, p. 1).

The development of new floor plans for the project was seen as a strategic opportunity to engage the resident population and achieve project support. With a resident population from mostly Moroccan and Turkish descent (80%) it was thought useful to host 'coffee mornings' for the women alone where they could air their wishes and needs. A Women's Council of ten to twenty similarly met once a month, and worked with the (female) architects in developing floor plans. The project team soon realised that communication was a linguistic challenge. Engaging the resident children at the local primary school proved a valuable link in reaching their mothers, some of whom spoke hardly any Dutch whatsoever.[281]

Architects Van Haaren and Kuipers developed a so-called 'renovation curriculum' for the children of the nearby Narcis-Querido primary school.[282] An important outcome was the children's own designs, of their ideal homes, captured in the form of models based on the basic structure of the apartment building. This experiment served two purposes: to highlight the limitations of the building to the residents and to inform the architects about the inhabitant's wishes and needs. One of the results of this engagement was the observation that the kitchens needed to be larger than was initially intended as these needed to serve also as a sitting room for women during guest visits.

281 (Woonstichting Eigen Haard, 2011, p. 14).

282 Marloes van Haaren and Frederike Kuipers.

A Children's Council of seven to ten children was later established to make a movie about the engagement and renovation process and once a week garbage was picked up around the neighbourhood. One child per walk-up was selected as *portiek-portier* (stairwell ambassador) as intermediaries between the neighbourhood and the neighbourhood manager appointed by Eigen Haard.[283]

Many of the aforementioned residents' activities, such as excursions, were in themselves ways to educate the residents about options for the renovation of the Koningsvrouwen building.

Strategic project 2: Destructive investigations

FIG. 6.28 The air handling unit of the demonstration apartment, visible through a transparent ceiling section (Van de Bree & Horst, 2013, p. 17).

To make residents even more aware of the dire technical state of their homes, residents were invited to inspect an apartment that had been stripped down to its bare bones as part of the process of destructive investigation. In this way "… they themselves discovered what was technically wrong and they themselves could draw the conclusions such as "the sewer system is worn out", "there is asbestos in the floor structures" and "we have to get out to carry out the renovation"."[284] This same dwelling also served to showcase new technologies through practical demonstrations to the residents long before the full renovation was set to begin.

283 (Eigen Haard, 2010, p. 25–31).

284 "...zodat zij zelf ontdekten wat er allemaal technisch aan mankeerde en zij zelf de conclusies konden trekken als "de riolering is versleten", "er bevindt zich asbest in de vloerconstructies" en "wij moeten er uit om de renovatie te kunnen uitvoeren"." (Van de Bree & Horst, 2013, p. 16).

Strategic project 3: The ‘Proefportiek’: a team learning project

The renovation project, which started in 2009, was planned in two phases. The first phase was the conceptualisation, execution, and reflection on a trial renovation of one of the walk-ups (*portieken*). As such it served as a strategically instituted learning project in the larger renovation cycle. It was extended also to be an active experiment for the 32 000 other three or four-storey walk-up apartments in the Eigen Haard portfolio.[285] A number of differences between the test walk-up (*portiek*) and the rest of the envisioned Koningsvrouwen van Landlust projects was therefore planned to develop generic approaches to meeting Eigen Haard’s energy reduction ambitions.

Abstract conceptualisation and active experimentation

“In the same way as this complex was built as an experiment in zeilenbau, the approach to the renovation/restoration that is now to be carried out can once again be called an experiment, but in the areas of insulation, energy supply, changing the layout of the dwellings and occupant participation”.[286]

The Koningsvrouwen was never presented as a restoration project, but it was billed by Van Haaren from the start as a combined restoration and renovation project.[287] The energy ambitions were clearly defined from the word go. Initial investigations concluded that the floor plans of the dwellings were useful and the approximately 25-year-old aluminium double-glazed windows were still serviceable. Ecofys Netherland BV was instructed to investigate a possible configuration of viable sustainable technologies, including in-house communication systems aimed at creating an awareness of energy use with the inhabitants, presenting all possible permutations of the viable insulation and energy source systems in a thorough report.[288] All options were investigated, including outside insulation, their pros and cons—such as the space-plan impact of internal insulation—weighed up against each other and against factors such as the cost to the residents.

285 (Archivolt B.V., 2009a).

286 “Net zoals indertijd dit complex is gebouwd als experiment van de strokenbouw, is de aanpak van de nu voorstaande renovatie/restauratie opnieuw experimenteel te noemen, maar dan op het gebied van isolatie, energievoorziening, wijziging van de indeling van de woningen en bewonersparticipatie.” (Archivolt B.V., 2009b, p. 1).

287 This use of this double-label was continued by Archivolt Architects. ‘Beknopte projectomschrijving. De Koningsvrouwen van Landlust.’ 4 February 2009. ('Bureau Monumenten en Archeologie, 2009'; SAA: BMA 2009.389).

288 (Van de Bree, 2008).

The residents were but one actor-group to consider the abstract conceptualisation. Their ambitions had to be harmonised with the EFL, Eigen Haard and Van der Ley's learning ambitions for the project aims, as well as the directives of the City of Amsterdam. The most important actors for the City were the *Bureau Monumenten en Archeologie* (Monuments and Archaeology, BMA), currently called *Monumenten en Archeologie* and the *Welstandscommissie* (Aesthetics Commission).

The BMA set out the boundary conditions for the renovation in February 2008.[289] The approach was further refined during a series of engagements over the end of 2008 and beginning 2009. BMA outlined their perspective in February 2009:

"The monumental values mainly lie in the urban setting and the exterior such as; façades, roofs, balconies at the rear and the characteristic dry covered walkway at the rear etc. The main structure with the stairwells and the grocery lifts are also among the elements that should not be affected. It is further desirable that any damage to the original architecture done in the recent past be reversed. For example, by replacing the current heavy aluminium frames with more slender metal frames that are closer to the original design."[290]

The BMA also concluded that:

"Little remains of the original dwelling layouts and these interiors were never of great architectural-historical importance... Given the many changes that have taken place in the past, the monumental values of the interiors are small... However, the BMA points out the possibility of one or multiple apartments to be 'traditionally furnished' as for instance a museum dwelling."[291]

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289 Marloes van Haaren met with the M&A and agreed to the framework for the renovation in February 2008. Personal communication, project architect Frederike Kuipers, 21 March 2016; (Bureau Monumenten en Archeologie, 2009, p. 1; SAA: BMA 2009.389)

290 "In hoofdzaak liggen de monumentale waarden vooral in de stedenbouwkundige setting en het exterieur zoals: gevels, daken, balkons aan de achterzijde en de karakteristiek droogloop aan de achterzijde e.d. Ook de hoofstructuur met de trappenhuizen en de boodschappenliften behoren tot de elementen die niet aangetast mogen worden. Verder is het wenselijk dat eventuele aantastingen, aan de oorspronkelijke architectuur, gedaan in het recente verleden, teniet worden gedaan. Bijvoorbeeld door de huidige zware aluminiumkozijnen te vervangen door rankere metalen kozijnen die meer het oorspronkelijke ontwerp benaderen." ('Advies Bureau Monumenten & Archeologie', [Advice 16732.102200912. Date: 6 February 2009], p. 4; SAA: BMA 2009.389).

291 "Van de oorspronkelijke woningindeling resteert weinig, en van groot architectuurhistorische belang zijn deze interieurs ook nooit geweest... Gezien de vele mutaties die in het verleden hebben plaats gevonden zijn de monumentale waarden van de interieurs gering…Wel wijst BMA op de mogelijkheid om een of meerdere woningen traditioneel in te richten als bijvoorbeeld 'museumwoning'." ('Advies Bureau Monumenten & Archeologie', [Advice 16732.102200912. Date: 6 February 2009], p. 4; SAA: BMA 2009.389).

Initially plans were made for such a museum dwelling, to be managed as a ‘home-stay’ B&B, managed by a group of lady residents, but these were never realised.[292]

Insulating the skin of the Koningsvrouwen block proved to be a great challenge. With external insulation as option eliminated at a very early stage at the insistence of the BMA, it was clear that the dwelling would need to be insulated from the inside. There was one problem though: the steel skeleton-structure, which extended through the façade, and the steel lintels over façade openings created rather severe cold bridges. The proposed response: creating an insulated living pod inside the building skin, called a box-in-box, which isolated the dwelling from the steel structure, meaning the latter could remain un-insulated. But this box-in-box installation proposal held a greater risk than external insulation due to the problem of condensation and subsequent rust formation on the steel structure.[293] Ecofys and the architects proposed to ventilate the cavity within which the steel structure would now find itself through the introduction of open joints in the façade. These needed to be drilled into the façade, one of the few interventions to the brick façade allowed by the BMA. Steel columns located in rooms needed to be well insulated. Ecofys initially proposed a synthetic silica aerogel rigid panel insulation system, but this was quickly disqualified because of cost and a less expensive alternative had to be selected.[294]

The final energy reduction measures, presented in a neat single-sheet analysis,[295] were quite clearly informed by the AR-DNA of the block. One proposal was to replaceme the old block heating gas fired boiler with what was then theoretically considered a carbon-neutral wood-pellet fired Combined Heating and Power (CHP) installation. Eigen Haard initially aspired to achieve a passivhaus energy standard– defined an energy usage of 15kW/m^2 per annum—but soon concluded this to be unattainable for a listed monument.[296] The passivhaus ambition mandated thermal insulation of the highest possible order to reduce heating requirements. This high insulation in combination with the large glazed surfaces of the building meant that summer-time overheating, an unbearable phenomenon that is expected to increase in the Netherlands in future, would now occur and space cooling would be required. Such a total renewal of the energy system would have direct impacts on the building and the inhabitants’ domestic economies.

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292 Personal communication, project architect Frederike Kuipers, 21 March 2016.

293 (Van de Bree, 2008, p. 42).

294 A product marketed under the name Bluedec®; Personal communication Philip Breedveld, Archivolt B.V. 22 March 2016. This was substituted with PIR (Weston, type Xtratherm PIR Universeel) (Archivolt B.V. 2009c).

295 (Ecofys 2009).

296 (Horst, 2008, p. 3).

The project team clearly wanted to learn as much as possible out of their experiment and in early 2009 planned to execute 6 trials. Five test walk-ups would be linked to different heating technologies that that used in the remainder of the complex.[297] Later the ambitions were realigned to three energy concepts based on three different heat sources for testing in the building. All three had a high insulation level to reduce the heating load as basis.

The low-temperature heating and cooling system–the latter required because of the high level of insulation the apartments combined with the high level of insolation their large glazed façade surfaces would now receive–was to be delivered through a hydraulic tube installation in the floors of the units linked to Aquifer Thermal Energy Storage wells through a heat pump. The increased insulative quality of the façade also necessitated the design of louvered solar shading on west-facing façades, which was designed to be withdrawn against the soffit of the balconies on the western façade. Retractable fabric sunscreens were planned for south-facing windows.

Added to the above measures all apartments would be fitted with Energy Label A++ equipment, such as fridges leased by inhabitants from the housing association. Inhabitants would be provided with a so-called 'Energy-box', including fridge thermostats and LED lamps and standby-killers.[298] A smart videophone intercom that shows energy use in relation to the average use of similar units in the complex each time it is used was chosen for installation.[299]

297 (Ecofys, 2009).

298 (SenterNovem, [s.a.], p. 14).

299 (Van de Bree & Horst, 2013, p. 17).

TABLE 6.3 Table 62. King's Wives initial Energy Concept (2008).[300]

Extent of implementation		Woodpellet CHP	Gas fired micro CHP (Charlotte de Bourbon Street wing)	Heat pump system (Louise de Coligny Street wing)
		Building block scale	Walk-up scale	Walk-up scale
Insulation	Building skin (Floors façades and roofs)	Box-in-box insulation		
	Window frames	Isolated aluminium frames		
	Glazing	Double glazing with vacuum		
Ventilation		Balance ventilation couplet to a walk-up-scaled heat exchanger	Balance ventilation couplet to a walk-up-scaled heat exchanger	Mechanical ventilation
Space heating		Collective Wood pellet fired CHP	Mini-gas fired CHP per walk-up	High performance heat pump per walk-up linked Aquifer Thermal Energy Storage wells
Hot water provision				High performance heat pump per walk-up linked Aquifer Thermal Energy Storage wells
Peak load supplementation		High output gas fired boiler	High output gas fired boiler	High performance heat pump per walk-up
Electrical power for services		An array of 278 photovoltaic panels drive the heat-pumps and fans for balance-ventilation		

Returning the windows to their original appearance while improving their thermal performance proved to be a particularly tough nut to crack. Both the Beter Verbeteren subsidy and the prescripts of the BMA meant that the renovation project had to return the building to its original steel-framed aesthetic. This needed to be married with the *passivhaus* ambitions of Eigen Haard, but achieving the required U-Value of 1,0-1,2 W/m^{2}K with standard double-glazing would require roughly a 26 mm thick glazing sandwich. This would have greatly altered the appearance of the façade. Single sheet monuments glass in steel framed windows would also not meet the target insulation. Vacuum glass with the required performance was much thinner at 11mm, but the thermal performance of even the most advanced steel frames could not achieve the required result.

300 Adapted from (SenterNovem, [s.a.], p. 5); See also (Van de Bree, 2008).

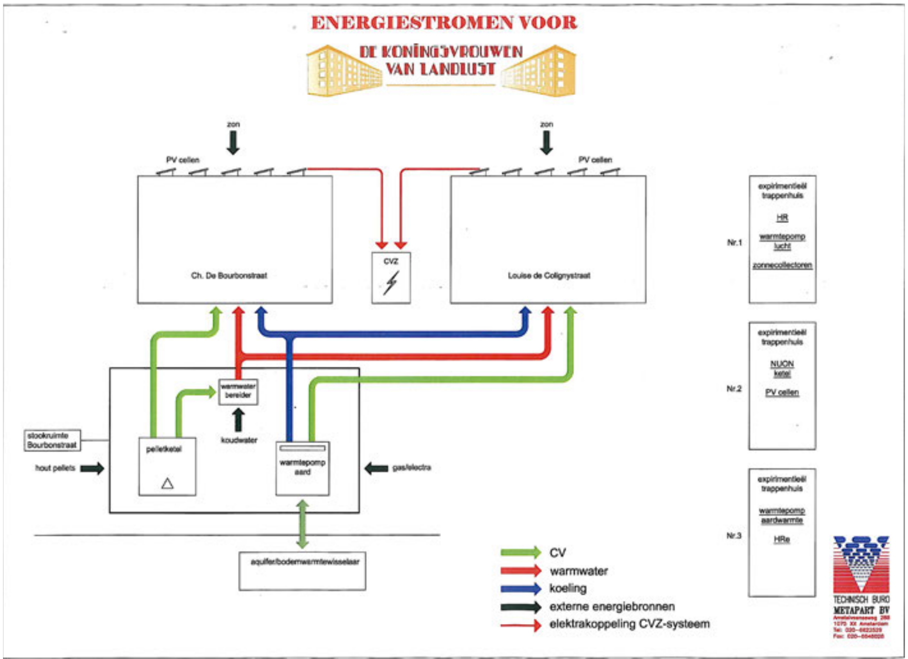

FIG. 6.29 Conceptual diagram for three test-case walk-ups (Metapart; Ecofys, 2009).

The first strategy that the team aimed to deploy, was developed by Ecofys in conjunction with the architects Marloes van Haaren and Archivolt.[301] Instead of replacing the windows, and needing to meet the BMA requirements, the idea was to maintain the existing aluminium frames and to increase the thermal resistance of the glazed openings by installing internal double-glazed sashes (*achterzetramen*). A possible negative side-effect could be condensation on the inside of the outer windows. These cavities would therefore need to be ventilated. This combination was submitted to the city in the May 2009 construction permit application.[302]

After a feasibility study concluded that the ironmongery of the 25-year old windows was in a poor condition and replacement parts could not be sourced, the team decided that all the windows had to be replaced.[303]

301 (Van de Bree, 2008, p. 43).

302 ('Louise de Colignystraat 37 t/m 39'; SAA: BMA.2009.B2.)

303 Personal communication, Cees Stam, manager: Renovation and Large-scale Maintenance (Renovatie en Groot onderhoud). Woonstichting Eigen Haard. 17 March 2016.

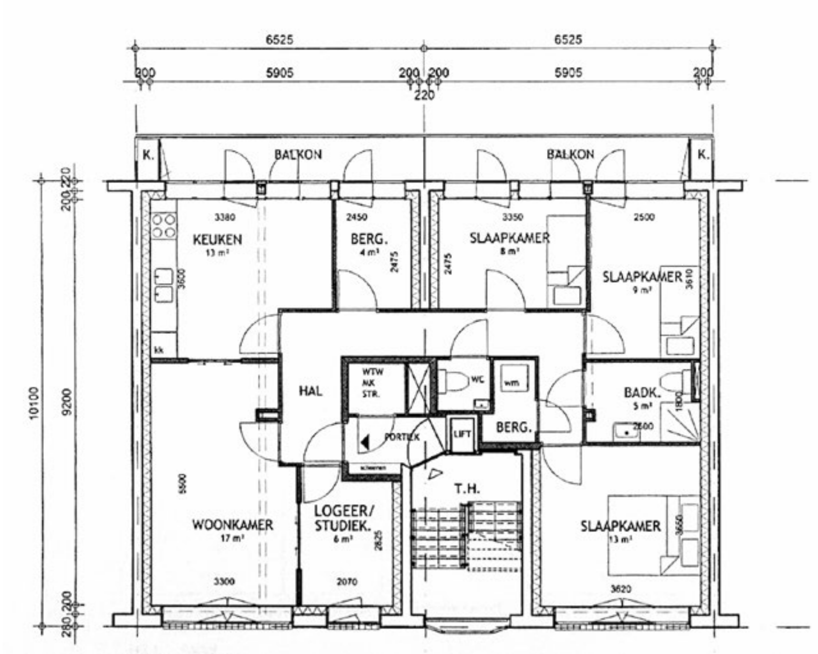

FIG. 6.30 One of the floor plans for the trial walk-up renovation project, showing the proposed internal double-glazed sashes, insulation installation as well as the continuation of use of the grocery lift in the stair well ('Architectenbureau M. Van Haaren, 19 December 2008; Drawing no. 075 'plattegrond nieuw''; (Archivolt Architects, (0757), Amsterdam)).

Initially, the choice fell on reinstating the steel framed windows, matching the original Versteeg windows, and ensured insulation through the internal double-glazed sashes.[304] This challenge was aligned with the project ambition of developing innovative technologies although internal sash windows are not a new idea per se.

Once the box-in-box principle was accepted, the double-windows were deemed not appropriate any more. Now the project team sought ways to replicate the appearance of the original steel windows. With no standard aluminium window profile available that closely matched the original thick steel window profiles, an industry partner, De Groot and Visser, was invited to develop a bespoke aluminium profile window system for the project.

304 (‘Verslag overleg. Landlust Proefportiek, Louise de Colignystraat 45-47’ 03 februari 2009; SAA: BMA 2009.389).

FIG. 6.31 The bespoke "Landlust' window, specially developed to mimick as cloasely as possible the original steel framed windows, but manufactured from aluminium and with double-glazing (2016).

The window profile was not the only problem: the appearance of the glass was also a challenge if the original appearance was the be reinstated. The Versteeg block was originally glazed with single-glazed drawn glass. This gave a broken reflection, in comparison to the mirror-like qualities of the current industry standard, float-glass. This reflection would be especially noticeable in the bay-windows of the stairwells. Monument glass (resembling drawn glass) was therefore chosen for the outer sheet of the vacuum-glass package.

The boundary conditions for the retention of the cultural historical value were set by the BMA early on in 2008 and were limited to the aesthetic of the façades, roof edges, and stairwells. The monumental qualities of the building therefor did not stand in the way of a total renewal of the energy system and its reticulation by including the introduction of a balanced ventilation system. The extant basements and flat roof provided opportunities for horizontal reticulation; the grocery lift shafts provided the required vertical reticulation space. The BMA did however value the stairwells and their grocery lifts, expressing the wish that these be retained, even if not in commission. Eigen Haard had however, had a bad experience after an incident with one of these lifts that led to a law suit being filed against them in 2003.[305] Eigen Haard's proposal to retain only the doors and foot brakes of these lifts, and utilize the shafts for service runs, was approved. From here new service runs could generally be accommodated in the skins of the new box-in-box living pods.

305 'Email from HorstAdvies dated 31 January 2009. ('Fw: Boodschappenlift info intern EH'; SAA: BMA 2009.389).

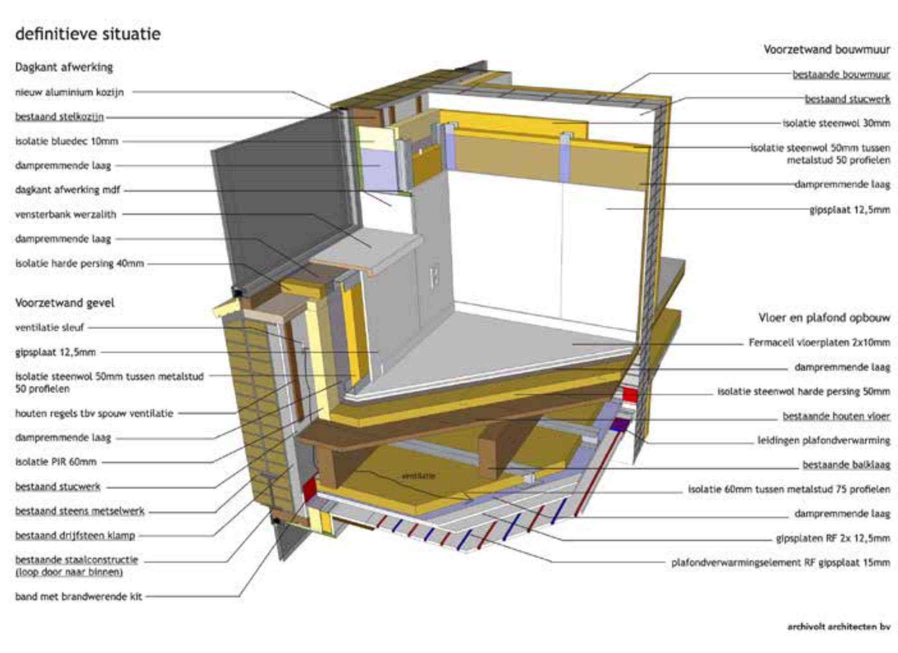

FIG. 6.32 The final design of the insulation and heating system for the Koningsvrouwen van Landlust project (Archivolt Architects, (0757), Amsterdam).

Concrete experience

The number of test-cases, the team had initially planned to undertake was quickly reduced from five in mid-2008, to three by the end of that year, and then from three to one in 2009. The test-case commenced with a preparatory site meeting on 7 January 2009, but real work on site commenced only in October 2009,[306] running to September 2010.[307] The walk-up, Louise de Coligny Street 37–9, was temporarily fitted with a micro–Combined Heating and Power plant (mCHP), a natural gas fired boiler system for space and water heating, coupled with a Stirling engine, which generates electricity from excess heat. A mechanical balanced ventilation system with heat recovery units on the roof was installed to optimise the energy efficiency of the system.

306 Municipal approval was granted in July 2009 (SAA: H01-888 BWT 2009).

307 (Archivolt B.V. Archive, Project 0901 BWT-01, 'NOTULEN van: 19E Bouw(team)vergadering Proefportiek Louise de Colignystraat 37-39 en voorbereiding uitvoering hele complex DKvL, 20 September 2010, Amsterdam').

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By March 2009, during the preparatory work for the test case, a new product was identified for the experiment: the *Comfortplafond* (comfort ceiling): a gypsum board ceiling with embedded piping for both cooling and heating with low-temperature water. The experiment was tweaked: the ground and first floor units were provided with an under-floor heating system while the top two floors received the new comfort ceiling system.[308]

Reflective observation

Regular inspections of the works were held and these were used to redesign or refine the renovation designs, specification and execution. The test case was also used to develop and refine the fire-prevention installation.[309] The floor and ceiling heating systems were continuously monitored and evaluated during the test walk-up phase.

It was discovered, for instance, that creating new open joints to ventilate the floor cavities and avoid condensation on the steel beams was not as straightforward as it seemed. At the fourth-floor parapet, old wallpaper—which need not be removed since it was being covered over by the box-in-box construction—curled back over the newly drilled opening. This would effectively block air movement and the team to conclude that making these ventilation gaps needed special care.[310]

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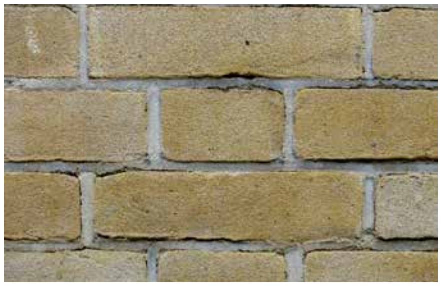

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FIG. 6.33 [1] A section of untreated; and cleaned façade; [2] A close-up of the cleaned brickwork (2016).

308 (Wind, 2011, p. 9).

309 Developed by Adviesburo Nieman consulting engineers.

310 (Archivolt B.V. Archive (Project 0901 BWT-01, ‘0901 Schouw 2019-01-14.doc.’), Amsterdam).

The project team did run into a number of conflicts especially with monuments services officials, who condemned the high-pressure cleaning of the brick façade of the test walk-up. This experience eventually led to a total ban on the cleaning of the masonry work of the building block's façade.

In June 2010 the Supervisor Gordel '20–40'[311] and the BMA assessed the test walk-up. Their concerns, noted in an Archivolt memo,[312] related to the aesthetics of the façade. This included fine-tuning the stairwell-glazing design and colour of the window frames and the sun-screen installation. The very important role of the test-case was to create awareness of the complexity of the renovation among residents. It also served as mock-up for the choices they had to make in terms of floor plan variants and finishing options and choices for sanitary fittings.[313] Through engagement with the residents Renovation Council–in turn advised by an independent building physicist afforded by Eigen Haard–the Comfortplafond ceiling heating and cooling system was chosen for the renovation. The reason was largely practical relating to energy efficiency: the preference for carpeting of the predominantly immigrant resident population, would reduce the effect of heating and cooling of an installation in the floor.[314]

The test-case helped the team to refine the ambitions for the project. In a 2011 promotional document Eigen Haard identified five 'pillars' for the renovation:

- "Pillar 1: Committed residents
- Pillar 2: Sustainable energy supply
- Pillar 3: Respect for its [the building's] historic monument status
- Pillar 4: High-quality public sector rented housing
- Pillar 5: Vital neighbourhoods."[315]

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311 Marloes van Haaren had by now recused herself from the Koningsvrouwen project and acted in this instance as Gordel '20–'40 Supervisor.

312 (Archivolt B.V. Archive (Project 0901 BWT-01 'Memo Beoordeling Proeftrappenhuis BMA / Supervisor Gordel '20-'40'), Amsterdam).

313 (Archivolt B.V. Archive (Project 0901 BWT-01, 'BEKNOPTE PROJECTOMSCHRIJVING Project: De Koningsvrouwen van Landlust; Datum: 28 mei 2009; Kenmerk: 0901-06 Projectbeschrijving BA; Bouwaanvraag H01-888 BWT 2009', p.1), Amsterdam).

314 (Wind, 2011, p. 9).

315 (Woonstichting Eigen Haard, 2011, p. 5).

The test case also served to fine-tune the renovation design; a design that greatly modulated the *Space Plan*, *Skin* and *Services* shearing layers of the Koningsvrouwen housing complex. The extent of these modifications was directly related to the dictations of *Site* (orientation) *Structure* (the steel framed structure, an essential part of the AR-DNA of the building), *Stuff* (including the wish of inhabitants to lay loose rugs in their homes) and the ambition to reinstate the aesthetic of the façade of the building (*Skin*).

6.5.3 Active experimentation (2009–2012)

Once the detailing of windows, internal insulation and floor plans had been sorted out, the approval of the residents had been achieved, alternative temporary or permanent accommodation had been arranged for the tenants and all statutory approvals were in place, the renovation of the larger 'Koningsvrouwen van Landlust' could commence. The go-ahead for implementation was given by Eigen Haard on 27 September 2010 and the project was completed by Van der Ley by the end of October 2012.[316] To normalise the finished renovation, the individual boilers in the test case walk-up were removed and the dwellings off this stairwell were connected to the main geo-thermal wells, coupled with heat pumps and gas boilers.

316 (Woonstichting Eigen Haard, 2011).

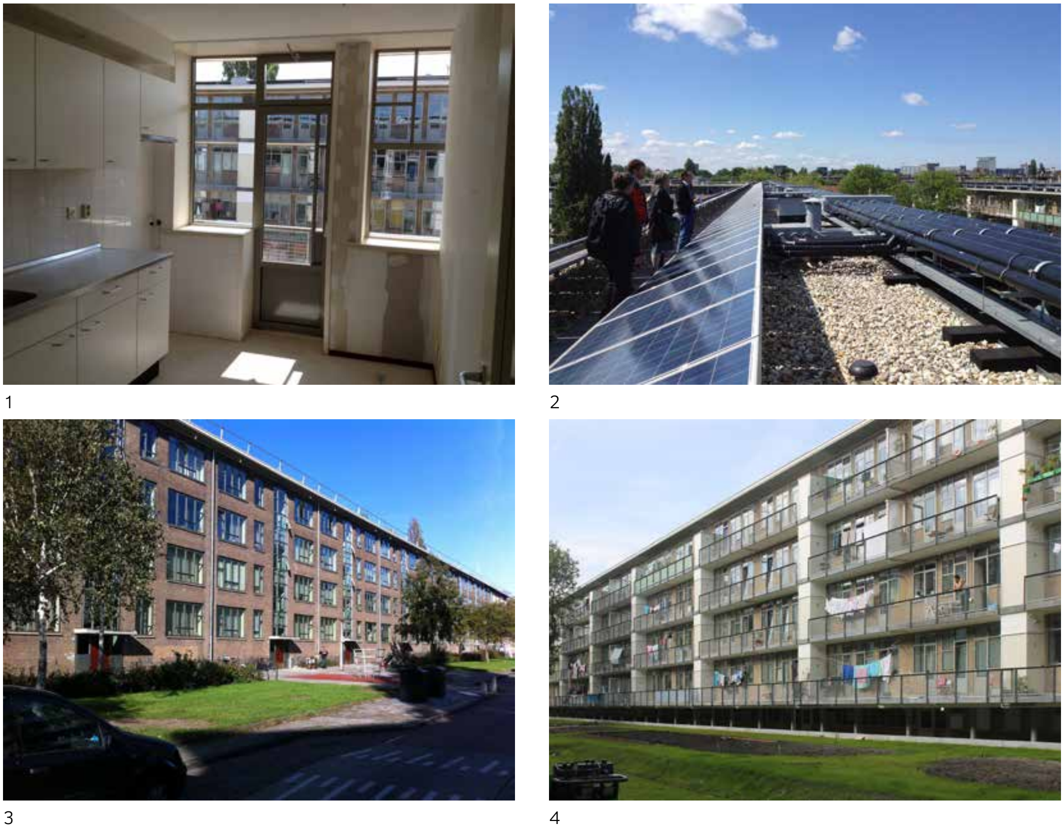

FIG. 6.34 The renovated Koningsvrouwen van Landlust housing complex: [1] new kitchen; [2] rooftop 2E+CO installations; [3] Charlotte de Bourbon Street façade; and [4] the garden-facing façade (2016).

6.5.3.1 The 2E+Co of the Koningsvrouwen van Landlust renovation

Economy

Throughout the project planning and execution, the project team continued to search for external subsidies. Over-and-above the UKR, Beter-Verbeteren and City of Amsterdam housing improvement subsidies, a *Stimulering Duurzame Energieproductie* (Stimulating Sustainable Energy, SDE) contribution was made to the solar array installation.

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In the end a total of € 23 million was spent on the project, an amount that equates to a rather breath-taking average of € 115 000 per dwelling.[317] The City of Amsterdam *Gemeentelijke Klimaatbureau* (Municipal Climate Office) allocated € 60 000 to the project as innovation stimulant,[318] a small contribution compared to the total of € 3,085 million that the project attracted in subsidies. This still left Woonstichting Eigen Haard with a staggering shortfall of € 25 million, approximately € 98 000 per dwelling, which would never be recuperated through rentals over the 40-year planned renovation cycle.[319]

To add to the financial woes, Eigen Haard's gamble on a continued rise in energy costs did not pay off in the short term. By the end of 2008, oil prices had dropped from trading from about US$ 150 to US$ 30 per barrel, meaning that the initially calculated financial benefit of the energy investment to both tenants and owner was not realized. This increased the long-term financial burden on Eigen Haard. This is but one example of how using payback period calculations as measure for decision-making in renovation projects, gives a false sense of security.

The beneficial financial agreements coupled with the intensive social engagement process led to a 51% rate of return of tenants for the project, even after an average rental increase of €150 per month, but now for much enlarged homes and reduced energy bills.[320]

Energy

The subsidy system steered the energy-technologies selected for the Koningsvrouwen renovation project. Especially the UKR programme's pre-defined set of technologies limited choice. The pellet-fired CHP plant—which was planned to heat the Charlotte de Bourbon Street wing of the Koningsvrouwen—was never realised because the standard accepted energy label calculations supporting the UKR subsidy did not include pellet-fired CHP installations. The only alternative calculation to base the installation on would have been that for a standard wood fired furnace, which would have been detrimental to the energy label rating. Achieving a high-energy label was an essential component of the UKR subsidy and subsequently the wood pellet CHP plant was omitted and a central gas fired boiler system installed

317 (Van der Tol, 2009, p. 1).

318 (Van der Tol, 2009).

319 (Woonstichting Eigen Haard, 2013, p. 5).

320 The average for Amsterdam at the time was 17%. (Van de Bree & Horst, 2013, p. 43).

in its place. This aspect of the experiment was doomed to failure, though all the provisions, including foundations, had been made for the eventual installation of a wood-pellet CHP system.[321]

The project did not achieve its passivhaus status with the aim of 15 kw/m^2 per annum, partially due to the above subsidy hiccup.

The energy use reduction concept relied on three areas of intervention, the skin (thermal insulation), the source and circulation of the energy (services) and energy use (stuff).

The pre-existing long internal garden between the buildings gave opportunity for two boreholes—one hot and one cold—to be drilled for the Aquifer Thermal Energy Storage system at the extremities of the garden. These were connected to a heat pump, located in the former boiler room in the double-basement. The solar panels on the roof were located out of sight from street-level passers-by.

A number of measures was taken to reduce household energy consumption, including the already mentioned provision of appliances with low energy usage.[322] Eigen Haard tried to limit the energy increase brought by the proliferation of energy appliances that characterises modern living in contemporary households, such as the inevitable large-screen televisions. This at the same time was meant to create awareness of the passive electricity consumption among its residents by issuing 'standby killer' plugs to inhabitants.

321 (Wind, 2011).

322 Personal communication, Cees Stam, manager: Renovation and Large-scale Maintenance (Renovatie en Groot onderhoud). Woonstichting Eigen Haard. 17 March 2016.

FIG. 6.35 The Koningsvrouwen van Landlust housing complex in 2016 with the cover over aquifer thermal energy storage well in the foreground (2016).

Operational energy use was reduced through a combination of box-in-box high level insulation, including the purpose made double-glazed windows, moveable solar shading installation and balanced ventilation with heat recovery. Heat pumps, connected to the aquifer thermal energy storage wells delivered the base load heating requirements for both space heating and hot water. This was augmented by gas-fired boilers when needed. In times of over-heating, the same heat pumps provided coolth from the cold aquifer thermal energy storage source, through the Comfortplafond ceiling. The main distribution network was installed on the roof of the complex. Two-thirds of the electricity generated by the photovoltaic installation on the roof drives the collective heat pumps as well as the individual-dwelling mechanical ventilation systems. The remainder is delivered to the grid.

The final thermal resistance achieved through the renovation was

- façade: 4 m^2K/W;
- roof: 7 m^2K/W.

The specially designed Koningsvrouwen windows achieved a heat loss coefficient in line with standard HR+ glazing (U value) of 1,6 W/m^2K. [323]

On moving into apartments, tenants were given a *Woonwijzer*: a guide to living in the newly renovated apartments.[324] The renovation achieved an 82% saving in energy use for space heating and hot water, a 7,5% reduction in energy use for household appliances and a 60% reduction in CO_2 emissions.[325]

Comfort

Thermal comfort was addressed as part of the energy reduction installation. The same box-in-box insulation package addressed both air- and structure borne sound transfer. Special attention was given to the sound insulation where vertical and horizontal services bridged the dwelling boundaries.

Some comfort issues with regards to *Space Plan* and *Stuff* need mentioning. Despite the presence in the original design of one, two, three and four-bedroom apartments, the average size of only 46m^2 led to the ideal of dwelling differentiation as a core ambition for renovation.[326] This ambition was the driver onto which to hoist the extensive architectural restoration that the tenants were calling for. Seeing as no restrictions had been set by the BMA with regards to retention of elements on the interiors of the dwellings, the project had free reign with regards to the floor plan design: as long as this made spatial sense in relation to the stairwell and the façade composition. The same steel structure that was such a limiting factor in the insulation of the dwelling, provided flexibility to the space planning. Engaging residents into the planning processes helped to mould the floor plans to the comfort wishes of the users. Their biggest complaints were that kitchens, bathrooms

323 (Woonstichting Eigen Haard, 2011, p. 21).

324 (s.n., 2010b).

325 (Van de Bree & Horst, 2013, p. 48).

326 (Woonstichting Eigen Haard, 2011, p. 7).

and bedrooms were too small for their needs.[327] The planning made some other culturally-specific concessions, for instance providing an entrance lobby to each house where shoes could be taken off and left before entering the apartment, instead of on the landing of the stairwells as is often the practice.[328] This had another benefit with regards to the servicing of the energy installation: these can now be services (filters replaced) without the technician having to enter individual apartments, infringing on the tenant's privacy.[329]

Enlarging the dwellings through merging two into one or even three into two, had the effect of fewer people living on a stairwell, and 'blind' doors were retained on landings where front doors used to be.

6.5.4 Concrete Experience and Reflective Observation

In 2010 a returning inhabitant reported that: "[t]he new apartment is spacious and excellently insulated. The heating in the ceiling works very well, it [the apartment] heats up quickly. We generally don't hear the neighbours; we only notice extreme sounds such as bouncing children."[330]

When the project was awarded the Gulden Fenix Prize for Renovation, it enforced the general conclusion that the renovation had been a resounding success, despite the extreme financial cost to the housing association.

Eigen Haard instituted a monitoring and evaluation programme to monitor the energy-use per apartment at distance, identifying potential problems in the energy systems installation. Once inhabitants had had time to accustom themselves to the new apartments their experiences were gauged through questionnaires emailed to

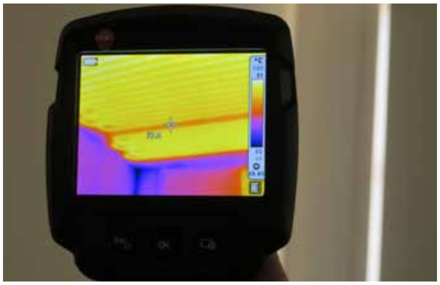
327 'Studie nieuwe plattegronden en woningdifferentiatie. Bijlage bij aanvraag monumentenvergunning. Weknr. 0757'. (Bureau Monumenten en Archeologie, 2009, p. 5; SAA: BMA 2009.389).

328 The project led to unintended publicity for Eigen Haard when it the renovated apartments were labeled as *Halal woningen* (dwellings) by right-wing politicians from the *Partij voor de Vrijheid* (PVV), leading to a media circus and a debate in the national parliament in 2012.

329 A rather common unfortunate effect of renovation of Existenzminimum housing. Refer for instance to the Kiefhoek project by JJP Oud, constructed in 1928–29 in Rotterdam, and reconstructed to the designs of W Patijn between 1989 and 1995.

330 "De nieuwe woning is ruim en uitstekend geïsoleerd... De verwarming in het plafond doet het prima, het is snel warm. De buren horen we normal gesproken niet, alleen extreme geluiden zoals springende kinderen." (s.n., 2010b).

them in 2016.[331] Inhabited apartments were inspected, including the use of infrared imaging cameras to check the efficacy of the Comfortplafond and the insulation package in general. One conclusion was that, despite the care taken to ensure a good corner junction in the insulation package–a problem identified in the test case walk-up–the installation of the insulation remained the Achilles heel for the box-in-box insulation approach. Teething problems plagued the geo-thermal installation: a leak in one of the borehole linings dramatically limited the cooling capacity of the system during the summer of 2016.



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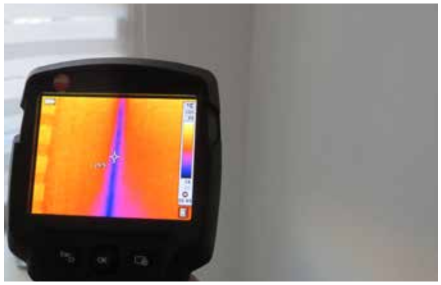

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FIG. 6.36 Infra-red imaging of the heating installation in teh ceiling and of corners of an exterior wall of an apartment in the Koningsvrouwen van Landlust housing complex. (2016).

Eigen Haard and its architects Archivolt translated lessons from the Koningsvrouwen project directly to the renovation of the world-famous Amsterdam public housing monument Het Schip, constructed in 1914–21 to a design by Michel de Klerk. One of the lessons from Koningsvrouwen was to address the energy-upgrades of this significant complex (of which the interiors had been mostly sacrificed during a renovation in the 1970s) implemented on a walk-up-scale instead of a block scale. The ventilation and heating installations were decentralised and scaled per stairwell, located in the storage attics. This allowed the housing association to undertake out maintenance without having to enter the dwellings[332] (as at Koningsvrouwen).

However, during the abstract conceptualisation phase for the Het Schip project during 2013–15, the team decided that box-in-box would not be replicated here. The team rather put a lot of energy into ensuring that the insulation package was

331 Undertaken by Antonin de Bree for the firm Bouwdynamika, in March 2016. Personal email communication Antonin de Bree to author dated 31 March 3016 'RE: Online vragenlijst warmteverbruik De Koningsvrouwen van Landlust'; (Archivolt B.V. Archive (Project 0901 BWT-01), Amsterdam).

332 (Archivolt., [s.a.]b).

thoroughly detailed, reducing the amount of dwelling space to be sacrificed to insulation. This project also saw the transition from what the architect referred to as 'old-style' renovation to 'new-style' renovation utilising Building Integrated Modelling (BIM) as design tool. [333]

Other projects also benefited from the example set by the Koningsvrouwen project. The sibling of the Koningsvrouwen block: the nearby former AWV housing complex at Bos en Lommer, now referred to as Bosleeuw Midden, was now owned by Housing Corporation Stadgenoot. Urban regeneration plans proposing demolition and rebuild following the AUP-based footprint and scale were put on hold in 2010, following the global economic crisis precipitated by the American sub-prime crisis of 2009. In 2012 KAW architects were appointed as aesthetic advisors to the renovation project. Notably, KAW Architects undertook a thorough analysis of the Koningsvrouwen project to inform the Bosleeuw Midden renovation. Koningsvrouwen served as an exemplary project in the need to approach renovation projects with a high qualitative ambition.[334] For a number of reasons—in part because the strategy for the project was to reduce the energy use of the building without the residents needing to vacate their homes—the building was insulated through adding an exterior insulation skin with a faux brick cladding. The garden elevation remained unaltered, its 1980s UPVC double-glazed windows were still deemed serviceable. The windows were replaced and moved outward to ensure the same façade proportions. For this the window reveals had to be extended outwards, with the added benefit that the asbestos-holding sealant installed in the 1970s could be removed. The special 'Koningsvrouwen' window profiles proved too be very expensive. Standard profiles were configured to match the original steel-framed windows to such an extent the city's *Welstand* (Aesthetics Committee) accepted this alternative.

Unlike the Landlust AWV Versteeg block, the block in Bos en Lommer had been constructed with individual coal burners in each apartment. These were later replaced by gas. In the 2012 renovation, residents could opt for an individual gas-fired central heating system, augmented by solar panels installed out of sight on the roofs. New kitchens and bathrooms brought additional living comfort. This approach avoided the need for protracted inhabitant negotiations over relocation while retaining the original image of the building. Because the building was not formally protected as municipal or national monument, the municipal monuments services were effectively put out of play. But the Aesthetics Commission of Amsterdam had identified the building as part of an integrated architectural ensemble and considered

333 Personal communication Philip Breedveld, Archivolt B.V. 22 March 2016.

334 Personal communication, Iskaner Pane, project architect KAW Architects. 27 January 2016.

it aesthetically important to the neighbourhood. The Bosleeuw Midden renovation project was seen by the Amsterdam Aesthetics Commission as an experiment on how to implement energy-efficiency upgrades cost-effectively to all the face brick buildings in Amsterdam that had been identified as making an aesthetic contribution to the city, but were not encumbered by monuments protection.[335] In this renovation the ideals of dwelling differentiation and material authenticity were abandoned in the face of more pragmatic considerations.[336] The floor-plans of the Bosleeuw Midden remained unaltered.

6.5.5 Learning Cycle 2: Actor Factor Set Ecosystem

The growing appreciation of the built environment in the Macrosystem created during the first half of the twentieth century, especially in Amsterdam, had a great influence on the evolution of the Versteeg-designed AWV Landlust project in becoming the Koningsvrouwen van Landlust. On Microsystem level, the pending (and at time of writing still not implemented) National Monuments status was a decisive factor influencing the strategic choices made by the owners, project team and BMA. The clarity of the aesthetics of the building was paramount.

335 Personal communication, Iskaner Pane, project architect KAW Architects. 27 January 2016.

336 (Clarke, 2016, p. 58–59).

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FIG. 6.37 The garden and Lucelle Street façades of the Bosleeuw Midden housing complex in Bos en Lommer the after renovation (2016).

The growing appreciation also had an impact on the Exosystem where subsidies, such as the municipal Beter Verbeteren subsidy, became twofold in aim. This subsidy did not only influence the project budget of the Koningsvrouwen project: the choice of the project architect by the Eigen Haard team was a direct result. The UKR-subsidy, also two-fold in aim, was an Exosystem factor that not only drove innovation in the Microsystem, but had as ambition to act as proximal process, using the experiences and innovation in the Microsystem to modulate the Exosystem, either in product development or in approaches to the renovation of valourised buildings for energy-efficiency. The limitations of the UKR, set in the Exosystem, however, also limited an innovation proposed for the Microsystem: the installation of the CHP plant. The innovations of the project modulated the Exosystem, for instance in the renovation of the iconic Het Schip housing complex, where technical configurations tested at Landlust, were implemented by Eigen Haard and its project team.

Energy cost predictions made in 2008 in the Exosystem were decisive in developing the renovation strategy. The energy costs of a household in the building were predicted to soon equal the monthly rent. Even though these predictions turned out to be incorrect, the promise of future savings drove technological innovation, and importantly brought a new dimension to the then commonly held view of the building: renovate, get more space and pay a bit more, or pay a much larger price rather sooner than later.

The renovation project served to test the efficacy of the diversifying range of technologies for energy saving to inform the future energy-use reduction renovations of the large walk-up housing stock of Eigen Haard. The lessons from Koningsvrouwen were well learnt because the project had been conceptualized as a learning cycle and the reflective observation, including on- and off-site monitoring undertaken. The strategically conceptualized sub-projects were an essential component of this approach. The EFL was an important Exosystemic actor in setting these ambitions and its tie with Eigen Haard as partner was made because of the physical Microsystem proximity: EFL shared Eigen Haard’s offices!

However, the distrust of residents was an important factor to address. Their agency as actors had grown over the years, embedded in policy and given potency by the Zwarte Bokaal award to Eigen Haard, even if it represented the grievances of all of Eigen Haard’s tenants, as Exosystemic factor. The negative image of the building amongst the residents was a key Microsystem factor to be modulated; the rebranding was one of the key strategies.

6.6 Conclusions

The Koningsvrouwen van Landlust case showed how, over the course of the twentieth and beginning of twenty first centuries, the focus on housing production in the Netherlands had shifted from Existenzminimum to the new ideal of Energy minimum.

6.6.1 Normalisation

The housing complex Gerrit Versteeg jr designed for the AWV at Landlust was an ambitious prototype developed with high technical expertise and well-considered technical inventiveness. It was also intended as a project to learn from. There are many intriguing parallels in the approaches of the Versteeg/AWV project and the Archivolt/Eigen Haard renovation. Versteeg and the AWV sought a replicable approach to provide affordable comfortable and energy efficient public housing to the workers of Amsterdam through new construction; Archivolt/Eigen Haard sought for a similarly replicable approach to provide affordable comfortable and energy efficient public housing to the workers of Amsterdam through renovating its existing housing stock. Challenged by advances in technologies for economy, energy and comfort, both chose to use a real-world project to test installations and components. This was not deliberate, but a historical coincidence, though grounded on a similar attitude towards providing good, affordable housing through well-considered use of technical advances. Like the Versteeg designed AWV building, the Eigen Haard experiment was meant to provide a normalised answer to the urgent challenge of energy use reduction in housing that this housing association had to face.

6.6.2 Ambitions

The three ambitions of innovation, energy reduction and improving tenant relations were to remain a constant in the Koningsvrouwen project, but the theme of identity–the canonising of a narrative–was paramount as strategic tool, resulting in the nameless Versteeg AWV block evolving into the Koningsvrouwen van Landlust. Economy, energy and comfort were the main drivers for the architectural renovation of the public housing complex, influencing architectural decision-making. The divergent histories of the near identical Bosleeuw Midden and Koningsvrouwen van Landlust buildings serve to illustrate the importance of a generally accepted narrative as evolutionary driver, steering the genotypic evolution even when dealing with such pragmatic issues as economy, energy and comfort. This narrative–in part the result of an architectural-historic prejudice in favour of Ben Merkelbach and ignorant of Gerrit Versteeg jr–led a life of its own. The association of the Landlust complex with the persona of Ben Merkelbach was decisive in the selection of the Versteeg-designed AWV block as municipal monument and continued to influence decision-making regarding the future of the entire zeilenbau experiment. By 2008 the BMA concluded that the aura of Merkelbach had cast such a long shadow that the Landlust contributions of Vorkink and Versteeg had been undervalued; leading to a disavowal of "…the essence of this gripping moment in the history of public housing…"[337] The consequences of the erroneous association of the AWV building with Merkelbach & Karsten, and especially the person of Ben Merkelbach, and the effects thereof on the evolution of the building, is now part of the narrative.

The pending, and never-effected, registration as national monument, though it had no legally binding effect, was a potent part of the generally accepted narrative. Its intent and content influenced decision-making on the Macro- and Microsystem and facilitated the communication (serving to stimulate proximal processes in the Mesosystem; for instance, between BNA and the architects) between these layers. In this way the promise of a future monument was enough to stimulate the heritage-driven evolution.

The influence of the historical and ambitions narrative in the evolution of the AWV building transcends different scales and does not necessarily mirror the fortunes of the building that brought it to life. As the building decayed, the strength of its heritage narrative grew, to such an extent that it had a decisive influence on the way housing was adapted over time for economy, energy and comfort. The case study of the AWV housing block at Landlust brought the role of the narrative in architectural evolution to the fore, against the background of the gradual and punctuated evolution of the genotype. It has highlighted how a narrative, which itself goes through a process of gradual and occasional punctuated evolution, can be a stronger factor than the genotype in the evolution of heritage buildings. For heritage buildings this narrative is the factor that the continuation of site, structure, skin, space plan, services and stuff depend on. It is mouldable and usually generated in the Meso- and Exo-systems, but at times of punctuated evolution, as in the Koningsvrouwen case, the Microsystem actors often further modulate or even invent new narratives.

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337 "… de essentie van dit spannende moment in de geschiedenis van de volkswoningbouw volledig ontkend." 'Advies Bureau Monument & Archeologie. Louise de Colginystraat 37 – 39' Advice number 16732. 102200912.doc. (Bureau Monumenten en Archeologie, 2009, p. 9; SAA: BMA 2009.389).

6.6.3 Nested learning cycle

Both the owner of the block, Eigen Haard, and others have drawn lessons from the project, implemented in its close and near vicinity. A decision of great impact was to isolate the test case walk-up experiment as nested learning cycle, to serve not only as informant for the renovation of the larger building, but also to inform the renovation of other walk-up public housing projects. This choice was, at least partly, driven by the UKR subsidy. Again, there is a coincidental parallel to the genesis of the complex where the 1933 Amsterdam Affordable Housing competition also served as a nested learning cycle for the urban design of Landlust and the architectural design of the AWV building there, which in turn was purposely conceptualised as a nested learning cycle for normalising the housing production of the AWV.

The Koningsvrouwen project served as a nested learning cycle in the Exosystem, directly influencing the evolution of both the Het Schip and the Bosleeuw Midden renovations. In the end the financial costs were not all devolved to the direct beneficiaries: because the AWV is a housing association, these expenses were carried from Microsystem (direct tenants) to Macrosystem (tenants of other AWV housing) ant the Exosystem, the Dutch tax-payer.

Both the nested trial and main renovations were used for concrete experience and reflective observation, initiating new processes of abstract conceptualisation and active experimentation post-2012 that extended the impact of the mutation beyond that of the project itself (Bosleeuw Midden, Het Schip and other housing blocks managed by Eigen Haard). The architects and owners served as proximal actors, transferring lessons learnt. In this way the mutation of the Versteeg block influenced its own ecology and became an Exosystemic factor of the ecologies of other building mutations.

6.7 Postscript: The Landlust Kitchen

Architectural historiography, focused on the individual and the event, painted a distorted picture of the genesis and evolution of the Landlust neighbourhood and the AWV complex. By rephrasing the history in the *longue durée* as a cyclical ecology, framed through Society, Economy and Technology, a different narrative emerges. This reading, contained in the above chapter, may have led to a different renovation

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project of the Koningsvrouwen van Landlust, possibly strengthening calls for a museum dwelling, or close scrutiny of the value of the building as experiment, not as architectural formalist expression, but as an important technological and tectonic milestone in Dutch public housing.

Fortunately, the distorted history of the Landlust zeilenbau public housing also added conservation benefits for the urban plan, the buildings' exteriors and their structures. Like the initial inclusion of the Versteeg AWV complex as Amsterdam municipal monument, one can but only conclude that the inclusion of the Versteeg kitchen in the Amsterdam Museum collection was made due to an error in ascribing authorship. What will and what should this newfound knowledge lead to?

FIG. 6.38 The AWV Versteeg kitchen in the collection of the Amsterdam Museum [Objects KB 2460 and KB 2457], erroneously identified as the 'Landlust Keuken' designed by Merkelbach & Karsten with Janzen (Amsterdam Museum, [s.a.]).

Will the historical value of this kitchen diminish or increase due to a change in association? Should it be revalued? The Versteeg kitchen for the AWV demonstrates a high level of functionalism dependent on a technological inventiveness, married with a quiet classical elegance. It was designed to serve, hygienically efficiently and comfortable, and was produced within strict economic limits. It reflects the general aspirations and resultant development of the time and summarises the integrity and innovativeness of the Versteeg AWV complex as an unappreciated, but none-the-less gripping and important social, economic, technological and architectural experiment.


Jeruzalem, Frankendaal, renovations underway in 2017.

7 Case study 3: Tuindorp Frankendaal, Amsterdam

The economics of crisis –

7.1 Introduction

The Tuindorp Frankendaal[1] (Frankendaal Garden Village) public housing project in Amsterdam-East, was commissioned by the *Gemeentelijke Woningdienst* (Municipal Housing Service) of the City of Amsterdam and constructed during 1949–51. Notable designers contributed directly or were involved indirectly in its genesis–Cornelis van Eesteren and Jacoba Mulder (urban design of the entire neighbourhood), Ben Merkelbach, Charles Karsten, Piet Elling, Mart Stam (public housing component), Mien Ruys (public housing landscaping) and Aldo van Eyck (play grounds for the public housing communal parks). They were noteworthy protagonists of the Modern Movement in the Netherlands.

1 Alternatively, also spelt Frankendael, a spelling that has become more popular recently. The original urban and architectural development plans (1947–50) refer to 'Frankendaal' and that spelling is continued in this chapter. The name refers to the former Frankendaal country estate that was located in the Watergraafsmeer Polder, of which the manor house still exits.

The public housing estate formed part of a larger urban development plan for Tuindorp Frankendaal. The Frankendaal neighbourhood was a component of the amended Amsterdam Algemeen Uitbreidingsplan (Amsterdam Extension Plan, AUP), approved in 1935, but mainly executed after World War II (WWII). The Frankendaal public housing estate development included larger freestanding houses, shops, schools, parkland and a church. The urban designers of the City of Amsterdam introduced the so-called *woonhof* (lit. residential court) in their Frankendaal plan; a novel urban block typology that would have a large-scale application during the Dutch Post-War Reconstruction.

The public housing at Frankendaal was constructed utilising prefabricated concrete construction elements in combination with traditional masonry work. Most of the housing units were designed as temporary 'duplex' dwellings; an interim measure to address the urgent post-WWII housing crisis in the Netherlands. The Dutch 'duplex' refers to the division of a single double-storeyed dwelling into a ground floor and top floor unit.

FIG. 7.1 The completed Frankendaal public housing estate, photographed in 1951 by Ben Merkelbach (SAA: 5293FO006116).

At Frankendaal, 390 public housing dwellings were split in two at the time of their construction to temporarily house 780 families. This situation was intended to last for a maximum period of only ten years. The public housing project additionally included six shop-houses and four single-family houses (not temporarily split) with an associated landscape.

This mass-produced housing estate was transferred to three housing associations on completion. The three housing institutions and their successors managed public housing at Frankendaal according to their own internal policies and processes. The housing remained occupied and the anticipated merging of two duplex dwellings into one only happened very occasionally. Most units remained unchanged as tiny as duplex dwellings.

Around the year 2000, a mere fifty years after construction, the public housing at Frankendaal came very close to being demolished to make way for an energy-neutral newbuild neighbourhood.

FIG. 7.2 An aerial photograph of the Frankendaal social housing estate with the Willem Dreeshuis old age home in the centre (SAA: 04139001174).

In 2007, the Frankendaal public housing was, however, included in the national list of *Top-100 Wederopbouw Monumenten 1940–1958* (Top 100 Reconstruction Monuments), indicating government's intention to list the complex as a *Rijksmonument* (National Monument). This led to a dilemma because the borough had already identified the neighbourhood as a *Herstructureringswijk* (Restructuring neighbourhood), which called for the demolition of the housing at Frankendaal.

After many discussions with the city, owners, inhabitants and other stakeholders, six woonhof housing blocks and the Professor Pieter Zeeman School (a so-called 'Double H-plan' school) with their associated landscapes were inscribed as National Monuments on 1 December 2010 as a representative unit for the larger neighbourhood.[2] The rest were earmarked for demolition.

In anticipation of the final decision to list a portion of the public housing and the school and their associated landscapes as national monuments, plans were drawn up for a radical renovation experiment of a single housing unit. This trial restoration was executed under the watchful eye of the *Rijksdienst voor het Cultureel Erfgoed* (Cultural Heritage Agency of the Netherlands, RCE) and the *Bureau Monumenten en Archeologie* (Bureau for Monuments and Archaeology, BMA)[3] of the City of Amsterdam. This project included replicating and reengineering the entire façade, installing a total new service system and remodelling the interior of the unit.

The financial crisis that unfolded at the end of thw decade put renovation plans on hold for a while until 2015 when new plans were developed to renovate both monument and sections of the not-listed public housing blocks of Frankendaal. These renovations, which again included experiments preceding implementation, were executed in the period 2016–2018.

Today a significant portion of the original Frankendaal project–three public housing blocks as well as the Ingenhouszhof and Willem Dreeshuis old age home–have been demolished to make way for new housing. The Rochdale and De Key housing foundations between them own the remaining original public housing stock, now referred to as *Jeruzalem*. Six of these are protected as national monument, the remainder is classified as Order 1 buildings by the City of Amsterdam.

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2 Complex Number 528268 containing Monument Numbers 528278, 528279, 528280, 528281, 528282, 528283, 528284, 528285, 528290, 528291, 528292, 528293, 528294 and 528295 (Rijksdienst voor het Cultureel Erfgoed, 2010). While commonly referred to as Jeruzalem, the RCE in the nomination file formalises the name as Frankendaal, but in the same document also refers to the monument as 'complex JERUZALEM', indicating that these names are interchangeable.

3 Now Monumenten en Archeologie, M&A (Monuments and Archaeology).

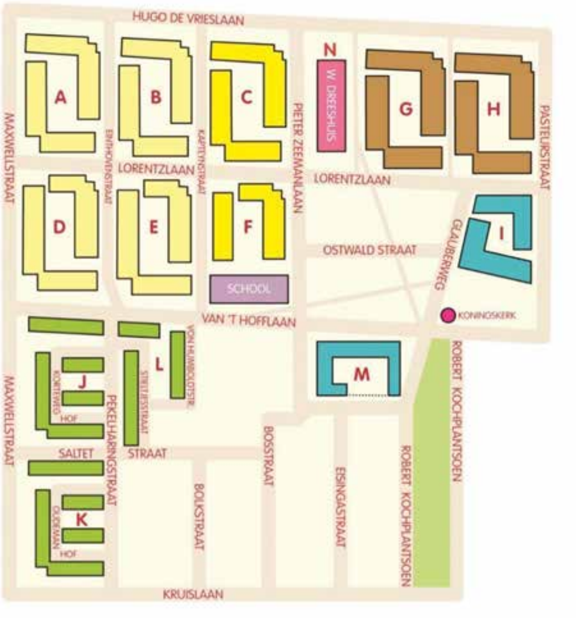

FIG. 7.3 Diagramme of the urban structure of the Frankendaal social housing complex, blocks A–F are registered as national monument, J, K & L are protected as Order I. G & I are new-build housing blocks (Heren 5 archtiecten bna, Hooyschuur, & Studioninedots, [s.a], p. 4).

The Frankendaal national monument contains five courtyard blocks, (A, B, C, D and E) each in turn made up of two L-shaped housing blocks, which surround a green courtyard forming a woonhof. The one u-shaped block (F) also forms a part of the Frankendaal national monument. Because of their repetitive nature, each urban block of the Frankendaal public housing estate was assigned a letter as identifier in c. 2009., which has since then been used continuously to refer to the various blocks.

1 2

FIG. 7.4 The Ingenhouszhof shopping and housing building in Frankendaal, shortly after completion.(c. 1951; SAA: OSIM00004003850); [2] The Willem Dreeshuis old age home in the centre, (possibly c. 1970; SAA: 5293FO008800).

7.2 Case study themes

The Frankendaal public housing estate was fragmented, not only in the physical sense, but also in terms of status and ownership. The once uniform public housing neighbourhood is today fuzzy. This has affected the original unity of the neighbourhood. The differences in legal protection and ownership closely reflect the changes in Dutch housing policy.

The conformity of the original design and the subsequent varying ownership legal conservation statuses make it a suitable case study in evolution in the built environment. Even though six of the blocks have been listed as a National Monument, its ownership is split between two housing foundations. This led to different restoration and renovation projects being implemented in the same monumental complex over time. Then there are the blocks that are not protected as monuments, some of which have been demolished, while others have recently undergone extensive renovation.

The Frankendaal case study allows the opportunity to explore divergent evolution in the built environment, illustrating the role of Macrosystemic, Exosystemic and Microsystem factors in how heritage learns. It provides a rare opportunity to track the same stock through different ownership and protection regimes. In this overview the requirements for 2E+Co will take a central role and help illustrate how housing learns, and if and how they change once housing evolves into heritage.

7.3 Defining learning cycles

Three learning cycles can be defined during the lifespan of the Frankendaal public housing estate. The genesis of the project dates to 1947–1951, including its abstract conceptualisation and active experimentation.

The first learning cycle commenced at the time of the genesis of the prefabricated concrete dwellings. Even though first upgrades were undertaken almost simultaneously in 1986–1987, this rather superficial facelift certainly changed the physical fabric and did not punctuate the learning cycle.

The second learning cycle only commenced in 2009, the year before a part of the Frankendaal public housing estate was listed as National Monument. This took the form of a short, focussed, experiment. The experiment was terminated before the cycle could be completed due to the global financial recession. From 2015 onwards, the most recent learning cycle unfolded. Large-scale renovations were planned and implemented, and a new period of concrete experience commenced.

TABLE 7.1 The evolution of the Frankendaal public housing estate to Jeruzalem, Frankendaal.

Learning Cycle	Dates	Designation	Phases
1	1951–2009	Frankendaal public housing estate	– Genesis: Abstract conceptualisation and Active experimentation: 1947-1952 (Planning and construction phase) – Concrete experience, including some maintenance – Reflective observation
2	2009-2011	Jeruzalem	– Abstract conceptualisation – Active experimentation – Concrete experience – Reflective observation
3	2015–2018	Jeruzalem	Abstract conceptualisation – Active experimentation – Concrete experience: 2017/18 –>

7.4 Learning cycle 1 (1951–2009)

7.4.1 S•E•T

The environment in which the Frankendaal public housing estate came to be, was highly influential in shaping its morphology. The social and economic conditions after WWII (1940–45) were coupled with technical developments and reconstruction ambitions to construct the set against which the radical design for the Frankendaal public housing was developed.

7.4.1.1 Society

Despite a Dutch declaration of neutrality in September 1939, military forces of Nazi Germany brutally invaded the Netherlands on 10 May 1940. WW II and the Nazi German occupation had far-reaching implications in the Netherlands. By the time the occupying forces capitulated on 5 May 1945, the country was faced with the reconstruction of war-damaged buildings and infrastructure and an urgent housing shortage. During this period the Netherlands had lost an estimated 82 000 dwellings, 45 000 were heavily damaged and 476 000 more required light repairs.[4]

War damage was, however, not the only cause of the housing shortage. The capabilities and position of the Dutch public housing foundations had been severely undermined during the decade preceding WWII. The financial crisis following the 1929 stock market crash drove material and labour costs sky high. At the same time the national government attempted to privatise housing provision by stimulating so-called 'middle-income housing', constructed by private developers. National subsidies and low-interest loans for housing foundations were dramatically reduced.[5] To repair the damage done to the built industry a *College van Algemene Commissarissen voor de Wederopbouw (*College of General Commissioner for the Reconstruction) was already installed during the occupation. Housing production, already at very low levels came to a complete standstill when the German occupiers prohibited all civil construction from 1 July 1942 onwards by proclamation of a *Bouwstop* (Building Stop).[6] The effects of the Bouwstop of 1942 further exacerbated the housing shortage, already acute due to the stagnation of production as a result of the financial crisis of the 1930s and liberal fiscal national policies.

By the time the war ended, the country counted less than 2 million dwellings and ±10 million inhabitants.[7] This meant that on average six people had to be accommodated in every extant home.[8] Many of the gains made since the promulgation of the *Woningwet* (Housing Act) of 1901 had been erased. The housing foundations–the main agents for housing production for lower income citizens before the War–were in no position to undertake the huge task of repairing war damage and address the housing backlog.

4 (Siraa, 1989, p. 43).

5 (De Vreeze, 2001).

6 This was under order of the German occupiers in order to prioritise the improvement and expansion of the Atlantikwall coastal defences of the west coast of mainland Europe (Siraa, 1989, p. 27–8).

7 (Van der Schaar, Faber, Koffijberg, & Priemus, 1996, p. 20).

8 (Hereijgers & Van Velzen, 2001, p. 47).

The Dutch government in exile (May 1940–May 1945) had been preparing for the reconstruction of the country after the War and a *Ministerie van Openbare Werken* (Ministry for Public Works) was established within a month after the German capitulation on 5 May 1945. A newly formed C*ollege van Algemeene Commissarissen* of the *Ministerie van Openbare Werken en Wederopbouw* (College of General Commissioners of the Ministry of Public Works and Reconstruction) replaced the war-time College.[9] The central government, through its Ministry of Public Works, tasked municipalities with housing production which, on completion, was then to be transferred to the various public housing foundations to manage. This meant that public housing institutions had to take ownership of housing of which they had little say in the design and construction. The Ministry for Public Works was soon renamed the *Ministerie van Openbare Werken en Wederopbouw* (Ministry of Public Works and Reconstruction) within three months of its establishment. By 1947 it had become the *Ministerie van Wederopbouw en Volkshuisvesting* (Ministry for Reconstruction and Housing). This indicated a shift in focus of reconstruction efforts from infrastructure to housing.

A total of near 13 000 temporary emergency dwellings and 4 500 temporary emergency farmsteads were constructed over what was left of 1945 and 1946.[10] In 1946 it was estimated that on average 70 000 dwellings needed to be constructed per year between 1947 and 1961 to meet the demand and overcome the urgent housing crisis. This was double the housing production of the years leading up to the War.[11] The College formulated an annual *Bouwplan* (Construction Plan), expressed in fiscal estimations of the building volume for that year, to steer the infrastructural and building construction in general, including housing production for that year.[12] From 1948, the Ministry instituted a process of decentralisation of housing construction: each municipality had to design and adopt a spatial *Wederopbouwplan* (Reconstruction Plan) before the central authority would release the necessary resources for construction.[13] But the country lacked the means to address the challenge in the manner and the using of the technologies it had done historically. The weakened position of independent housing institutions further exacerbated the problem of housing production. New strategies were urgently needed to meet this challenge.

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9 For an extensive history of the governmental institutional history of this time see (Siraa, 1989) and (Bogaarts & Ruijters, 1996).

10 (Nicolaas, 1972, p. 16).

11 (Van Ettinger, 1946, p. 528).

12 (Siraa, 1989, p. 53).

13 (Siraa, 1989, p. 70); (Blom et al., 2017, p. 10).

7.4.1.2 Economy

Construction Economy – Materials and Skills

The construction of such a huge number of dwellings provided the impetus to transform the building sector into one of the most important drivers of the post-War Dutch economy. Construction material and skilled labour shortages were of the most urgent issues to be dealt with to get housing production going again. The economic crisis in the 1930s had led to high unemployment, as high as 50% in 1936 under construction workers,[14] and the rate of education of craftsmen had consequently declined. As a result of the Bouwstop proclamation, no craftsmen had been trained in the Netherlands and many had retired or found new occupations or were casualties of the War.

While the country had the raw materials and the means needed to produce bricks, like during and directly after WWI, the energy-shortage (coal) meant that the required volumes could not be produced, and where production was possible, a shortage of skilled brick sorters and the use of lignite as replacement for coal, compromised both the production and quality of bricks produced.[15] In short, bricks–a historic mainstay of the Dutch construction industry–was less than ideal in 1946 for the massive reconstruction task that lay ahead.[16]

This post-War material and labour scarcity and subsequent high-costs were factors that could not be ignored in reconstructing the country. Construction material shortages were so severe that the Dutch Government went further in intervening in the production and distribution of construction components and materials than it had dared to do after WWI. The College of General Commissioners of the Ministry of Public Works and Reconstruction intervened directly in the manufacture, procurement and distribution of construction materials and components.[17] At the same time, the new national government identified housing construction as a key driver for economic development to stimulate the local economy. It was also essential that the persistent trade deficit the country was faced with, be addressed. The consequence: stimulating industrial development and limiting construction material imports.[18]

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14 (Bervoets & Berkers, 2003, p. 205).

15 (Stichting Ratiobouw Bouwcentrum, 1946b, p. 656).

16 (Stichting Ratiobouw Bouwcentrum, et al., 1946, p. 13).

17 (Bogaarts & Ruijters, 1996, p. 3751).

18 Nicolaas, 1972, p. 20); (Van der Schaar et al., 1996, p. 20).

The prefabrication of mass-produced construction elements was much encouraged by the national government in an effort to stimulate local industrial development. The aim was to reduce a dependence on scarce and expensive crafts while at the same time improving construction speed and efficiency, with the anticipation that this would reduce cost.

Unlike the post-WWI situation, such industrialized housing met with less opposition from architects, municipal makers and public housing associations. This was mainly because the housing shortage was so large that the benefits brought by mass-production simply could not be ignored. In addition, many architects had spent the war-years studying efficient housing construction.[19]

Timber was the scarcest of construction materials during this period and the post-War Dutch government entered into trade treaties regarding access to timber reserves.[20] In 1946 the College issued a prohibition on the use of timber in the building industry where alternative materials could replace it. This restriction included roof trusses.[21] A year later, the *Stichting Bouwcentrum* (Building Centre Foundation, located in Rotterdam),[22] calculated that the use of alternative materials for roof construction could bring about a saving of as much as 20–40% in timber use per house.[23] By 1947, the timber shortage was so acute that it was seen as endangering the entire reconstruction effort.[24] The timber crisis deepened during 1948[25] despite a continuing sequence of treaties and agreements with other countries. Construction-timber remained in short supply well into 1949.[26]

19 See also (Siraa, 1989); (Bosma & Wagenaar, 1995) & (De Vreeze, 1993, p. 210–7) for more on centralization in housing policy, distribution of construction materials and rationalization of construction.

20 One example of such a treaty for the delivery of timber was signed with Czechoslovakia in 1946 (Stichting Ratiobouw Bouwcentrum, 1946c).

21 (Stichting Ratiobouw Bouwcentrum, 1946a).

22 Created in 1946 from the Bureau Documentatie Bouwwezen (Construction Industry Documentation Office), which in turn was founded in 1943 (Siraa, 1989, p. 30).

23 Based on a typical pre-war single-family home design (Stichting Ratiobouw Bouwcentrum, 1947c).

24 (Stichting Ratiobouw Bouwcentrum, 1947b).

25 (Stichting Ratiobouw Bouwcentrum, 1948b).

26 A so-called timber-treaty signed with Sweden provided for amongst others, 325 000 m3 construction timber to be imported to the Netherlands over the period 1 March 1949 and 1 March 1950 (s.n., 1949b)

To make matters worse, roofing tiles were so hard to come by during 1948[27] that the country was forced to spend valuable American European Recovery Programme (Marshall Plan) funds on importing tiles from Belgium.[28] This further stimulated the search for alternative cost-effective roofing systems that avoided the combination of timber and tiles.

In response to the crisis, the Dutch trade journal *Bouw*[29] ran a series of articles during 1946 and 1947 focussing on substitutes and measures to reduce the use of timber in construction, while reporting constantly to the volumes of timber that became available sporadically up to 1949. These articles nearly always propose alternatives to traditional timber construction using concrete, especially for roof construction.

The choice for concrete as preferred material of choice for the Dutch Reconstruction was economically pragmatic. The Netherlands had its own natural coal and lime resources[30] and the *Eerste Nederlandse Cement Industrie* (First Netherlands Cement Industry, ENCI, founded in 1924, its operations commencing in 1926) in Maastricht had come through the war unscathed as had the ENCI blast furnace cement facility at IJmuiden. The ENCI had been of strategic importance to both to the occupying forces–for construction of defence infrastructure–and to the Allied forces who spared the ENCI facilities from bombing because of their potential importance in the anticipated reconstruction of the Netherlands. Coal mining, however, was severely disrupted by the War, leading to acute shortages.

The shortage of iron and steel was also a factor to be addressed. The NV Hoogovens blast furnaces at IJmuiden–despite being repeatedly bombed during 1944,[31] and further ruined by the retreating Germans towards the end of that year –were, however, soon back in production.[32] For the building industry this had the additional benefit of more cement for the local market: the Cement Industrie

27 (Stichting Ratiobouw Bouwcentrum, 1948d, p. iv).

28 (Stichting Ratiobouw Bouwcentrum, 1948e, p. i).

29 This journal was established by the Bouwcentrum and soon became the most influential magazine of the Dutch post-WWII Reconstruction period.

30 Increasing the concrete production capacity of the Netherlands was deemed so important that the ENCI was awarded an enlarged area of the limestone Pietersberg in Maastricht for a period of 60 years in 1948. This meant that the already approved Maastricht urban expansion plan had to be amended (Stichting Ratiobouw Bouwcentrum, 1948d).

31 Today, Tata Steel IJmuiden. The complex was repeatedly bombed by the Allied Forces (RAF) amongst others during the nights of 14, 21 and 27 January 1944, (s.n., 1944a); (s.n., 1944b) but this does not seem to have brought production there to a halt.

32 (Aneta, 1944).

IJmuiden (CEMIJ)[33]–a collaboration between the NV Hoogovens and the ENCI–produced blast furnace cement (*hoogovencement*) from slag at IJmuiden from at least 1930.[34] By 1947 both iron and steel were available to the Dutch building industry, though still rationed, and used as substitute for timber,[35] which was imported from Belgium, Luxemburg and Czechoslovakia, amongst others.[36]

Despite post-War coal shortages,[37] Dutch cement production industries were operating at maximum capacity by the fourth quarter of 1946, producing half the amount of cement the country's building industry was then consuming. After all, it took only 360kg of coal to produce 1 ton of Portland cement.[38] The country was in a good position to stimulate a new home-grown industrial construction industry in the form of concrete prefabrication (Portland cement of blast-furnace cement). However, the increase in domestic demand eventually outstripped the increase in domestic production and cement imports swelled by nearly ten-fold between 1945 and 1948 as construction increased.[39] Careful engineering concrete structures and prefabricated elements remained a priority to limit waste, cost and imports.

Construction Economy: Standardization and mass-production for efficiency

Standardisation emerged as one of the drivers of construction development after WW II. The War had been won as much by assembly lines as by soldiers. This had conclusively proved the efficacy of mass-production manufacturing processes.

During the pre-WWII period, investigations into housing development in the Netherlands had prioritised standardising housing prototypes over the development of industrial construction processes. At the same time a new focus on efficiency emerged as a national theme during this period, as expressed by the newly founded *Nederlandsch Instituut voor Efficiency* (Netherlands Institute for Efficiency, 1923),

33 Today ENCI IJmuiden.

34 Blast furnace cement was used in the construction of public housing at Betondorp in 1923–24, but it is unclear where this was manufactured (Kuipers, 1987).

35 (Bouwstoffen, 1947a).

36 (Bouwstoffen, 1947b, p 809).

37 Marshall Plan funds were used to tide over coal-supply problems and American coal reached Dutch shores in 1948 (Van Overbeeke, 2001, p. 158).

38 (Bouwstoffen, 1947a).

39 The 51,3 tons of cement imported in 1945 increased to 435,9 tons in 1948 (Fransen, 1948, p. 383).

established with the purpose: "…to prevent wastage of intellectual, physical and material labour by improving working methods and through efficient administrative organisation."[40]

The *Nederlandsch Instituut voor Volkshuisvesting* (Netherlands Institute for Workers Housing, NiV) also embraced the concept of efficiency. In 1923 already, the NiV published four discussion documents, including one each by Plate and Keppler that addressed the housing issue for the workers' class: The general conclusion of the NiV, according to the newspapers at the time, was that the cost price of building workers housing, could only be reduced through the application of the principles of 'efficiency'.[41]

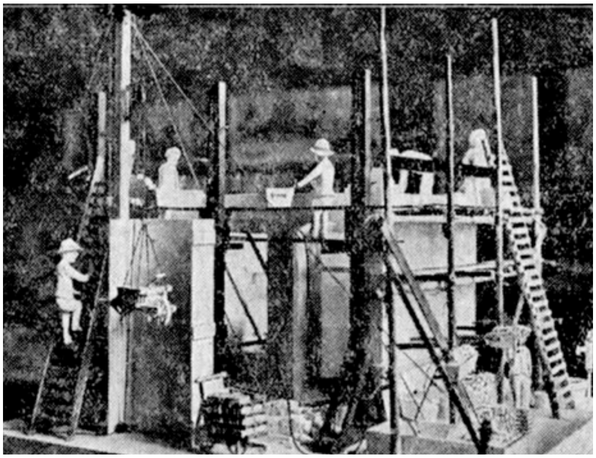

FIG. 7.5 A model showing efficient construction in comparison to traditional methods, exhibited in Amsterdam in December 1928 during the two-day Efficiency congress. (s.n., 1928b).

A two-day congress in Amsterdam in 1928 included an exhibition of physical models at the *Stedelijk Museum* (City Museum). One of these models showed a traditional construction site, with workers manually hauling bricks up to the works on the one side, and the efficient application of new technologies, in the form of a mechanical lift on the other. These ideal found fertile ground after WWII.

In 1947 the *Ministerie van Wederopbouw en Woningbouw* (Ministry of Reconstruction and Housing) initiated the *Studiegroep Efficiënte Woningbouw* (Study Group for Efficient Housing Construction). The aim of this agency was to develop

40 "ten doel stelt verspilling van intellectueelen en lichamelijke arbeid en van materiaaal te voorkomen, door verbetering van arbeidsmethoden en door doelmatige administratieve organsiatie." (s.n., 1928a).

41 (s.n., 1923b). See also (De Vreeze, 1993, pp. 166–73).

"ways by means of rationalisation of traditional building methods to come to greater efficiency and consequently cost savings in mass housing."[42] The urgency of the housing crisis, compounded by a skills shortage, construction material shortage and a national trade deficit, came together in a strategy to stimulate the efficient production of labour-saving prefabricated modular concrete construction systems through subsidies. Mass production was one way of doing so, and subsidies were created to stimulate further innovation towards this goal.

Spatial efficiency

The Studiegroep Efficiënte Woningbouw did not only focus on construction processes and systems–including the production of materials and components, technical installations, transport and financing–but also aimed at bringing rationalisation and efficiency to the design of dwellings, especially that of floor plans. A subcommittee of the Studiegroep, the *Onderwerkgroep Plattegronden* (Subgroup Floor Plans) was tasked with reducing commonly applied floor plans to rational and efficient standard models.[43]

One way to address the urgent housing shortage was to plan for the temporary double-occupation of dwellings, a common post-War occurrence where multiple families were forced to share one house. This temporary measure could be planned into new housing: the controversial temporary duplex.

The duplex was not a new phenomenon in the Netherlands. The *beneden- en bovenwoning* (two stacked single-family dwelling) was common for working-class housing. A duplex typology had also been applied at Betondorp, Watergraafsmeer, albeit meant as permanent duplexes, during the housing crisis that followed WWI.[44]

After WW II, the duplex-principle was explored as a temporary measure: two small homes that would be joined to become one within a period of maximum 10 years. The city of Hengelo, constructed some of the first examples of temporary duplex housing, in part from demolition rubble, which was competed in December 1946. The temporary duplex-type received much positive and negative comment in the

42 "teneinde middelen te beramen om door rationalisatie der traditionele bouwmethoden tot grotere efficiency en daarmede tot kostenverlaging in de massale woningbouw te komen." (Van den Broek, 1948, p. 393). The study group consisted of JH. van den Broek, HN Dutilh, J. van Ettinger, JP Mazure, ZY van der Meer, JF Posthumus, AO Schuil and JJ van der Wal.

43 (De Onderwerkgroep Plattegronden - Studiegroep Efficiënte Woniningbouw, 1948, p. 2).

44 See (Kuipers, 1999) for more information.

construction press, especially in the journal *Bouw.* In a 1947 article in *Bouw* titled *Dubbele bezetting van nieuwe woningen* (Double occupation of new houses) the *Directeur van Gemeentewerken en Bouw- en Woningtoezicht* (Director of Municipal Works and Building Controls) of the city of Almelo propagated the implementation of the temporary duplex principle, which according to him, had been 'sentenced to death' by the ministry.[45] This was because the temporary duplex had received the official thumbs-down by now. The *College van Algemeene Commissarissen* (College of General Commissioners) of the Ministry of Public Works and Reconstruction declared it an undesirable housing type in 1947. However, a number of municipalities opting to experiment with the principle. For instance, the city council of Zuilen (today part of Utrecht) approved a plan to construct 126 duplex dwellings on the *Burgemeester Van Tuyllkade* in 1948.[46] The high housing need meant that the temporary duplex, despite its many disadvantages, simply could not be disqualified.

The Studiegroep Efficiënte Woningbouw's Onderwerkgroep Plattegronden decided to briefly investigate temporarily splitting new dwellings into two to allow for the short-term double-occupation of houses. In parallel, a grouping of progressive architects, the *Kerngroep Woningarchitectuur* (Core Group for Housing Architecture) collaborated with the central directorate of the Ministry of Reconstruction and Housing to further investigate the temporary duplex. Together, they called on architects to submit proposals for temporary duplex housing in an effort to improve the efficiency of the temporary duplex-type. These houses had to be functional as double family dwellings but also be convertible to functional single-family residences in an efficiently easy and economical manner. The most promising submissions were published in 1947.

In the following year, the Kerngroep Woningarchitectuur was less cautious than that of the College when publishing its conclusions on the temporary duplex-house. They concluded that this strategy could have value, but should only be used to temporarily house small families. In response, the Ministry advised against the application of the temporary duplex in instances where it would lead to reducing the dwelling size for what was referred to as 'normal' families;[47] two parents with two to four children, all accommodated in three bedrooms: one for the parents, a boys' room and a girls' room.

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45 (Hartstra, 1950).

46 (Stichting Ratiobouw Bouwcentrum, 1948c, p. I).

47 (Studiegroep Woningarchitectuur, 1946, p. 9).

In ’t Veld’s ministry revoked the decision against any temporary duplexing of housing in the Netherlands taken by his predecessor’s ministry and implemented an official policy to stimulate the construction of dwellings that could be occupied by two families for a limited period of time.[48] In ‘t Veld served as mayor of the city Zaandam before being appointed as Minister for Reconstruction and Housing. His appointment coincided with the much-welcomed implementation of the Marshall Plan, which provided external funds for European economic reconstruction. The Marshall Plan encouraged mass-production in various, fields including the building industry.

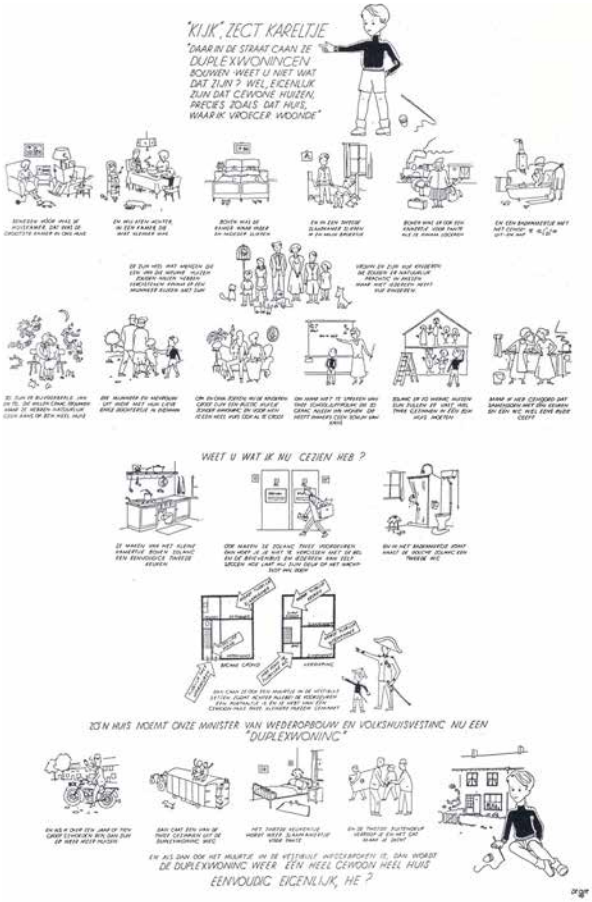

FIG. 7.6 Cees le Cler’s often-published cartoon describing the (temporary) benefits of duplexing homes (Van Rossem, 2001)

48 (De Jonge, 1994).

By the end of 1948 the temporarily duplex had been accepted by the Ministry as housing model. A much-reproduced pamphlet issued by the Ministry of Reconstruction and Housing explained the system, describing the principles of the temporary double occupation of new dwellings as infographic, in 1949. The cartoon was drawn by architect Cees de Cler–himself a member of the Kerngroep Woonarchitectuur and one of its assessors of temporary duplex plans–describes the principles of the temporary double occupation of new dwellings as infographic. This pamphlet gave the 'duplex dwelling' the Minister's personal stamp of approval: "This is what our Minster for Reconstruction and Housing now calls a "Duplex" dwelling."[49]

Despite the ministerial approval, the temporary duplex remained a topic for discussion, especially because there were concerns about the length of time people would need to live in these sub-par units. The chair of the *Limburgse Katholieke Bond van Woningbouwverenigingen* (Limburg League of Catholic Housing Associations) calculated in 1950 that it would take twenty years before 20 000 would be converted to 10 000 single family homes.[50] In general, however, the conclusion was that the temporary duplex was a necessary evil, passable only because it was temporary. The housing inspector of the aforementioned duplex housing at Hengelo concluded that for her, "…in comparison to a normal house, the duplex house is not very satisfactory ... In this context, it is better to consider the duplex house more as a form of housing that is halfway between a shared and an undivided house."[51]

Home Economy: Energy Efficiency

Energy provision for households in the Netherlands was severely restricted during and after the War. Coal, the energy source for electrical generation and gas production was in short supply. In the years following the War, electricity and gas were rationed during winter months to deter residents from heating their homes.[52] Electricity shortages were so severe that radio broadcasts were suspended during

49 "Zo'n huis noemt onze minister van Wederopbouw en Volkshuisvesting nu een "Duplexwoining"." Reproduced in (Blom at al., 2004, p. 9).

50 "Ik meen, dat de 10.000 duplexhuizen, die men gedurende 10 jaren, dat worden dus 20.000 duplexwoningen, op de woningmarkt wil brengen… zou het 20 jaren duren voordat de laatste duplexwoningen zouden zijn opgeruimd." (I believe that the 10,000 duplex houses that are planned to be put on the housing market over a period of 10 years, which means 20,000 duplex houses, would take 20 years to clear.) (Moubis, 1950).

51 "…de duplex-woning vergelijken met een normale woning, deze ons weinig bevrediging schenken… In dit verband is het raadzamer de duplex-woning meer te beschouwen als een vorm van huisvesting welke het midden houdt tussen een gedeelde en een niet-gedeelde woning" (Hartstra, 1950).

52 (Van Overbeeke, 2001, p. 157).

peak load hours in an attempt to limit use during 1948. For the time being, coal burners remained the norm for space heating in urban areas. This does not mean that the use of individual coal burners was deemed ideal for residential heating. At a meeting of the Royal Institute of Engineers (KIVI) in 1947, one speaker stood astounded to think that in "…317 dwellings, 317 house wives would need to service 317 stoves!"[53] While coal was initially a scarce commodity for households (reserved for industry), this energy source became more readily available after 1948 through the Marshall Plan. Although American coal was imported to the Netherlands, electricity and gas remained rationed until 1952.[54]

Resistance to central heating in subsidised housing, already prevalent before WWII, remained. According to W Scheerens, the secretary of the *Nationale Woningraad* (National Housing Board), the economic basis of a large portion of the Dutch population was so precarious that imposing a fixed energy cost in 1946, which he calculated at 1 guilder per week, was simply unjustifiable.[55] Energy scarcity did, however, not stimulate the development of construction towards energy use reduction, as the construction economy and efficiency outweighed home economy and comfort considerations in the Netherlands throughout the 1950s.

7.4.1.3 Technology

The Netherlands experimented with prefabrication and concrete construction under very similar conditions after WWI.[56] Despite remaining neutral during that conflict, labour and material prices also made traditional construction exceptionally expensive and first attempts were made to develop concrete construction systems (in situ, hybrid and precast), to address the chronic Dutch housing shortage.[57] One notable example is Betondorp, constructed with funding from the Amsterdam Municipality between 1923–25, and–like Frankendaal–located in the Watergraafsmeer polder. These experiments, and others in cities like The Hague / Scheveningen, Utrecht, Rotterdam and Den Bosch, failed to have an immediate impact on Dutch construction

53 "Waarom zouden nu in een woningcomplex van 317 woningen, 317 huisvrouwen zich vermoeien met 317 kacheltjes?" (De Graeff, 1947, p. 32).

54 (Van Overbeeke, 2001, p. 158).

55 (Studiegroep Woningarchitectuur, 1946); (Van Overbeeke, 2001, p. 164).

56 The dwellings designed by architect JB van Loghem for construction using the Bims Beton Bouw BBB) concrete construction system at Betondorp Watergraafsmeer during 1923–4 were duplex dwellings (Kuipers, 1987, p. 41).

57 (Kuipers, 1987).

because the price of bricks and labour soon returned to acceptable ranges and traditional construction processes regained their popularity.[58]

Interest in these construction systems and processes was reignited for the very same reasons–material and labour shortages and consequent costs–after WWII. One of the members of the Studiegroep Efficiënte Woningbouw study group, tasked with rationalising housing production for improved efficiency was JP Mazure. Mazure served as architectural advisor to the Dutch government during its exile in London. While still in exile and in anticipation of the looming reconstruction of the Netherlands, he and BHH Zweers co-founded the influential *Stichting tot Rationalisatie van het Bouwen* (*Ratiobouw*); (Foundation for Rationalisation of Construction) in 1943.[59] Ratiobouw started operating a year later. One of its tasks was to evaluate and approve building systems for use in the Netherlands.[60] Mazure became sole director of Ratiobouw when Zweers was appointed as professor at the Delft Institute of Technology (Technische Hoogeschool Delft). His inaugural lecture was somewhat predictably titled: *Rationalisatie van de woningbouw* (Rationalisation of housing production).[61]

According to both Mazure and Wim van Tijen, who also served on the Ratiobouw board, it was evident that new modes of construction were urgently needed. Mazure and Van Tijen authored an advisory document on housing production on behalf of Ratiobouw in 1946. A shortened version of this advisory was published in one of the many Bouwcentrum annexes to the reconstruction-period journal *Bouw*. Mazure and Van Tijen set out their arguments for the development of prefabrication and concrete construction systems in this advisory. They argued that the urgent housing crisis, the lack of trained craftsmen and the lack of construction materials–especially timber–could only be adequately overcome by prefabrication. They further reasoned that development of prefabricated concrete construction systems would improve the efficiency of the construction process, also as it would allow for construction during adverse weather conditions when traditional construction would need to be halted.[62]

Ratiobouw became an important player in a highly innovative Dutch post-War housing provision when it was tasked by the Ministry of Public Works and Reconstruction to evaluate all new construction systems. A positive Ratiobouw

58 (Stichting Ratiobouw Bouwcentrum et al., 1946, p. 13).

59 (Van der Wal, 1953).

60 (Priemus & Van Elk, 1971, p. 16).

61 (Zweers, 1946).

62 (Stichting Ratiobouw Bouwcentrum et al., 1946, p. 13).

technical and economic review was critical for the developers of systems as it would empower the Ministry to subsidise the use of an approved system to 10% of construction costs for up to 500 dwellings,[63] over and above the normal subsidies for housing provided for by the Woningwet! No less than 128 construction systems–many of them based on prefabricated concrete kit-of-part elements–had been submitted to Ratiobouw for assessment by the end of 1947. Only 21 of the submission were approved for tests, following which 19 were approved for general construction.[64] One of these was the Dotremont-Ten Bosch system, which was in time to be selected for the construction of the Frankendaal public housing estate.

7.4.2 The Dotremont-Ten Bosch prefabricated concrete house

The origin of the Dotremont-Ten Bosch prefabricated system relates to three men. Industrialist PJG Dotremont, gave the system its name and sponsored the development of a prefabricated concrete façade panel system, designed by the acclaimed Belgian architect LH de Koninck. De Koninck and Dotremont later extended it into a full prefabricated house system.[65] Dutch architect WTH Ten Bosch adapted it further to a full prefabricated house for construction in the Netherlands. The association between Dotremont and De Koninck dates to approximately 1929 when Dotremont commissioned De Koninck to design a house for him at Uccle, south of Brussels. This house was completed in 1932.[66]

House Dotremont is an important link in the history of the Dotremont-Ten Bosch prefab house system. De Koninck had been experimenting with construction systems for a number of years by the time he received the Dotremont commission. He applied two of his systems, Acia and Metrikos in House Dotremont.[67] Dotremont's interest in standardised construction was piqued, and he commissioned De Koninck to further develop prefabrication prototypes.[68] WWII intervened, but the work done

63 (Priemus & Van Elk, 1971, p. 16).

64 (Stichting Ratiobouw Bouwcentrum, 1947a).

65 (Havenith, 1953b).

66 De Koninck designed another project for Dotremont, a block of flats in the Rue du Doyenne, also in Uccle, soon after.

67 (Raaffels et al., 2017, p. 382); The building is located at 3 Schepenij Avenue, Uccle.

68 Metrikos formed the basis for as a prefabricated timber holiday bungalow prototype with flat roof called Tecta, which, along with a concrete Acia building, was publicly displayed in 1939. Both were displayed in the Parc du Cinquantenaire in Brussles in 1939 (Van de Voorde, 2011, p. 446).

in developing industrial construction systems before the War found fertile soil in post-War Belgium. The post-War reconstruction provided an idea context in which to produce and market a prefabricated concrete house that could be constructed in limited time with limited labour. In 1945 Dotremont established a company called Skalja to, amongst others,[69] further develop De Koninck's concrete Acia system. For design and technical assistance, he employed De Koninck.[70]

FIG. 7.7 The Acia house (Havenith, 1953a, p. 309).

Dotremont patented the column and panel façade system under the name Skalja. in Belgium in 1945 and in Great Britain and France in 1946.[71] The design consisted of prefabricated panels with an integrated hook hung onto a steel rod spanning horizontally between cross-shaped steel columns. The panels were not necessarily manufactured from concrete and could be made of any number of materials. Listed in the patent text are "…dense concrete… terra cotta, ceramic, glass, metal, artificial or natural stone, synthetic substances, etc. whose four lateral borders present a simple or multiple rabbet/s so that, when inter-engaging the borders of adjacent plates, joints of sufficient tightness and good stability in operative position are obtained by contact."[72] The first of at least 14 post-War building using the Skalja

69 A patent for a domed roof-light with opening system registered to the Skalja company in Belgium in 1959. See patent application number BE19590579336 and BE19590579337.

70 They were assisted by an engineer named Raes, according to Dotremont himself: "Parmi les réalisations importantes auquelles il me fut donné de participer dans leur phase initiale, je citerai le système préfabriqu´´<<Skalja>> que j'élaborai avec Monsieur Philippe Dotremont et Monsieur Raes, ingénieur conseil. (Among the important achievements in which I was able to participate in their initial phase, I will mention the prefabricated system "Skalja" that I elaborated with Mr Philippe Dotremont and Monsieur Raes, consulting engineer.) Quoted in: (Havenith, 1953a, p. 310). Possibly a relation of/or Jacques Raes who in 1962 published an article on the journal LM in 1962 on a small investment building in Brussels (pp. 99–100). Refered to in (Van de Voorde et al., 2015, s.n. [p. 451]).

71 (Dotremont, 1946, p. 1). Refer to patent application numbers GB19460011086 and FRD1070401.

72 (Dotremont, 1946, p. 1). A variation was possible: steel U channels over which concrete panels were hooked with timber blocks. (Dotremont, 1946, pp. 12–13).

patent façade system wereconstrcuted in Belgium. The first was an annex added to the De Koninck-designed Hôpital Molière Longchamp in Brussels in 1946.[73] Dotremont continuously improved the design, filing updated patenta in Great Britain and France in 1948, while registering the patent in Switzerland, Ireland and Germany over 1949–50.[74] The 1948 patents show an adaptation of the concrete column and panel system wich obviated the need for the horizontal steel rod.[75]

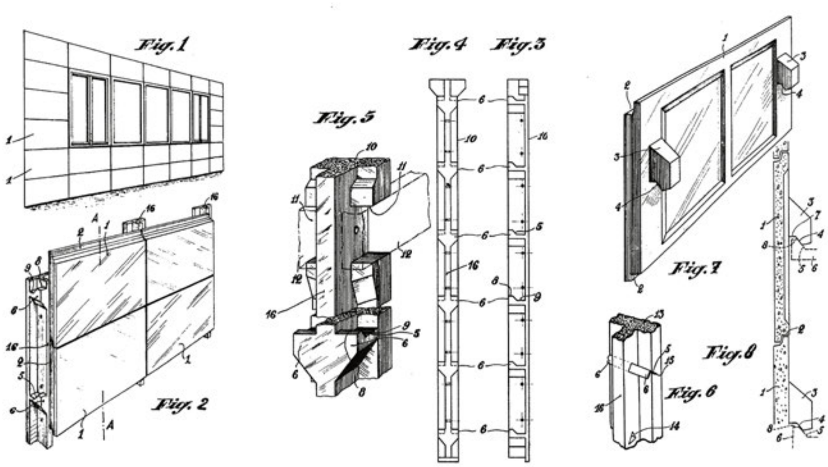

FIG. 7.8 Patent drawings for the Dotremont façade system lodged in Switzerland in 1948 (Patent no 281673).

73 (Delevoy et al., 1980, p. 214); (Van de Voorde, 2011, p. opp. 468). It is unknown if this building still exists. The former L'Hôpital Molière Longchamp is today the Molière Longchamp campus of the Iris Ziekenhuizen Zuid in Brussels. Other Skalje buildings include a house in Dies by C. Reynaert, a house in Zellik by R van Wijngaerden and a both a workshop and school in Hove by H Hoste (Van de Voorde, 2011, p. 466)

74 Patent numbers GB19480027882, FRD972187, CHD281673, IE19490000117 and DE1950D003379.

75 This column and panel system was further developed and later new amended patents registered in Germany, Great Britain, France, and also the Netherlands in May 1964. In this updated version the hanging system had been refined and the rebate profiles of the prefabricated vibrated concrete panels refined. It is not clear what De Koninck's role in the later development of the system was, but we can assume that some link remained as he remained resident in Uccle. That the Skalja façade was further refined shows that despite the rather low success in Belgium and short-lived but moderately widespread application of the system in the Netherlands, Dotremont still believed that the system had potential.

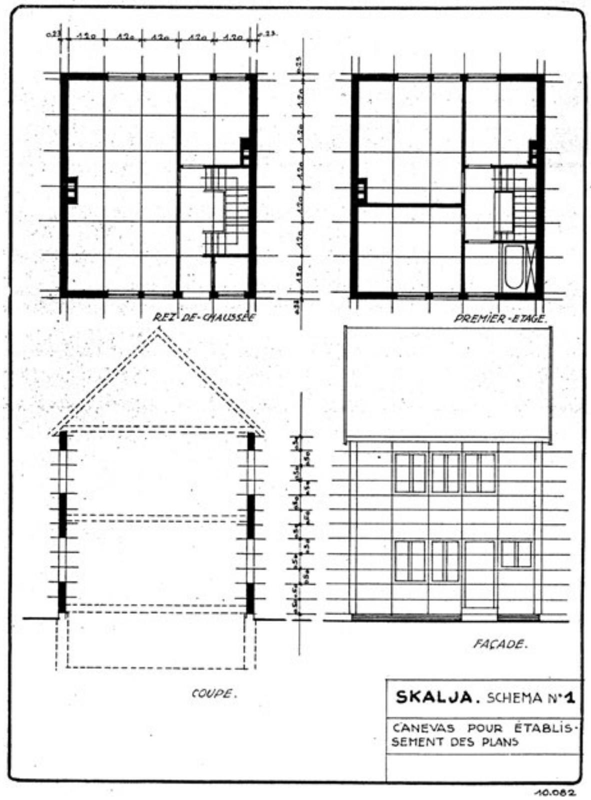

FIG. 7.9 The Skalja prefabricated house (Van de Voorde, 2011, opp. p. 468.)

In c.1951 the Skalja company published a catalogue of 33 prefabricated concrete elements that worked together in a modular system to construct Skalja house-types.[76] This included footings, columns, wall and corner panels, door- and window surrounds and sills, flooring channels, profiled floor slabs and even brackets to hold rainwater downpipes. All these concrete components were manufactured from vibrated concrete.[77] One application of the Skalja catalogue of parts, was the construction of a doubled storeyed rowhouse as illustrated in a Skalja catalogue.[78] The floor plan was divided into a wider bay for living and sleeping rooms, and a narrow bay to house the entrance, kitchen, stair, bathroom and small bedroom or study. This gave the house an asymmetrical façade. The ground floor living/dining room was designed as a *doorzonkamer*, a room that stretched from front to back of

76 (Van de Voorde, 2011, p. 468).

77 (Van de Voorde, 2011, pp. 467–69).

78 Reproduced in (Van de Voorde, 2011, opp. p. 468).

the house with larger windows on each side. Party walls were to be constructed of standard masonry bricks. Belgium was a net exporter of clay tiles, so there could be no objection to using these for the roof.

The Skalja prototype rowhouse may have been based on the designs of Ten Bosch for the Dotremont-Ten Bosch prefabricated concrete row housing. The links between Ten Bosch, Dotremont or De Koninck, and how Ten Bosch knew of the Belgian Skalja system remain a mystery. Seeking a market for his system, Dotremont, may have sought contact with the well-positioned French-speaking Rotterdam architect Ten Bosch because the war damage there had to be repaired.[79] It could also be that Dotremont sought to collaborate with Ten Bosch because he had designed the first zeilenbau housing in the Netherlands–a public housing developmen, called Jaffa in 1936 for the Municipality of Rotterdam–in collaboration with architect W van Tijen, who designed the urban plan.[80]

Wim Ten Bosch very quickly adapted the Skalja system for Dutch conditions as rowhouse. This was referred to as the Dotremont-Ten Bosch ‘system’;[81] but was in fact a rowhouse type utilising Dotremont’s patent Skalja prefabricated concrete construction system. The resulting Dotremont-Ten Bosch House was approved for construction by Ratiobouw in February 1948.[82] When Ratiobouw approved the system-built house for construction, it noted that the house employed prefabrication as far as possible, limited the use of skilled labour for its construction, made use of available materials and would be produced by existing manufacturers (thereby supporting and promoting industrial development). Ratiobouw, however, noted some misgivings regarding its cost effectiveness.[83]

79 Ten Bosch had designed a house for Minister In ‘t Veld when the latter was mayor of Zaandam before the war. They remained associated, as evidenced by a note on a letter from Ten Bosch addressed to the Minister of Reconstruction and Housing. In the note, Minister In ‘t Veld ask officials to bring him up to speed with regards to the Dotremont-Ten Bosch system as Ten Bosch would be visiting him on the following Saturday morning. Pencil note on (Ten Bosch, 1948b). In ‘t Veld also appeared at the opening of the school designed by Ten Bosch in Zuid-Laren on 6 January 1950.

80 It was completed in 1938. The urban plan was by JH (Jo) van den Broek and Willem van Tijen (Dettingmeijer, 1988, pp. 336–37); Ten Bosch was not a member of the CIAM, one possible reason why his work has been overlooked in favour of the work of CIAM members.

81 The earliest dated drawing for the system, 22 February 1948, located in the archive of the Ministry of Reconstruction and Housing lists the system in the drawing title block as ‘Montagebouw Systeem-Skalja, Dotremont-Ten Bosch’ (Construction System Skalja, Dotremont-Ten Bosch). The word ‘Skalja’ is pasted over. Was this because of copyright issues related to the use of the name ‘Skalja’? (NA. V23924. (5261). Asset No. 2.17.03 [Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer: Central Sectorarchive]).

82 (Mazure, 1948).

83 (Mazure, 1948).

The rain-screens, walls, floors, and even roof of the Dotremont-Ten Bosch proposal were to be constructed of pre-fabricated concrete elements. The specifications submitted to Ratiobouw list vibrated concrete façade panels, finished with a white marble granulate. The ground floor was an in situ floor slab on compacted fill, spanning between in situ concrete floor beams, which in turn spanned between pile heads. The first floor was to be timber planking over pre-cast concrete I-beams, under which a board ceiling would be nailed. The roof structure was to consist of pre-cast concrete I-beams, spanning between *kalkzandsteen* (calcium-silicate) masonry end-walls, over which light-weight *Antifer* concrete plates were laid.[84]

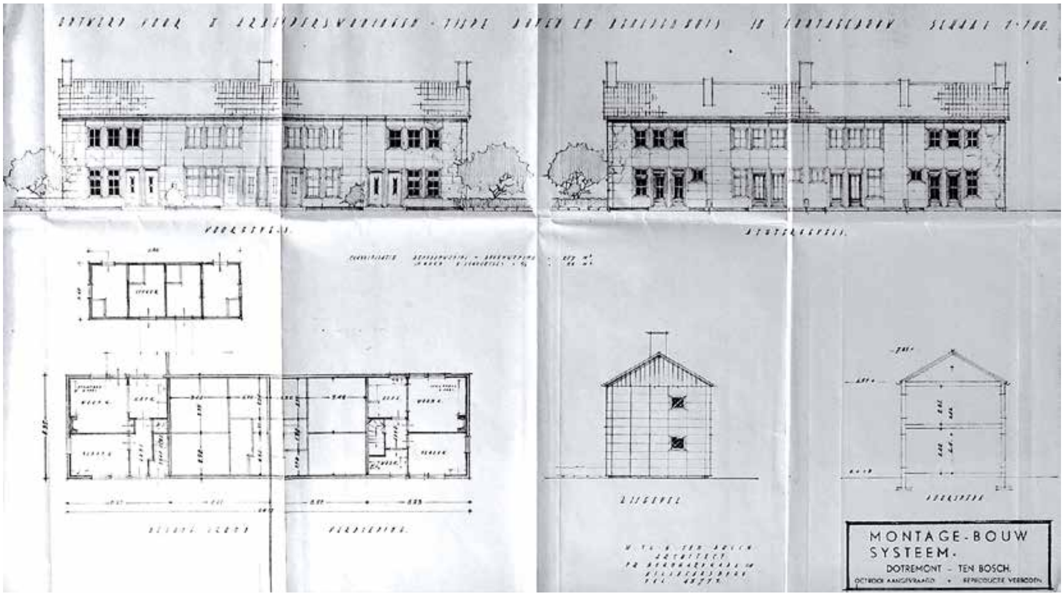

FIG. 7.10 The pre-fabricated Dotremont-Ten Bosch prefabricated temporary duplex row-housing design (NA:10807).

Clay roof tiles were to be nailed to timber battens, laid on rafters, which in turn were nailed into the Antifer sheets. The design result emulated typical Dutch single-family row houses following in the pre-war Delft School tradition, each with its own back-yard containing the ubiquitous garden shed in which a coal bin was located. The Dotremont-Ten Bosch house was effectively an amalgamation of designs of Ten Bosch, De Koninck and Raes.

84 Described in the specification for the house as lightweight concrete ("beton met laag soortelijke gewicht") (Ten Bosch, 1948d). These Antifer roofing plates were most probably another of the Skalja company products.

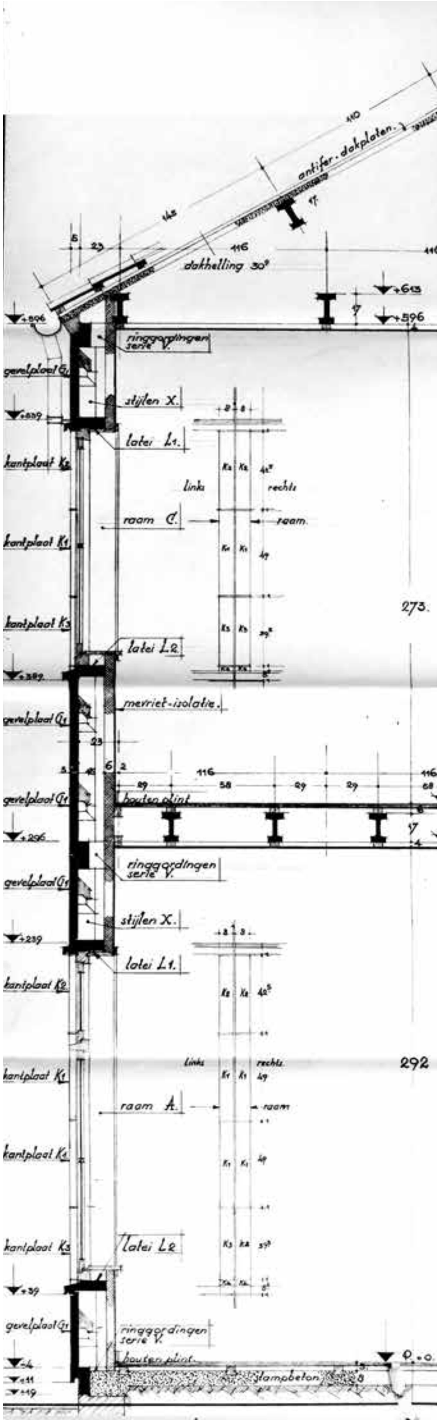

FIG. 7.11 Section through the façade of the pre-fabricated Dotremont-Ten Bosch row-housing design. Note the prefabricated I-beams carrying both wall and roof (NA: 10807-10810)

The Dotremont-Ten Bosch house was a well thought-through complete construction package. The plan was divided into two bays, the wider containing living/sleeping rooms and the narrower the services and circulation zones. Its total floor area of $79m^2$ contained a lounge-dining room and three upstairs bedrooms. Space heating was provided by means of a combustion fireplace but a gas connection provided for hot water and cooking. The Bruynzeel Company, located in Zaandam since 1921, was contracted to provide the prefabricated timber kitchen and bedroom cupboards. Bruynzeel employed designer, typographer and photographer, Piet Zwart in 1930, to design its first fully prefabricated modular timber kitchen. The *Bruynzeel Keuken* (kitchen), launched in 1938, remained in production until 1972.[85]

All three bedrooms were provided with Bruynzeel cupboards and two of the three bedrooms were fitted with flues to make the installation of future heating installations possible. The walls were insulated with an inner-skin of 50mm cement-bonded wood fibre panels (tradename Mevriet, today Durisol). The roof was insulated in-part through the application of the light-weight Antifer concrete sheets and the roof void provided an additional thermal buffer.

The earliest known application of the approved Dotremont-Ten Bosch rowhouse in the Netherlands was the construction of six experimental dwellings, of which two were duplex dwellings, at the Laan der Vijheid 20–25, in Zaandam, completed in July of 1948.[86] They were not deemed a great success and received a scathing review from the Director of Works of Zaandam.[87] The concerns raised were echoed by the Ministry and included complaints of: steel reinforcing visible on the surface of the panels; the Mevriet inner-skins showing excessive shrinkage; the façade panels not easily adjusted and the tolerances on the whole systems too large.[88] Still, the former mayor of Zaandam and now Minister of Reconstruction and Housing, In ‘t Veld, made an official visit to the project, guided by the architect Ten Bosch. Despite his applauding words “I think that they look pretty nice"[89] no further units were constructed in Zaandam.

85 (Den Besten, 2001).

86 The construction of these six dwellings had already been approved by the Zaandam municipality when Joris In ‘t Veld was mayor and before the system was evaluated by Ratiobouw. They were constructed as first trial towards Ratiobouw approval (Broersma & Ministerie van Wederopbouw en Volkshuisvesting Centrale Directie van de Wederopsbouw en de Volkshuisvesting, 1948).

87 Directeur Gemeentewerken, ir. W. Zuurmond, in a letter dated 21 June 1950 to the Zaandam City Council, quoted in (Roding, [s.a.], s.n.).

88 (Broersma & Ministerie van Wederopbouw en Volkshuisvesting Centrale Directie van de Wederopsbouw en de Volkshuisvesting, 1948).

89 (s.n., 1948).

The Ministry of Reconstruction and Housing however entered into a contract with Ten Bosch for the delivery of 1000 dwellings at a fixed per-square meter price for the year 1949.[90] This guarantee was meant to ensure a scale of manufacturing that would allow for prefabrication to be undertaken on an economically efficient basis.

Ten Bosch oversaw the construction of Dotremont-Ten Bosch rowhouses at Brunssum, Boxtel, Sittard and Maasniel (today part of the city of Roermond). These included standard and temporary duplex units (Sittard), even before the temporary duplex was adopted by the central government. These houses were constructed for the *Staatsmijnen* (government mines) and were not tied to subsidy rules. All of these construction projects took place between November 1947 and October 1948.[91] Again In 't Veld showed his personal interest: he made an official visit to the Dotremont-Ten Bosch housing at Sittard.[92]

After the Ministry of Reconstruction and Housing had officially implemented the temporary duplex as policy, Ten Bosch was asked in August 1948 to price his temporary duplex, already constructed for the Staatsmijnen and at the Zaandam trial, for subsidised housing construction. He submitted an estimate and drawings within a week on 1 September.[93] The un-duplexed version was priced at *ƒ* 10 500. Temporarily duplexing the dwellings would cost a *ƒ* 2000 extra. The estimate included provisions for an extra Bruynzeel kitchen (for the temporary top dwelling), and an extra toilet, gas connection, water connection, front door and garden shed, the latter as an optional extra. But the drawings submitted with the estimate show that the ground floor dwelling would not have its own bathroom–only a toilet. No showers were planned for at all and the lounge would double up as children's bedroom at night. This was clearly a huge step backwards in the quality of the living environment that the Dotremont-Ten Bosch house in its un-duplexed form would provide.

The last application of the Dotremont-Ten Bosch rowhouse construction in the Netherlands was for the development of 522 units in *Tuindorp Oostzaan* (Garden Village Oostzaan) for the city of Amsterdam, constructed in 1951, to the design

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90 At *ƒ* 38/m2 (Ten Bosch, 1948c).

91 (Stichting Ratiobouw Bouwcentrum, 1948a, p. 111). These all still exist at the time of writing; all duplex units been 'unduplexed' and have nearly all received new windows and outer skins. A tell-tale characteristic of the Dotremont-Ten Bosch system is the prefabricated windowsill, still visible at these houses.

92 The houses at Stittard were inspected by Minister In 't Veld, accompanied by Ten Bosch in January 1949 (s.n., 1949d).

93 (Ten Bosch, 1948a).

of Ten Bosch.[94] The lack of bathing facilities in the temporary Dotremont-Ten Bosch duplex house led to council debates in Zaandam and the floor plan had to be modified before any construction could be approved.[95] Ten Bosch had by then further developed the Dotremont-Ten Bosch system for schools, examples of which were constructed in Zuid Laren, Voorburg and The Hague. A 1953 article on the Skalja system makes mention of a school in Nijmegen.[96] It seems that only the school in The Hague remains today, albeit unrecognizable after the application of exterior façade insulation.[97]

7.4.3 Abstract conceptualisation: The Frankendaal public housing estate

7.4.3.1 Urban Genesis

The Watergraafsmeer Polder was reclaimed in typical Dutch fashion from the Diemer Lake (or *Watergraafsmeer*; Watergraafs Lake) in 1629. For centuries this polder served as a green lung for the gentry of Amsterdam; their country estates there structured by the spatial order of the polder's orthogonal canalised drainage system. The area remained an independent administrative unit, the Watergraafsmeer Municipality, until 1921 when it was annexed to the City of Amsterdam.[98]The urban layout of the larger Watergraafsmeer underwent a long development on paper, punctuated by plans published in 1907,[99] 1933 and 1939.[100] The 1907 plan

94 Transferred to housing association De Dageraad after construction. All are located to the west of Pomona Street and are easily distinguished from the NEMAVO Airey-built dwellings by their steeper roof pitches which characterises the Skalja rowhouse as originally developed by Dotremont and De Koninck. (Quist et al., 2017) date the construction to 1958, but (Paulen et al., 1992, 102–7) list 1952. The former, 1958, is unlikely as Ten Bosch relocated to France in 1955. The neighbourhood is commonly referred to as and now known as the Tuttifruttidorp (transl. Tuttifrutti Town, so-called because all the street names are after fruit).

95 (s.n., 1950b).

96 (Havenith, 1953b).

97 2021. Now the BSO Timo DAK, located at Kokosnoot Street 84, The Hague.

98 This planning history of Frankendaal has been widely reported to; including at its time of construction (Mulder, 1954); (Van Eesteren, 1952).

99 Designed for the Watergraafsmeer Municipality and encompassing the entire municipal area which was in fact the entire polder, by P Vorkink and JP Wormser. Kuipers (1987, p. 18), provides a good overview of the development of this first plan).

100 (Van Eesteren, 1952, p. 189).

formed the basis for the Betondorp neighbourhood. The 1939 plan formed part of the General Expansion Plan (AUP) developed under the leadership of Cornelis van Eesteren by the *Afdeling Stadsuitbreiding en Stadsontwikkeling* (Division for City Expansion and City Development) of the Amsterdam *Dienst Stadsontwikkeling* (Town Planning Department), already published in 1934 and approved by the Amsterdam City Council in 1935.

FIG. 7.12 The so-called *deelplan* (section plan) for the Watergraafsmeer section of the AUP. The area later to be developed as the Frankendaal public housing estate is located to the north-east of the cemetery in the middle of the polder, Betondorp to the south-west (NAI: Merkelbach MELK0202 (t49.6)).

Implimentaiton of the AUP, including its Watergraafsmeer portion, was interrupted by WWII. Much idle time during the War was spent at the Afdeling Stadsuitbreiding en Stadsontwikkeling reflecting on the successes and failures of the zeilenbau implemented in Amsterdam before the War. The successes and failures of especially the *Bos en Lommer* neighbourhood development, constructed according to the 1939 version of the AUP, provided food for thought.

The execution of the AUP, and that of the Watergraafsmeer portion of the plan in particular, was interrupted by WWII. Much idle time during the War was spent at the Afdeling Stadsuitbreiding en Stadsontwikkeling reflecting on the successes and failures of the zeilenbau implemented in Amsterdam before the War. The successes and failures of especially the *Bos en Lommer* neighbourhood development, constructed according to the 1939 version of the AUP, provided food for thought. The reassessments and redesign of the *deelplannen* (section plans) of the AUP during the War was also informed by a 1939 visit of Van Eesteren to Copenhagen, to study the "...experiences and insights [men hold] there with regards to zeilenbau, which has been applied there at a bigger scale and in a more consequent manner than here [in the Netherlands] and, it should be added, in many ways better designed and more spaciously planned".[101] The final *deelplan* (section plan) for the still-undeveloped sections of the Watergraafsmeer polder was completed in 1948[102] and approved in 1949.[103] Its authors referred it to as *Plan Frankendaal*.

Jacoba Mulder, who was responsible for the development of the design for this deelplan in the Division for City Expansion and City Development, introduced the woonhof as part of Plan Frankendaal.[104] The woonhof urban structure eliminated the much-maligned back façade and backyard. Now there was only the street façade and the garden façade. The plan for the development of Frankendaal as a whole, described by both Van Eesteren[105] and Jacoba Mulder[106] was for a complete neighbourhood. It included "396 single-family dwellings, which as duplex dwellings will be inhabited temporarily by 792 families, 76 villa's, 24 shops, a church with annexes, schools, business premises, a home for the elderly and a building for medical services."[107] The Frankendaal urban plan was intended as "an independent unit, of which there are others in the Watergraafsmeer".[108]

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101 "…ervaringen en inzichten aldaar met betrekking tot de strokenbouw, die daar op groter schaal en consequenter dan hier voorkwam en, moet er worden bijgezegd, in vele opzichten ook beter verzorgd en ruimer van opzet is." (Van Eesteren, 1952, p. 189).

102 (Mulder, 1954, p. 709b).

103 (Zijlstra, p. 25).

104 (Scheffer, 1951, p. 170); (Zijlstra, 2013, p. 35).

105 (Van Eesteren, 1952).

106 (Mulder, 1954).

107 "Dit laatste bevat 396 eengezinswoningen, die als duplexwoningen tijdelijk door 792 gezinnen wodern bewoond, 76 villa's, 24 winkels, een kerk c.a., enige sholen, bedrijfjes, een tehuis voor de ouden van dagen en een gebouw voor de Geneeskundige Dienst." (Mulder, 1954, p. 790b).

108 "De wijk vormt een zelfstandige eenheid, zoals er in de Watergraafsmeer meer liggen" (Mulder, 1954, p. 790b), presumably referring to the pre-WWII Tuindorp Watergraafsmeer.

FIG. 7.13 The final plan for the section of Frankendaal developed for the Frankendaal development published in the journal *Forum* (Van Eesteren, 1952)

By the time the final designs for the Frankendaal housing were nearing completion in February 1949, they were predominantly for temporary duplex public housing units.[109] The duplex principle entered the development plans for Frankendaal towards the end of 1947. Sketch plans of provisional floor layouts date to December of that year.[110] Ben Merkelbach served as adjudicator of the designs for duplex plans submitted to the Kerngroep Woonarchitectuur during the same period that his practice was developing the duplex designs for Frankendaal.[111]

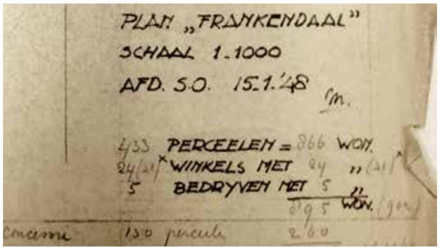

FIG. 7.14 Detail from an urban plan drawing dating to 1948 in which the initials JM are visible. (NAI: MELK0202 (t49.6)).

An amended version of the 1939 approved urban plan issued by the Department of Town Planning dated January 1948 and initialled 'JM' (possibly for Jacoba Mulder) projects 866 dwellings on 433 sites. This provides a clear indication that the Afdeling Stadsuitbreiding en Stadsontwikkeling was in support of implementation of duplexes in principle at the start of 1948[112] before the Ministry of Housing changed course to support the temporary duplex principle.[113] Van Eesteren later recalled that the designers all kept to their own disciplines: the Division for City Expansion and City Development developed the urban plan, architects designed the buildings and the landscape architect developed the green infrastructure designs.[114]

109 (Van Rossem & Schilt, 2002, p. 41).

110 Drawing titled 'Bebouwingsplan Frankendaal, Watergraafsmeer. Woningtypen. Voorlopie uitvoering. Blad N.M. 3/5.' Dated 12 December 1947. (HNI: MELK0202, t49.1 [Bureau Merkelbach, Elling en Karsten archive]).

111 (Kerngroep Woningarchitectuur beoordelingscommissie, 1947, p. 421).

112 Drawing titled 'plan "Frankendaal"', Drawn bij 'Afd. SO.' ('Afdeling Stadsontwerp'/Division Town Planning) on 1948-01-15. (HNI: MELK0202, t49.1 [Bureau Merkelbach, Elling en Karsten archive]).

113 Amsterdam was not alone in this. Other cities, Utrecht, Brunssem etc. had already constructed, or were in process of constructing temporary duplexes.

114 "De ontwerpers van de verkaveling en die van de woningen zijn toen, elkaars werkgebieden en bevoegdheden respecterende, gemeenschappelijk aan het werk gegaan." (The designers of the urban plan and the dwellings then took on the [design] task collaboratively while respecting each other's areas of expertise and competencies, (Van Eesteren, 1952, p. 189). Van Eesteren was to reiterate this in in a letter to Karsten that the Frankendaal plan was designed by him (in this instance one should read 'his team') and the dwellings by Merkelbach & Elling (Blijstra, 1968, p. 39).

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7.4.3.2 Architectural genesis

The functionalist AUP, which came into effect in 1939, initially projected a mid-income housing development at Frankendaal. The practice of Merkelbach & Karsten in association with Mart Stam[115] was commissioned by the City in 1947 to develop a design for the 400 rather large single-family units at Frankendaal,[116] as provided for in the 1939 AUP.

Many of the design drawings for the Frankendaal scheme are undated, but changes of staff and principles at the practice make a rough reconstruction of the development process possible. Piet Elling had joined Merkelbach & Karsten architects in March 1947. In September 1947 he became a partner and the practice briefly became Merkelbach Karsten & Elling. Charles Karsten took sick leave in March 1948, and left the practice in February 1949. The firm was now known as Merkelbach & Elling. These changes are reflected in the title blocks of the design development drawings for the Frankendaal public housing.

The design development for the Frankendaal housing seems to have floundered until c. mid-1947. A new dynamic is noticeable after Elling had joined the practice. Piet Elling had brought experienced draughtsman Frits Fortgens, a close friend of his, to the practice, and it is to Fortgens that we should look as a key contributor to the Frankendaal temporary duplexes.

Fortgens had come to Merkelbach Karsten & Elling from the practice of Van Tijen & Maaskant to act as "chef de bureau"[117] and most of the design development drawings for the public housing are initialled 'FF'. Merkelbach's role was arguably supervisory. There are no indications that Elling contributed to the design of the

115 Mart Stam is often credited as contributor to the design of the public housing at Frankendaal (Schilt, 2010, p. 26); (Zijlstra, 2013, p. 37). His role must have been rather limited as he left Amsterdam for the Soviet Zone in Germany during 1948, some time before the design for the public housing at Frankendaal was finalised. Stam was probably involved in developing early unexecuted designs for mid-segment dwellings with internalised garages at Frankendaal (possibly early-1947). Other undated design development drawings in the Merkelbach archive (HNI: MELK0202, t49.1) indicates the architects as 'MKE&S'. Seeing as Elling became a partner in September 1947 it is possible that the 'S' could relate to Stam. However, it is more likely that the 'S' on these undated drawings refer to Hein Salomonson. Salomonson was a member of the larger Frankendaal design team and was responsible for the design of the Ingenhouszhof, which contained ground-floor shops and workshops and dwellings above. It completed in 1951 and demolished in 2013. A reason to believe that this 'S' may indicate Salomonson is that his Ingenhouzhof building's footprint is indicated with great accuracy on these sketch drawings.

116 (Van Eesteren, 1952, 189).

117 (De Wagt, 2008, p. 107).

project according to his biographer, W.G de Wagt.[118] Mien Ruys was commissioned to design the landscapes of the project. She developed a unique planting scheme for each courtyard which accommodated the play apparatus designed by Aldo van Eyk.

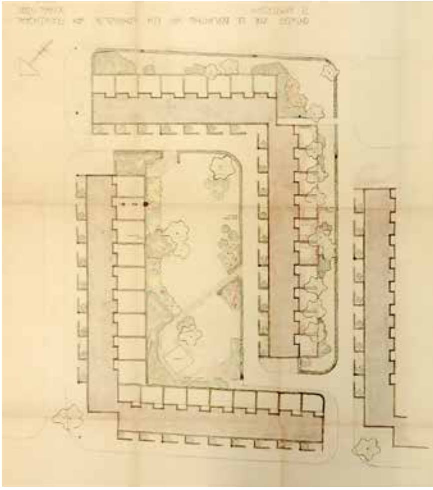

FIG. 7.15 Sketch plan by Ruys for a section of the Frankendaal public housing block (November 1949; (HNI: MELK0202 (t49.1)).

Structural Genesis – Mutating the Dotremont-Ten Bosch rowhouse

The council submission drawings for the Frankendaal public housing as well as all articles in the press at the time of its construction stated that the complex was constructed utilising the Dotremont-Ten Bosch system. The first Merkelbach & Elling drawings indicating the Dotremont-Ten Bosch system in the Frankendaal Public housing date to as late as May 1949. This was after their temporary duplex floor plans had already been developed and the woonhof urban layout decided on.

The application of the system at Frankendaal may have been under duress. It may have been imposed in an attempt to meet the delivery guarantee agreed to between Ten Bosch and the Ministry of Reconstruction and Housing. Ten Bosch was quite direct about the slow rate of implementation of his delivery contract. In a letter to the Ministry of Reconstruction and Housing in February 1949, he reminded the Director General that his delivery contract for 1949 was set for 1 000 dwellings, only 220 had been ordered. He noted how had taken it on himseld to contact

118 (De Wagt, 2008, p. 259).

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municipalities and even the Philips factories in Eindhoven in this regards, but, to reach its contractual obligations, the Ministry would need to facilitate the construction at least 100 dwellings per month for the remainder of the year.[119]

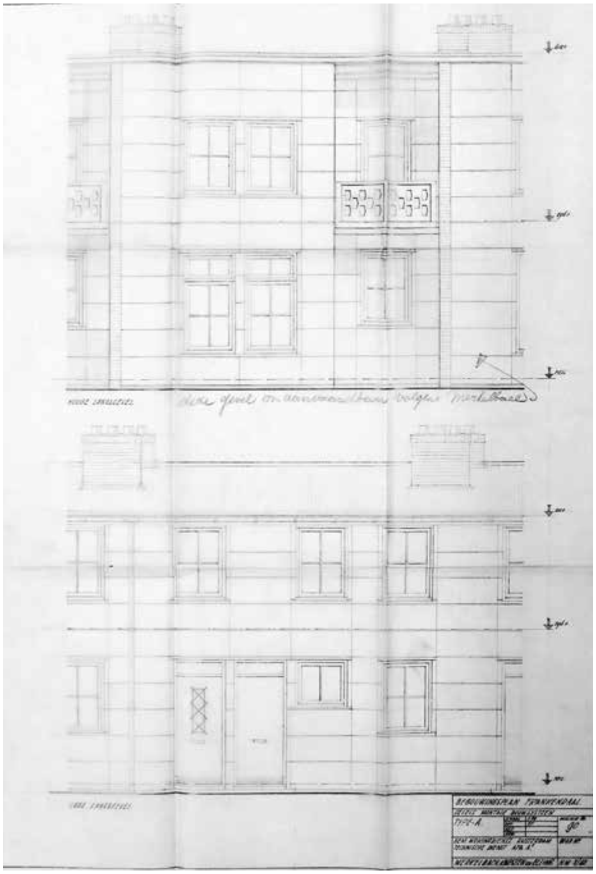

FIG. 7.16 Pencil drawing titled *Gevels montage bouwsysteem* (façades, prefabricated construction system), from the office of Merkelbach, Karsten & Elling (undated; HNI MELK 0202)..

It seems likely that the Ministry imposed the Dotremont-Ten Bosch temporary duplex house on the Frankendaal project. The already far-progressed designs for the housing at Frankendaal had to be quickly adapted to accommodate the prefabricated elements of the Dotremont-Ten Bosch duplex house and the module of its structural and façade system. Merkelbach & Elling had to reconfigure the Dotremont-Ten Bosch house to suit these urban and architectural ambitions while at the same time

119 (Ten Bosch, 1949).

conforming to the imposed requirements of the Ministry of Reconstruction and Housing. This was essential to guarantee the funding for the project.

A drawing from the practice shows two façade variations in what must be a first attempt to marry the Merkelbach & Elling temporary duplex plan with the Dotremont-Ten Bosch system. The drawing shows the Dotremont-Ten-Bosch kit-of-parts temporary duplex rowhouse façade below an alternative, designed in the office of Merkelbach & Elling. The latter has a low monolith roof and incorporated the Dotremont-Ten Bosch façade panels and windows. The positions of the balconies indicate that this was adapted to the already developed temporary duplex floor plan. A pencil note on this drawing is recorded that Ben Merkelbach found the adapted façade design unacceptable.[120]

Because the superficial appearance of the Dotremont-Ten Bosch based housing is startlingly different from the Ratiobouw approved dwellings, it has in some instances been assumed that the Frankendaal public housing had been constructed utilising the similar Nemavo-Airey prefabricated concrete construction system.[121]

The Airey system, originally developed in England by structural and industrial engineer Sir Edwin Airey, was introduced to the Netherlands by the *Nederlandse Maatschappij voor Volkshuisvesting NEMAVO* (Dutch Company for Workers Housing); a collaboration between the Ministry of Reconstruction and building contractors, including the firm of H van Saane.[122] The system was composite: it employed a steel superstructure, with a prefabricated concrete column substructure over which prefabricated concrete panels were hung. Steel trusses and timber beams to carry floors and roof. Doors and windows were framed in pressed steel, fixed to concrete reveals. Inner walls were clad in imported *Heraklith* plaster board.

The similarities with the Airey system–which was more used in part because the Ministry had an financial stake in the system –are striking but also superficial.[123] Yet, the Frankendaal public housing project is in instances incorrectly presented as having been constructed using the Airey system.

120 “deze gevel onaanvaardbaar volgens Merkelbach” (HNI: MELK0202, t49.1 [Bureau Merkelbach, Elling en Karsten archive]).

121 The Ministry of Housing already commented on the similarity in 1948: “Enige overeenkomst met system Airey.” (Some similarity with the Airey system) (Sub. Bureau Bouwsystemen, 1948).

122 (Priemus & Van Elk, 1971); (Messchaert, 2004 , p. 8–9).

123 in the Cultural Heritage Agency of the Netherlands’ online database Kaart van bouwsystemen. (Rijksdienst voor het Cultureel Erfgoed, 2021). The description of the buildings in the National Monuments Register (Rijksdienst voor het Cultureel Erfgoed, [s.n.]b) does however correctly indicate the Dotremont-Ten Bosch system.

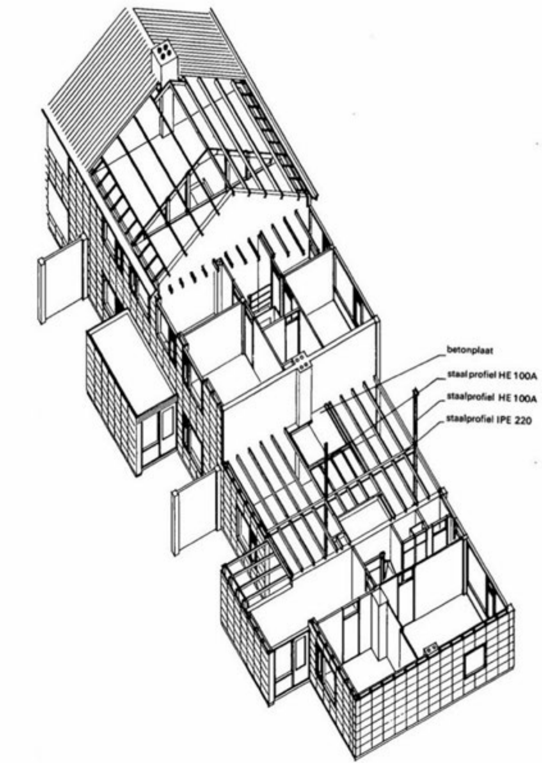

FIG. 7.17 An axonometric of a rowhouse designed for construction with the Airey system (Priemus, 1971. p. 10.6.4).

All of the Dotremont-Ten Bosch prefabricated concrete elements were used in the final Frankendaal design, including the entire modular façade system. Even the Dotremont-Ten Bosch system door- and windowsills were used. The first storey floor and roof were carried by the prefabricated I-beams and the mono-pitch roof constructed from some-what modified Antifer concrete sheets. The clay roof tiles were omitted and the concrete roof plates were waterproofed instead, essentially following the methodology Ten Bosch proposed for the garden sheds of his housing. In this manner the delivery contracts with the various concrete element manufactures could be honoured without building the Dotremont-Ten Bosch rowhouse. The design for the Frankendaal public housing is in fact a hybrid in which all of the unique Dotremont-Ten Bosch system elements were utilised. Consequently, both Van Eesteren and Mulder could report that the public housing at Frankendaal had indeed been constructed utilising the Dotremont-Ten Bosch system of prefabricated elements.[124]

124 (Van Eesteren, 1952); (Mulder, 1954).

7.4.4 Active experimentation

The construction of the Frankendaal public housing estate was undertaken over three years, between September 1949 and 1951.[125] The contractor was Van Rossum, an Utrecht based builder,[126] who had also constructed other buildings utilising the Dotremont-Ten Bosch system, including a school.[127]

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FIG. 7.18 [1] The Social-Democrat alderman for both Housing and Public Works, Jonas van de Velde, drives the first of 6 000 piles for Tuindorp Frankendaal public housing on 22 September 1949 (N Swaager; SAA: 5293FO000815); [2] The construction of the ground floor of the Frankendaal public housing complex. The first prefabricated concrete Skalja panel has been placed in the middle of the façade. (N Swaager, January 1950; SAA: 5293FO000825).

Once completed, the public housing was transferred to Onze Woning (276 units, blocks A, B, C & D, handed over in 1950,), Patrimonium (184 dwellings, blocks C, F, G, H & I, handed over in 1950 and 110 a year later) and Amsterdam Zuid (210 units, blocks J, K & L, handed over in 1951).[128]

125 The first of the 6 000 piles was driven into the ground on 22 September 1949 (s.n., 1949a).

126 Their offices were located on the Rijn Avenue, Utrecht. The contract amount of ƒ6 418 730 (s.n., 1949e).

127 The public school (Openbare Basissschool) located in the Emma Avenue, Zuid-Laren, since demolished.

128 ('Algemeen overzicht omtrent de duplexwoningen te Amsterdam en de bewoners daarvan.'; SAA: 15030/85597). This amount is 110 shorts of the actual 790 dwellings, including shop houses of the complex in the duplexed format as indicated on the construction drawings.

7.4.5 The 2E+Co of the Frankedaal public housing' s genesis

7.4.5.1 Economy

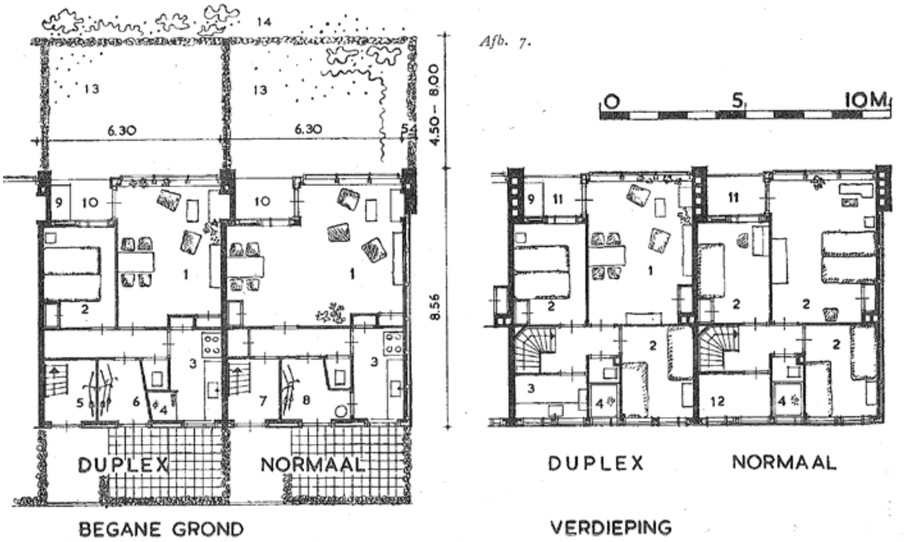

FIG. 7.19 The final design for the Frankendaal public housing, published in the *Polytechnisch Tijdschrift*. These clearly indicate that the duplex setup was not thought of as the final 'normal' layout (Mulder, 1954).

Construction economy played a decisive role in the development of the Frankendaal public housing, not only in the choice to temporarily split the housing units, but also in the application of the Dotremont-Ten Bosch system. The budget for the construction of the public housing was tight; so tight that no yard walls could be constructed to screen the street-side doors from the street. This omission was seen by Van Eesteren as lamentable, but necessary from a budgetary perspective.[129] Economy had of course already been baked into the Dotremont-Ten Bosch system: pile-foundations were reduced to a minimum with an in situ ground-slab spanning between in situ concrete beams according to the original system design.

129 Van Eesteren wrote that this was a pity as this denied the occupants a place where they could tinker about out of sight of their neighbours and hang their washing out to dry (Van Eesteren, 1952, p. 190). None of the design development drawings indicate yard walls.

The final design for the Frankendaal public housing was for remarkably small units; as defined by the compulsory temporary duplex model. The rooms of the Frankendaal public housing temporary duplexes were too small according to the city's plans reviewer: the living area of the ground floor dwellings was 1,7m^2 too small, the main bedroom 1,28m^2 too small, instead of 1,5m^2 of cupboard space, only 0,77m^2 was provided and an enclosed shower was not provided. Ground floor inhabitants had to make do with a niche separated from the kitchen by a shower curtain![130]

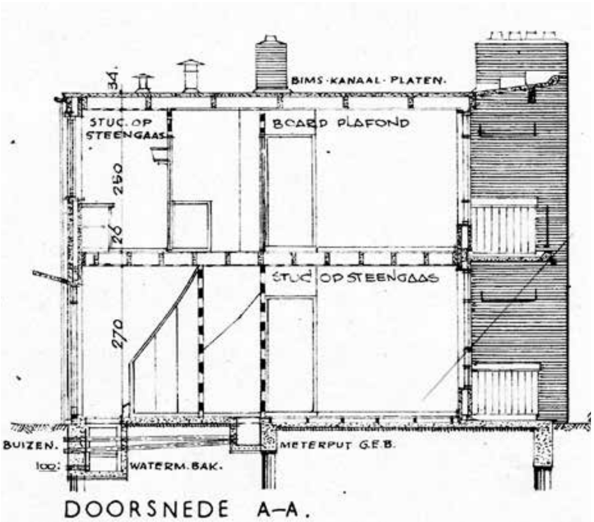

FIG. 7.20 Typical cross-section for the Frankendaal public housing, as submitted for plans approval Note the first-floor floor construction: *stuc op steengaas* (plaster work on wire mesh) (SAA: SU10075686_00001).

The top floor had no space for a coat rack or a utilities cupboard and the second bedroom, according to the plan reviewer, was not adequately lit. Yet, despite these shortcomings, the project was allowed to proceed. The Merkelbach & Elling floor plans were a step up from Ten-Bosch's temporary duplex proposals, which for instance had no shower provision at all.[131] The too-small floor plans were after all

130 Amsterdam had already in 1933 enacted a bylaw mandating a bath or shower for new dwellings. The shower ('douche cel') became a national minimum requirement in the 'Voorschriften en Wenken' (Requirements and Guidelines) of the Ministry of Reconstruction and Housing in 1946 (Van Overbeeke, 2001, p. 198); (Gemeentelijk Bouw- en Woningtoezicht, 1949).

131 This was a hurdle to the application of the Dotremont-ten Bosch temporary duplex house in Amsterdam: the City Council in 1950 would only approve the plans for the construction of 522 temporary duplexes in Tuindorp Oostzaan after the plans had been altered to have a shower in both temporary homes (s.n., 1950b).

only temporary and the intention was that two dwellings would soon to be converted into one. The floor plans had been developed to ensure conversion into a single dwelling with a minimum of interventions: demolishing two walls on the ground floor, removing the ground-floor shower to make room for a washing facility and removing the upstairs kitchen.

The most visible departure from the Dotremont-Ten Bosch system at Frankendaal was substituting the hipped roof with a near-flat roof of prefabricated pumice-concrete plates carried on the concrete I-beams. The Ministery of Reconstruction officially limited the use of roof tiles towards the end of 1948, where other materials such as bituminous paper etc. could be used as substitute.[132] This was not only an aesthetic preference on the part of the architects,[133] but also implied that no clay roof tiles or timber roof members were required at Frankendaal. The decision was made for the sake of economy during a time when the supply of both timber and tiles was highly restricted.

The choice for a low-pitched concrete flat roof, however, removed some of the lateral support that would have been provided to the rowhouses by the pitched roof structure. To address lateral stability the street-side façade was stiffened by substituting the isolative inner skin wood-fibre concrete panel (which also acted as wall insulation) with a stiff pumice-stone concrete (*bims-beton*) masonry block skin, built tightly into the jambs of the pre-cast concrete columns. This also reduced costs. The L-shaped woonhof layout added further lateral support.[134]

7.4.5.2 Energy

Initially each dwelling at the Frankendaal public housing estate was provided with the option for a single coal fired heater, located in the corner of both ground- and first floor living rooms. The construction drawings for the Frankendaal public housing did

132 (Stichting Ratiobouw Bouwcentrum, 1948f).

133 Ben Merkelbach, who as we have seen did have a role overseeing the design process, is on record as taking a very pragmatic perspective on housing roof form. He responded to a questionnaire on housing design undertaken during 1942–43 by the Studiegroep voor de Architectonische Verzorging van Den Na-Oorlogsche Woningbouw (Study group for the Architectural care of post-War housing) questionnaire. To the question as to the ideal roof form for multi-storeyed housing Merkelbach responded that "… the form of the roof can not be chosen only from an aesthetic wish". "In elk geval moet de vorm van afdekking niet alleen gekozen worden in verband met den architectonischen wensch." (Studiegroep Woningarchitectuur, 1946, p. 33).

134 (Bureau P/A, Jansen, & Gerbscheid, 2001, p. 379).

not show the coal burners, only a tiled niche with a chimney connection to receive them. The burners were possibly to be provided by the housing institutions. The original Dotremont-Ten Bosch specification also does not prescribe the combustion stoves. The coal boxes on the balconies were, however, part of the Merkelbach & Elling design. This meant that residents of the upper-floor dwelling had to haul coal up from the street via their winding staircase, through their lounge, and onto the balcony.

FIG. 7.21 Photograph taken by Ben Merkelbach of an interior of the sitting room of an upper-floor dwelling at Eijkman Street 16, (August 1952; SAA: 293F0004311).

During 1942 Merkelbach reiterated his 1936 statement that central heating would 'lock' residents into a financial obligation over which they had no control, impacting on their home economy. He argued that financial considerations outweighed the benefits that central heating would bring: among them, reducing dust and homework for housewives, who would be free to spend their energy on other tasks.[135] Over and above the rudimentary argument of economy, a social argument may also have been in play: single coal-burners supported a social construct, providing a winter-time magnet for the young and old, a place for domestic interaction, the warm sitting and dining room was seen as an essential, generating and maintaining the 'family'. Home-education, magazines and books at the time, propagated a dining room with a good electrical lamp as the place for the family to gather, and together read during the evening.

These simple space-heating measures did not provide for hot water or cooking (1952 photographs of the living rooms at Eijkman Street 16 and 18 show kettles standing on the coal stoves). A small gas-fired boiler in the kitchen for which the

135 (Studiegroep Woningarchitectuur, 1946).

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exhaust channel connected it to its own flue (indicated with a dotted line), was provided. This gas boiler may also have provided hot water for the shower, located in the kitchen in the ground-floor dwellings, and adjacent to the kitchen on the first floor. Design development drawings from the Merkelbach & Elling archive indicated that the basic Piet Zwart-designed Bruynzeel kitchens, that Ten Bosch had negotiated were installed in the houses at Frankendaal.[136]

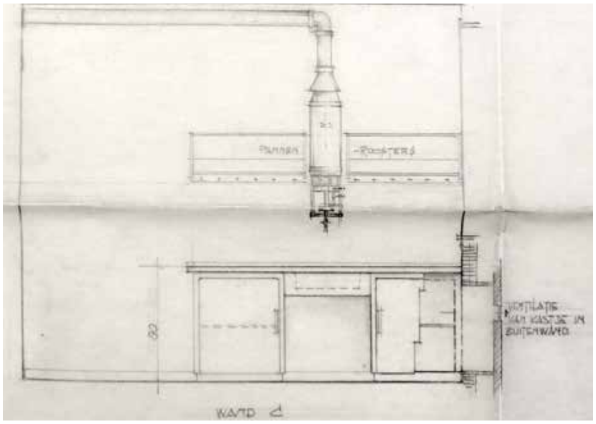

FIG. 7.22 Sketch of the kitchens of the Frankendaal public housing, showing the gas fired boiler and flue as well as the design for the kitchen cupboards (HNI: MELK0202).

The standard design for kitchens did not contain a hob or stove and it is unclear if the housing institutions or tenants provided gas or electrical hobs and ovens. The kitchen was serviced with both a smoke and ventilation duct, the former for the gas fired boiler and the latter for general ventilation. This detail is particularly interesting, when seen in the light of the Van Loghem ventilation principal application in the Frankendaal public housing design.

7.4.5.3 Comfort

Thermal comfort and hygiene were inextricably linked with ventilation and drafts. From the 1920s onwards the salubrious indoor environment was linked to sunlight and fresh air. The architects of Het Nieuwe Bouwen advocated solar ingress and fresh indoor air as architectural ambitions. The Amsterdam progressive architects'

136 Letter from Ten Bosch dated 20 May 1948 to His Excellency the Minister of Reconstruction. (NA: V23924. (5261), Ass. No. 2.17.03 [Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer: Centrale Sector Archive).

collective *De 8*, including Ben Merkelbach, had set up the *Zonne-commissie* (Sun-commission) to investigate the influence of sunlight on human health, and how this could be incorporated into planning and housing in 1930.[137] By 1934 this commission was co-opted as an organ of the *Nederlandsch Instituut voor Volkshuisvesting en Stedebouw* (Netherlands Institute for Housing and Urban Design). When the commission completed its work by 1947[138] it put together a report published in 1949 on its findings. Seeing the role of Merkelbach in the Zonne-commissie, it should come as no surprise that solar orientation of the housing blocks at Frankendaal was an important issue, mentioned of by all authors who wrote about the project at its genesis. Jacoba Mulder writes that "because the north arrow lies diagonally across the plan, all living rooms could be located with a southwester aspect, the access, kitchens and yards, on the north-east".[139] The large glazed south-west or south-east facing living room windows, with views over the green courtyard or street were clearly intended to allow for solar ingress, greatly beneficial to general health and contributing to home economy.[140] Well-aware of the potential for over-heating[141] and the damage done to precious fabrics by the sun, the architects developed drawings showing integrated retractable canvas awnings. Despite being drawn out in some detail, they were not installed. If yard walls could not be afforded within the construction budget, we can assume that these too would have been culled from the project quite quickly.

The large south-facing single-glazed façades, much larger than that of the Dotremont-Ten Bosch model, was a source of solar heating but would also lead to quick heat loss. No thermal requirements existed for housing at the time, and the only extra measure taken to add to the insulation of the roof with its thin light-weight concrete slabs, was a board ceiling fixed to the bottom of the concrete roof beams, leaving a 340mm air cavity. The choice to replace the hipped roof with its insulating roof void with a thin flat precast concrete panel roof led to the top floor dwelling

137 Refer to the Ben Merkelbach collection in the Het Nieuwe Instituut (HNI: MELK95).

138 (Nederlandsech Instituut voor Volkshuisvesting en Stedebouw, 1948, p. 17).

139 "Doordat de noordpijl als een diagonaal t.o.v. het plan ligt, zijn alle woonvertrekken op het zuidwesten geprojecteerd, de toegangen, keukens en plaatsjes op het noordoosten." (Mulder, 1954, p. 791b). This statement was repeated by Van Eesteren in the journal Forum (Van Eesteren, 1952) and L Scheffer in the Tijdschrift voor Volkshuisversting en Stedebouw (Scheffer, 1951).

140 "Uit een enquête die de „Zonnecommissie" enige jaren geleden heeft ingesteld bleek, dat de moderne mens zoveel mogelijk zonlicht in zijn woning verlangt." (A questionnaire undertaken by the 'Solar Commission' a couple of years ago, has shown that modern person desires as much sunlight in the dwellings as possible) (Bijl, 1949, p. 7).

141 AR ter Linde made a plea for passive design during the 1948 study day on hygiene in public housing where Merkelbach also spoke. He called on architects to ensure as good as possible natural climate, including solar shading for the short periods of the year when over-heating could be expected in the Netherlands (Ter Linde, 1949, p. 20).

being either very hot in summer or very cold in winter. The choice, or rather need, to replace the inner skin fibre board (Mevriet) of the street façades of the Dotremont Ten-Bosch face system at Frankendaal with pumice-concrete blocks unfortunately led to a decrease in insulation qualities of the dwellings. The effective insulation of the north-eastern facing walls, utilising the adapted Dotremont-Ten Bosch system reached a rather low insulation value.[142]

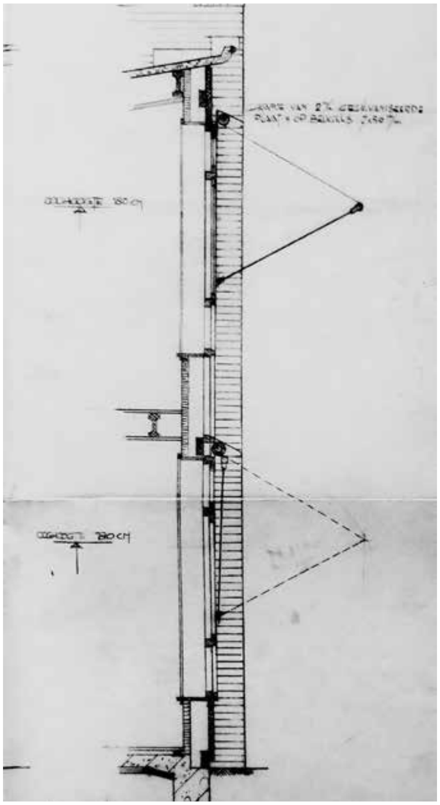

FIG. 7.23 Detail of a sketch design for the south-facing façades of the Frankedaal public housing, with sunshades (HNI: MELK0202).

While the master bedroom could rely on a bit of direct sunlight to heat the coldest days, this was little solace for the second bedrooms located on the cold north façade with no solar ingress at all.

142 Rc of 0,77 (m2.K/W) (Bureau P/A & Jansen, 2001).

Heating, ventilation and healthy indoor climate hygiene go hand-in-hand. Merkelbach was particularly vocal with regards to indoor climate. Such was his advocacy that he was invited in 1947 to speak at a study-day of the *Instituut voor Praeventieve Geneeskunde* (Institute for Preventative Medicine) on hygiene in housing. The published proceedings make for fascinating reading on topics on which totally different perspectives are held today, for instance that high levels of CO_2 are not harmful to health.[143] Merkelbach's contribution on the day focused on the psychological needs of inhabitants of high-rise housing (*stads-etage woningen*), addressing aspects such as privacy, access to green infrastructure, connection to the earth and providing for social interaction (for both the youth and the aged). Much of what he addressed was still too ambitious to incorporate into the designs for the sub-economic public housing at Frankendaal: a second sitting-room, heating to all bedrooms and a kitchen balcony. But within the limited means for the project the Merkelbach & Elling design did achieve some of the ideals: good solar access to dwellings, the so-called *woonbalkon*, a balcony off the living room, ideally large enough to sit and accommodate a baby-box (although dramatically reduced by the need for a coal bin), and the application of the so-called Van Loghem-*raam* (window).[144]

JJ Van Loghem should not to be confused with architect JB (Han) van Loghem, who published the book *Acoustisch en thermisch bouwen voor de praktijk* in 1936.[145] JJ van Loghem was a bacteriologist and epidemiologist who started his career specialising in tropical diseases in the former Netherlands Indies (Indonesia). After Van Loghem's return to the Netherlands, he became the country's leading immunologist. He also researched indoor climate and published his design for improving indoor climate, in 1937, specifically the elimination of discomfort-causing draughts, which relied on a deflector installed on the inside of sash-windows.[146] This quickly became referred to as the Van Loghem-raam (window) principle.[147] The aim of this deflector was to direct the airflow through windows upwards over the inhabited zone to an opening in the opposite wall–an inexpensive way to flush hot stale air from a room while avoiding draughts and ensuring a healthy fresh air supply. The hopper-window was already well known and in use, with inward-falling hoppers in wide use for instance in school buildings. An often-ignored part of the Van

143 (Bijl, 1949, p. 4).

144 (Merkelbach, 1949, p. 49).

145 (Van Loghem, 1936).

146 (Van Loghem, 1937).

147 For its application in D (Dirk) Roosenburg's Rijksverzekeringsbank (1935–9) see (Zijlstra, 2006a).

Loghem principle is that the principle combined the hopper with an exhaust opening high inside the room to achieve an effective ventilation regime.[148]

Ben Merkelbach expressed his enthusiasm for the Van Loghem-raam or application of the principle thereof to develop a "non-draught generating natural ventilation, especially for the bedrooms" in 1948.[149] The principles that informed the Van Loghem-raam were applied in the Frankendaal public housing in a carefully devised ventilation and draught strategy. Early design drawings indicated a single chimney flue per duplex dwelling. This was later augmented with a second flue: these are marked 'RK' and 'VK': '*Rookkanaal*' (smoke flue) and '*Ventilatiekanaal*' (ventilation flue). The architects added a chimney flue dedicated to ventilation for both ground and first living rooms (the latter to become the master bedroom once un-duplexed). In principle these would work as follows: Air entered these shafts by way of ventilation grill against the ceiling.

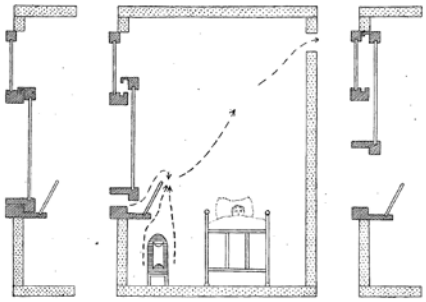

FIG. 7.24 The Van Loghem-raam principle illustrated in Van Loghem's 1937 article describing its benefits (Van Loghem, 1937, p. 3773).

On early photographs a ventilation grill can be seen, tucked up against the ceiling above the coal stove. Heat from a burning coal stove would warm the shaft walls, thereby heating the air in the adjacent ventilation shafts, causing the air to rise. This would not only remove stale air and smoke that stratified against the ceiling, but also draw fresh air into the room and house through the hopper windows, placed in such a position that the inhabitants would not be in the direct line of airflow.

148 This was certainly not a new invention. Many nineteenth century buildings employed the principle of buoyancy ventilation through a directed indirect airflow to drive a ventilation system, often with air outlets located in the ceiling. Commenters failed to mention the exhaust as an essential part of the Van Loghem-raam. Zijlstra records two published references to the Van Loghem-raam, both of which only mention the deflector combined with the window (Zijlstra, 2006a, p. 62–63).

149 (Merkelbach, 1949, p. 90).

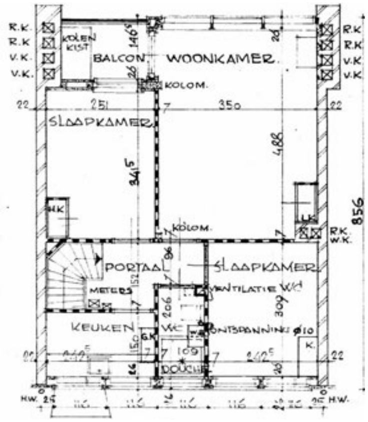

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FIG. 7.25 Venitlation in the Frankendaal public hosuing: [1] Floorplan of a top floor unit for the Frankendaal public housing, as submitted for approval to the City of Amsterdam, indicating the various smoke (R.K) and ventilation (V.K) stacks (SAA: SU10075686_00001); [2] Detail of an interior of an upper-floor home on Eijkman Street photographed by Merkelbach in August 1952. Note the ventilation grille in the corner of the room above the mantelpiece (SAA 5293FO004286); [3] Back façade with hopper windows (cut-out, B Merkelbach, September 1951; SAA: 5293FO004310); and [4] Completed houses seen down the FC Donders Street. Ventilation grills are incorporated into the windows. Doors without canopies were supposed to later give entry to the bicycle storage box, when the units were un-duplexed (1951, B Merkelbach; SAA: 5293FO004287).

The ground floor kitchen is provided with an extraction flue additional to the smoke flue/chimney. The top floor had a small vent pipe inserted directly through the roof. The same goes for the ground and first-floor toilets, their stale air removed through an air stack or chimney. In effect each small duplex unit had three ventilation flues and two chimneys. The eventual number of ten exhaust flues per non-duplexed rowhouse is rather exceptional.

A healthy indoor environment was dependent on a steady air-change rate in dwellings. It was, however, importation that this air-change rate would not lead to discomfort, or inhabitants would close the system down by covering the ventilation opening. The cheap and effective principle employed in the Van Loghem window was applied at Frankendaal to all windows in an attempt to limit draught and discomfort. Its application took three different forms. In the south-facing façade top lights were installed. The master bedroom window (in the duplex form), shielded by the balcony, had a glazed inward-falling hopper as top-light, but for the unprotected glazed wall of the living room the top-light had to take the form of an outwards opening hatch, or rainwater would be driven through the façade. Fresh air entering the room through the top-lights would mix with hotter air stratified in the ceiling zone before reaching the inhabited zone to be exhausted through the various flues provided.

Each room on the front façade had a ventilation inlet that was designed to function separately from the glazed window. This timber louver section, located adjacent to the window, was closed with a timber hopper. When open, it would direct fresh air to the ceiling in the kitchen, bathroom and bedroom, sending the cool air intake upwards, away from the habitation zone. This device effectively separated ventilation and daylight provision from each other.

Although the Frankendaal public housing ventilation system was carefully designed to ensure a steady supply of fresh air and thereby contribute to a healthy indoor environment without compromising thermal comfort, it may also have contributed in a small way to thermal comfort and home economy. Clearly much attention was given to ventilation to ensure a hygienic interior environment. The same cannot, however, be said for aural comfort. The homes were constricted with a traditional timber floor: floor planks were nailed over timber beams, to the bottom of which a wire mesh supported a plastered ceiling.

Good acoustic design was a major concern of the post-WWII reconstruction. The *Algemeen Gemagtiche voor den Wederopbouw* (General Authority for Reconstruction), JA Ringers, asked the Delft-based *Geluidstichting* to investigate the sound insulative qualities of floor and wall construction methods already in 1942. After three years their research–which was completed in collaboration with the Delft Institute of Technology and the governmental research institute TNO–was published, as the first technical report of Ratiobouw.[150] The report was quite direct about its conclusions: what it termed the *normale Hollandse vloer* (normal Dutch Floor) was found to provide a level of sound insulation "...which is certainly insufficient for floors

150 (Stichting tot Rationalisatie van het Bouwen - Ratiobouw, 1945).

separating different dwellings." It recommended that the ceiling at least be hung from disconnected purlins, through which: "…airborne and impact sound insulation are increased by 6 to 10 dB, while the additional costs are only ƒ 0.40 per m2.."[151]

The choice for this rudimentary flooring system remains a mystery, but a good guess would be that the project budget dictated as cheap a floor as possible; even if the normale Hollandse vloer was known to be inferior and other options were known and available. The argument of temporariness of the situation probably also influenced the decision-making. Yet, despite various options already published in 1954, and simultaneous to the design and construction of the public housing at Frankendaal by his own practice, Ben Merkelbach lamented: "It should be possible to make floors of a different construction method, which guarantees significantly better sound insulation than using timber beams and planks."[152]

The cramped homes held littel space for comfort when inhabited by a large famliy and the urban design eliminated any possibility for garden sheds, relegating coal bins to the balconies which also had to suffice as drying area for the washing. Each home would have a *lavette* (a wash trough) once un-duplexed, but till then the housewife would have to make do with her kitchen sink or bend over a loose tub on the floor as there was no space for a kitchen table for the time being. During fine weather washing could be done on a table on the balcony. When not in use, washtubs were hung on a nail against the balcony's inner wall. This situation was far from perfect. Merkelbach & Karsten attempted to address this problem with the partly screened balconies at Landlust in 1938, even then admitting that theirs was not an ideal solution. It was apparently no longer deemed shocking or undesirable to see a family's undergarments blowing in the breeze. This would eventually lead to the neighbourhood, already called Jeruzalem because of its white cuboid appearance, earning a second nickname: *Luierdorp* (diaper town) because of all the diapers that were always drying on the balconies of the houses.[153]

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151 "…welke voor vloeren, die verschillende woningen scheiden, stellig onvoldoende is. …lucht- als contactgeluidisolatie worden 6 a 10 dB grooter, terwijl de extra kosten slechts ƒ 0,40 per m2 bedragen." (Stichting tot Rationalisatie van het Bouwen - Ratiobouw, 1945, p. 32).

152 "Het moet mogelijk zijn om vloeren in een andere constructiemethode te maken, welke belangrijk betere geluids-isolatie waarborgen dan de houten balklaag." Ben Merkelbach saw the post-War material shortages as an opportunity to develop alternatives to: a development "…niet te betreuren'" (not to be regretted) (Merkelbach, 1949, p. 50).

153 (Kruizinga, 1952, p. 16): (Hendriksen, 1998, p. 110). Other Dutch neighbourhoods were also treated to the same monikers. In Amersfoort, Den Helder, Emmen, Helmond, Nijmegen, Meppel, Roosendaal and Tilburg, new neighbourhoods constructed of pre-fab concrete façade systems were all called Jeruzalem (Amersfoort also has a Jericho). (Bouwhulpgroep advies en architectuur & Platform 31, 2013, p. 14). Similarly, post-WWII neighbourhoods were also called Luierdorp, including the Amsterdam Tuindorp Slotermeer and Hoogvliet in Rotterdam (s.n., 1956); (s.n., 1957).

7.4.6 Concrete experience 1951–2010: gradual evolution

Not much is known of the changes made to the Frankendaal public housing estate over the period 1951-2000. The dwellings at Frankendaal remained fairly unchanged over the years. While the intention was for the duplex-dwellings to be merged into single double storeyed houses within 10 years of construction,[154] only 68 had been merged by the year 2001,[155] leaving the rest as (too-) small duplexes. Living in these small dwellings could not have been comfortable. A photograph of the completed houses taken by Ben Merkelbach in 1950 shows how limited the space must have been.

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FIG. 7.26 [1] Einthoven Street 10 (B Merkelbach, 5 October 1950; SAA: 5293FO004308); [2] Frankendaal housing, with garden established and sunscreens installed by residents (B Merkelbach, September 1951; SAA: 5293FO004981).

The so-called ‘living-balconies’ were cluttered with all sorts of paraphernalia of daily life, including carpet beaters, ladders and ubiquitous galvanised washtubs, hung from nails in the dividing brick walls. Some changes were made to improve comfort to the dwellings over time. Exterior sunscreens were installed almost immediately by some inhabitants to shade the living room windows of the interior.

Societal comfort norms were about to change dramatically. The discovery of the large natural gas reserves in the Netherlands from 1948 onwards, and especially the discovery of large gas reserves in Groningen in 1959, brought a revolution to the

154 (Hendriksen, 1998, p. 110).

155 (Bureau P/A et al., 2001, p. 6).

Dutch energy landscape. In 1964 the first houses in the Netherlands were connected to natural gas from Groningen. By 1968, 78% of all Dutch households were cooking on natural gas. This required large-scale retrofitting and installing gas-using appliances for which a subsidy system was implemented from 1964.[156] Coal burners were replaced with gas heaters. The *gevelkachel* (wall heater), a gas burner installed on the interior of an exterior wall, soon became common in many households. This wall heater, often hung under a window, only required that a single hole be made in the gable of a building for an air in-and-outlet. Because this type of gas heater did not require a chimney, it could be installed in all perimeter rooms,[157] heralding a revolution in thermal comfort norms.

7.4.7 The 2E+CO of the gradual evolution

After the national transition to natural gas for space heating many of the public housing units at Frankendaal were adapted and kitchens and second bedrooms were heated with gevelkachels. The coal hoppers on the balconies became obsolete and were removed.

The architectural detailing of interventions differed per landlord, leading to small differences in the various street blocks. By the late 1980s all the landlords had already remodelled the thermally leaky block-end walls: De Dageraad, heir to Amsterdam-Zuid, built full-height brick walls to the ends of its blocks whereas Patrimonium and Onze Woning (later to be owned by De Principaal soon to become De Key) installed a brick end-façade on ground floor level with a ship-lap timber plank façade above.

For Frankendaal, the first coordinated interventions came around the years 1985–8, when large-scale maintenance was undertaken and so-called comfort-improving interventions were implemented by all three owners near-simultaneously. Because the Frankendaal public housing had been split into three ownership portfolios, these maintenance interventions, while being similar in general as they responded to the same type dwellings during the same period, differed in detail.

156 (Van Overbeeke, 2001, p. 235).

157 (Van Overbeeke, 2001, pp. 348–49).

These renovations changed the appearance of the Frankendaal estate. The profiled roof edged of the cantilevered Antifer plates over the garden-side elevation were cut short. Street-side gutters replacedm, concealed with high-pressure laminate (HPL) barge-boards, linked to PVC downpipes. The bargeboards were either the same colour as the façade or a dark brown, in which case the spandrels of the new rather heavy PVC curtain-glazed façade were of the same colour. New double-glazed windows were placed. Their frames did not replicate the original openings with central casement- and awning opening sections. The choice fell on inward tipping hoppers located on the sides of the glazed areas. In some instances, the original balconies were enclosed. Windows were provided with built-in trickle vents, a development of the principle underlying the original ventilation openings, but providing a subtler air-change for the dwellings.

During these large-scale upgrades, Onze Woning and Patrimonium painted the precast concrete façade panels and face brick chimneys white. Amsterdam-Zuid did not paint the façades or the faces of the brick chimneys, only the sidewall reveals of the balconies. Patrimonium and De Principaal (and De Dageraad somewhat later in 1987) followed the same approach: The south facing glazing timber-framed curtain walling was replaced with double-glazed PVC windows and the front doors were replaced, reducing both draft and heat loss. The waterproofing of the roofs was re-laid.

Patrimonium and De Principaal (71 of the 279 units in the De Key portfolio) carried out ‘comfort improvement’ upgrades during 1984–87: plastrwork was repaired, kitchen cabinets and sink replaced, showers renewed, central heating installed and the electrical wiring and distribution renewed. In units where inhabitants did not select to have central heating installed, because of the extra rental they would need to pay, a gas burner in the lounge and a gevelkachel in the kitchen served as space heating installations.

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FIG. 7.27 [1] Newly renovated houses in Jerusalem with W Dirks (centre), the representative of the housing foundation Onze Woning, and two members of the residents' association, T van den Brink (left) and D Offerman (right) (F Busselman, 2 February 1986;SAA: B00000005286); [2 & 3] Frankendaal in 2007 (H Zijlstra).

De Dageraad at the time controlled 194 units, all of which were upgraded following a similar approach as implemented by the other landlords, except that De Dageraad also gave attention to the roofs. They were not only re-waterproofed but also insulated with 60mm rigid insulation board, edged by HPL bargeboards. The front façade windows were replaced and included trickle vents in the top of the opening sections. These subsidised upgrades had a planned payback period of 15 years, meaning that the investment would be recouped in 2002. To accommodate elderly tenants, 16 dwelling were modified: the wall between kitchen and living room was removed and a door between the living and bedroom installed. Over the following period leading up to 1998, De Dageraad replaced toilets and showers before new inhabitants moved into units.[158] Once uniform Frankendaal, had grown divergently due to a hodgepodge of small mutations.

After all these interventions, the original ventilation system was effectively obsolete. A 2009 inspection of the Frankendaal estate found that the residents had covered over all the ventilation duct openings.[159] However, because the windows on the street side façades were not replaced with PVC, the original ventilation louvers remained visible at most blocks. Some were replaced with metal grilles. These changes all fitted within a general modus current under housing associations at the time. The large-scale façade upgrades of the 1980s did as much as was deemed necessary and as little as possible: they did not include integrated awnings to the garden-side façades and inhabitants once again installed their own retractable sunscreens.

Over time the neighbourhood and its inhabitants aged. By 2001, 40% of the public housing at Frankendaal's inhabitants, including the residents of the retirement home, were older than 60 years,[160] their dwellings following not far behind at 50 years of age.

7.4.8 Reflective observation

The public housing component of the Frankendaal neighbourhood received a considerable amount of publicity and recognition during its construction. The Mayor of Amsterdam featured it in an address given at the Annual Conference of the American Municipal Association at Cleveland, Ohio in December 1949, while Frankendaal was still under construction.[161] This is indicative of the status that the project enjoyed in the administration of the city at the time. It was also held in high regard internationally, being one of the new housing projects in Amsterdam visited by delegates to the International Congress for Housing and Townplanning in 1950.[162]

158 (Bureau P/A et al., 2001, pp. 9–10).

159 (Hooyschuur Architecten bna, 2011, p. 19).

160 (Bureau P/A et al., 2001, p. 6).

161 An annotated photo book was published by the Department of Public Works and Housing "on the occasion of the International Congress for Housing and Townplanning – Amsterdam 1950" (Department of Public Works and Housing, 1950).

162 (Scheffer, 1951, p. 174).

Judging from the review the project received in the *Tijdschrift voor Volkshuisvesting en Stedebouw* in 1951, the project was welcomed as a ground-breaking success, mainly due to its innovative urban design.[163] After its completion in 1952, Frankendaal featured in a multilingual promotional brochure published by the Ministry of Reconstruction and Housing to promote the achievements of the Dutch post WWII reconstruction.[164] Over time, the project was mentioned in architectural publications in relationship to the persons of Cornelis van Eesteren[165] and Ben Merkelbach,[166] and to the development of urban planning in Amsterdam.[167]

However, it was only because of the 1980s renovations that an appreciation of the public housing at Frankendaal as a heritage worth cherishing was first aired. Noud de Vreeze, a lone critical voice expressing displeasure at the interventions at Frankendaal, referred to these interventions as "shamelessly failed" projects. He lamented the fact that the "thorough ruining" of the Frankendaal public housing was not due to budgetary restraints but rather due to the housing associations' maintenance departments' "stupid fixation" with HPL (trespa) and plastic window frames. De Vreeze sketched the causes for this apparent failure: having grown from the 1970s where occupant participation became important as part of a drive to democratisation (the emancipation of the individual), the focus within housing associations had narrowed to accounting principles, market-driven decision-making and a fixation on pay-back periods.[168] This may even have been due to a reaction to the civic emancipation of the 1970s. Financial and accounting processes offered housing associations a modicum of control–incontestable hard facts–when dealing with forthright tenants.

This article by De Vreeze, an architect working with the Nationale Woningraad at the time, was the first to acknowledge Jeruzalem as an ensemble with historical and aesthetic significance and the only instance for real reflective observation during this period. However, the interventions implemented to date had been run-of-the mill and did not herald a new learning phase for Frankendaal's public housing.

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163 (Scheffer, 1951, p. 174).

164 (Central Directorate of Reconstruction and Housing and the Information Department of the Ministry of Reconstruction and Housing, 1952, s.n.).

165 (Blijstra, 1968).

166 (Van Tijen, 1956); (Blijstra, 1956); (Blijstra, 1968); (Kras, 1983) & (Hereijgers & Van Velzen, 2001). The design of the 'woonhof' block-plan is often erroneously attributed to the person of Merkelbach.

167 (Van der Velde, 1968).

168 "…wijk Frankendaal in Amsterdam van architect Merkelbach werd onlangs niet grondig verpest door een tekort aan budgettaire ruimte of door de voorrang voor functionele eisen, maar door de op trespa en kunststof kozijnen gefixeerde domheid van de onderhoudsdienst van de woningbouwvereniging." (De Vreeze, 1990, p. 21).

7.4.9 Learning Cycle 1: Actor Factor Set Ecosystem

The socio-economic consequences of WWII were greatly determinant in the genesis of Frankendaal. The urgent housing, material and fuel shortages were Macrosystemic factors that could not be ignored. To address these, national government, an Exosystemic actor, influenced Microsystem decisionmakers–the architects and commissioning bodies–through the Mesosystemic proximal processes of subsidies and the development and prescription of technologies. The housing institutions, whose position as commissioning agent was naturally located in the Microsystem, had been so weakened that they couldn't take on this role. City authorities, usually an actor on the Exosystemic scale, were repositioned as commissioning agents in the Microsystem.

The actors in the Microsystem–the project designers and city authorities–capitalised on the limited environment as best they could. Construction economy (material and financial) was the driving factor that led to a spatial and comfort economisation. Energy was a severely limited resource in the environment in which public housing saw its genesis. The only choice for thermal comfort available to the designers was to capitalise on the free energy in the environment: solar access and a clever low-tech natural ventilation system. In this case though, thermal comfort should be understood as a result of an ambition for hygiene. Resource shortages suited the ambitions of the architects. The delays brought by the War offered the city planning department the opportunities to reassess their own plans. However, it can only be concluded that the imposition of the Dotremont-Ten Bosch system was an unwelcome imposition on the Microsystem from the Exosystem.

In the case of Frankendaal the housing institutions had no role to play in the abstract conceptualisation and active experimentation. Their entry in the Frankendaal Microsystem was delayed until the concrete experience commenced.

The period of concrete experience of the first learning cycle coincided with a period of emancipation. Society underwent an economic and energy emancipation resulting in increased comfort ambitions and modification of the Frankendaal housing stock. The public housing institutions were economically emancipated, steered by national government through its subsidy systems. They acted individually, but needed to engage the inhabitants progressively. This led to a process of divergent evolution of the fabric and systems logic of Frankendaal. At the same time, the emancipation of tenants allowed them to demand that they too become actors in the Microsystem when important evolutionary decisions regarding the 2E+Co of their homes were about to be made.

7.5 Learning cycle 2 (2000–11)

7.5.1 S•E•T

The Dutch national urban renewal policy has its origin in the post-War reconstruction and the Ministry of Reconstruction and Housing.

Conservation had already entered the Reconstruction arena in the 1950s. The first large-scale post-War conservation project was a result of the need to restructure the economic basis of the town of Veere in Zeeland during the 1950s.[169] The focus of this and similar projects lay on the conservation of urban structures, not individual buildings, allowing for demolition and newbuild within the general urban character of neighbourhoods.

By 1997 *Nota Stedelijke Vernieuwing* (Policy on City Renewal)[170] had widened the focus of the Dutch urban renewals policy to include larger metropolitan areas, including the areas constructed as part of the post-War Reconstruction. The public housing landscape had also been dramatically altered during the 1990s. The 1989 *Nota Volkshuisvesting in de jaren 90* (Policy on Public housing in the 90s) mandated decentralization deregulation and overall emancipation of public housing institutions. Many became for-profit corporations who saw their housing portfolios as properties to be redeveloped as dictated by market forces.[171] Soon large-scale post-War housing areas threatened by sweeping urban reconstruction plans. Frankendaal was not spared this treatment and the Borough of Watergraafsmeer identified the neighbourhood as requiring restructuring in 1997.[172] This paved the way for the demolition of the public housing estates and the construction of new dwellings. The curtain was slowly falling on Frankendaal.

169 (Clarke, 2016, p. 55).

170 (Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer, 1997).

171 (Hereijgers & Van Velzen, 2001, p. 69).

172 (Van Rossem & Schilt, 2002. p. 5).

The growing threat of redevelopment to post-War Reconstruction neighbourhoods– calculated in 2001 to led to a rate of demolition and rebuild of an average of 25 000 dwellings per year.[173] This in turn led to a reflection on the value of these neighbourhoods. They were by now getting on in years, and would soon be eligible for listing under the Monuments Act of 1988. A reappraisal of the large production of Reconstruction neighbourhoods was both urgent and problematic. But the sheer number of buildings in these neighbourhoods, coupled with their non-traditional construction methods, made traditional assessment and listing neigh impossible. The traditional conservationist arguments of beauty, vitality, identity, age and material authenticity failed to impress, compared to large Modern Movement housing areas, which combined, made up approximately one third of Dutch urban areas by the end of the century.[174]

The liberalisation of the Dutch public housing system had already commenced in the late 1980s with the idea that profit taking from the housing market by housing institutions could fill the gap of central government subsidies.[175] Housing associations, re-cast as corporations in 1994, were tasked to make profit from the open market in order to subsidise their public housing agenda. This meant that housing institutions geared up to act as developers of secondary projects to reach their aims towards the year 2000.

In February 2000, the inhabitants of the Frankendaal public housing experienced a rude awakening: They were notified by the housing institutions[176] that their dwellings would be demolished to make way for new housing construction.[177] The decision to demolish had been made based on the 1997 structure plan for the larger Watergraafsmeer on which a so-called *structuurschets* (structure outline) had been developed. After further studies the three owner-housing institution decided to develop a single vision and communicate this to the tenants.[178]

173 An estimation by Damen Consultants cited in (Hereijgers & Van Velzen, 2001, p. 137).

174 (Hereijgers & Van Velzen, 2001, p. 137).

175 The white paper *Volkshuisvesting in de jaren negentig* (Transl. Public housing in the nineteen-nineties) was published in 1989 and by 1994 the associations and corporations were liberalised. This meant that whereas in the past their debt in the form of government loans had formed part of the national debt, this was externalised to the now independent corporations.

176 By now the public housing at Frankendaal was owned and managed either by De Dageraad, De Key and Patrimonium. (Zijlstra, 2013). In the early 1990s the housing was controlled by Patrimonium Amsterdam-Zuid and Onze Woning stock at Frankendaal (Paulen et al., 1992).

177 (Schilt, 2010, p. 23).

178 (Zijlstra, 2013). p. 42).

Financial considerations played the decisive role. The housing institutions were unencumbered by a negative book value seeing as the c.1985 renovations had been booked at a payback of 15 years[179] and were therefor just written off. More importantly, the leasehold for the land on which the housing was located was to expire and had to be renewed for a period of 75 years. These reinvestments in the land and location had to be recouped.[180] The time was ripe to redevelop the area for full market value.

Retaining all or any of the dwellings was only marginally feasible: by 2002 housing association De Dageraad–who by now seemed to have taken control of some of the stock at Frankendaal–calculated that letting out an extant un-duplexed public housing unit at Frankendaal for another 75 years, was worth a measly total of € 6 000. But this would call for for two large maintenance interventions.[181] To renew the leasehold, which had just expired, would cost around € 5 500 per half-duplex. This translated to a negligible of return on investment of € 500 over a period of 75 years or € 0,67 per year![182] To retain the Frankendaal public housing would require external funding, or in other words, subsidisation. This was not forthcoming[183] and demolition and newbuild would be the only financially sustainable way forward, even if this meant higher rentals for tenants.

By now the neighbourhood had developed a new identity: it was being referred to as 'Jeruzalem'. The first mention of the change from the by now forgotten 'diaper town' to Jeruzalem was in 1998.[184] This name change coincided with a growing appreciation of the cuboid houses, which by now had become bright white.

Long term residents had formed a closely knit community and were a force to be reckoned with in any renovation. In 2001, the municipality set up a working group, the *werkgroep Sociaal Plan* (working party Social Plan) with representation of housing corporations, the borough, care institutions, inhabitants (and their supporting institutions) and local businesses to come to an agreement on the rights of the neighbourhood. The most important topic of the working party was the *terugkeergarantie* or guarantee of a right to return. The agreement concluded that inhabitants who legally lived in Tuindorp Frankendaal on 1 July 2003, would

179 (Stadsdeel Oost, 2002, p. 13).

180 (Knulst, 2002, p. 1).

181 After 25 and 50 years.

182 (Knulst, 2002).

183 (Hendriksen, 2001).

184 The first published source that uses the name 'Jeruzalem' for the neighbourhood is (Hendriksen, 1998, p. 110).

have a right of return.[185] In a residents' survey undertaken in anticipation of a renovation project in 2003, 81% of residents wanted to return after a renovation project to their neighbourhood, Jeruzalem. Older residents were most attached to the neighbourhood with 89% of people over 65 years of age wanting to remain in the housing estate.

In 2000 the *Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer* (Public Housing Spatial Planning and Environmental Management, VROM) publicised its policy document *Nota Wonen* to timeously investigate early-post-War neighbourhoods for potential listing as monuments.[186] In this new climate of a growing appreciation for the neighbourhood, the city of Amsterdam's monuments and archaeology section soon undertook an assessment, publishing a so-called *Cultuurhistorische Effectrapportage* (Cultural-historical Impact Report, CHER), which found that the complex was conservation worthy.[187] As a response, the borough commissioned a so-called second opinion of the living and constructional quality of the public housing at Frankendaal in 2001.[188]

This 2001 Second Opinion report provided an insight into the quality of the dwellings and listed the most urgent defects, as reported by owners and inhabitants. The housing institutions found that the dwellings were too small; this factor was exacerbated by their lack of storage space (providing storage space at 6,5% of the floor surface was the norm at the time of newbuild). At 48,5m^2 use-area and 26m^2 living area, the dwellings scored far below the then current minima of 55m^2 and 44m^2 respectively of the City of Amsterdam.[189] Of course these were the requirements for new housing construction, but the point was easily made: the housing at Frankendaal was too small to meet contemporary comfort needs. Another argument put forward was that ground floor units were an easy target for unwanted intruders and it was near-impossible to adapt the housing units for wheelchair users. The stairwells leading to the top floor dwellings were also too small to install a stair-lift.[190]

The thermal isolation was found to be deficient, and as the foundations could not carry any additional loads, this could not be repaired. Acoustic privacy was not adequate. The now-painted pre-cast concrete façade panels were also in a poor

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185 (Plan, 2013).

186 (Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieu, 2000).

187 (Van Rossem & Schilt, 2002).

188 (Bureau P/A et al., 2001).

189 The City of Amsterdam's *Richtlijnen Kwaliteit Woningbouw Amsterdam 1995*, amended in 1999 set requirements over and above the national Bouwbesluit norms.

190 (Bureau P/A et al., 2001, p. 13).

state of repair with rusting reinforcement and consequent spalling. They even found that the heating systems were out-dated, despite some units having received central heating only four years earlier in 1997, the year in which the first investigations into their possible replacement were being made! In short, the dwellings were deemed to be deficient in skin, space plan and services.

It should come as no surprise that inhabitants shared some of these perspectives, complaining of cold floors, walls and especially roofs. Unsurprisingly the thin pumice-concrete roof plates also caused top floors to overheat in summer, a deficiency only partly addressed in a small number of blocks where had roofs been insulated. The poor thermal insulations resulted in disproportionately high gas bills.[191] Cold, condensation and mould remained problems that required addressing, but the residents were willing to live with these deficiencies of their homes because they appreciated and enjoyed their neighbourhood, added to which their rents were low.

By 2004 the Frankendaal public housing neighbourhood's cultural historical value was validated when it featured prominently in an official report assessing the typology of early post-War Reconstruction neighbourhoods.[192] The residents had by now united themselves under the slogan *Jeruzalem Blijft!* (Jeruzalem Stays!). The inhabitants protested against the pending demolition and reconstruction of the neighbourhood.[193] They were not only quick to protest against the proposals, but seeking a vehicle for their voice, they soon began to lobby the municipal and national monuments services in an attempt to get the neighbourhood formally protected,[194] despite their rather decrepit living conditions.

The Second Opinion investigation also proposed possible remedial actions to breach the stalemate between the ambitions of owners and that of the residents. But the authors concluded that adding even only thermal and acoustic isolation to the buildings could lead to the foundations failing.[195] The question remained: how to deal with these out-dated too small and thermally- and acoustically deficient houses, which could not show a decent return on the required financial investment?

191 Those belonging to the Dageraad in the blocks between the Van Hoff and Kruis avenues.

192 (Blom et al., 2004).

193 (Bureau P/A et al., 2001, pp. 14–15).

194 It is worth noting that not all residents were in favour of listing, preferring demolition and newbuild because the Frankendaal housing was out-dated, small and run-down.

195 (Bureau P/A et al., 2001, p. 22).

The next decade would see a flurry of activity that led to the renovation of only one of the public housing units. This was the valorisation decade, a process of that would 'mutate' six courtyard-blocks plus the primary school.

7.5.1.1 Rude awakenings on the road to valourisation

The 2001 CHER concluded that Tuindorp Frankendaal represented a milestone in the development of architecture and town planning in the Netherlands of the twentieth century and therefore contained a high level of cultural-historical importance,[196] a conclusion that echoed in newspaper articles[197] and publications by experts.[198] The architectural practice Werkplaats voor de Architectuur[199] was approached in c.2002 to conduct a feasibility study for the reuse of the existing public housing for a period of 25–75 years, their proposal going further than the originally intended de-duplexing and suggesting horizontal and vertical merging of the units to create more feasible and comfortable housing units.

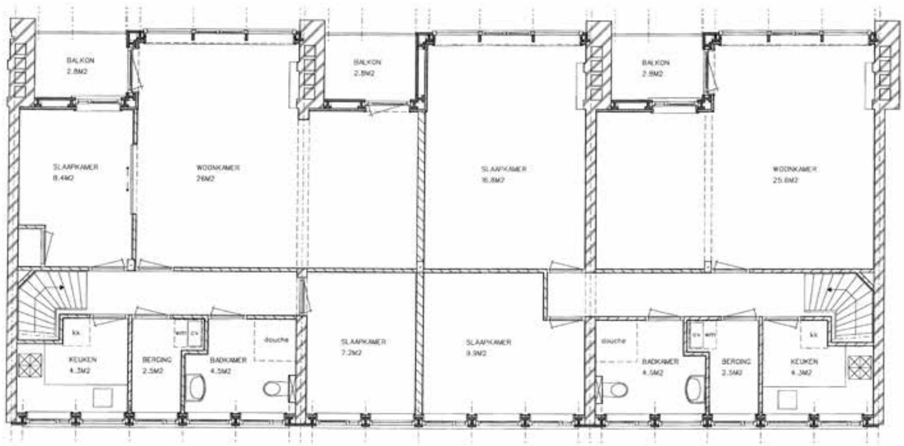

FIG. 7.28 Proposed remodelled units to create larger homes, as proposed by the Werkplaats voor de Architectuur: the aim: to preserve the façades as far as possible (Hooyschuur Architects Archive (090302), Wormerveer).

196 (Van Rossem & Schilt, 2002, p. 80).

197 (Hendriksen, 2001).

198 (Zijlstra, 2003); (Kuipers, 2004) & (Polman, 2004).

199 Architect Bertus Mulder of Werkplaats voor de Architectuur had been responsible for the restoration of the Rietveld Schröder House in Utrecht in 1987.

These plans came to naught when it transpired that they would cost too much. A 2004 attempt at listing the Frankendaal public housing as national monument[200] failed in part because the houses were assessed as being too small, too noisy, too cold and too damp to remain feasibly inhabited in future. In addition, the sewerage was deemed to be in a too deplorable state to warrant conserving the housing.[201] A counter proposal made at the time suggested that 50% of the neighbourhood to be demolished to make way for new buildings, the remainder was to be listed and renovated. However, naught came of the proposal at the time.

The Frankendaal public housing estate remained unprotected as monument. Two important factors were at play: At the time the RDMZ (today RCE) maintained a policy to the effect that only buildings threatened by demolition could be listed as national monuments[202] and did therefore not take any action. The ambitions of the landlords also did not include listing, but rather demolition and redevelopment: a financially lucrative trajectory, but in no means in the interests of the inhabitants.

In the hope of finding a common-ground way forward, the three landlords together invited three urban designers to prepare proposals for Frankendaal.[203] The CHER had clearly concluded that Frankendaal did contain cultural historical value: a conclusion that could not be ignored. The selected proposal by Atelier Quadrat included the retention of the six 'most representative' courts of the Frankendaal public housing estate. According to this plan, these were to be renovated in a 'monument-worthy' fashion, including their landscaped areas. All the dwellings in these six blocks were to be un-duplexed, as was the original intention of the post-War project, except for 54 dwellings along the Maxwell Street, that were to be retained in a duplex form. The rest of the Frankendaal public housing stock was to be demolished and the area redeveloped as three storeyed public housing with some ground-floor commercial space.[204]

Again, the projected costs were too high. Attempts to adapt the Atelier Quadrant masterplan failed because all financially feasible proposals would require higher densities than planned and therefore lead to higher buildings or demolition, thought appropriate to the cultural-historical value.

200 (Schilt, 2010, p. 23).
201 (Hofland & Tellinga, 2004, p. 87).
202 (Schilt, 2010, p. 29).
203 These were: Atelier Quadrat, Palmboom & Van den Bout and Urhahn Urban Design.
204 (Atelier Quadrat, 2003).

After four years of intensive discussion, planning and public participation, the development plans were withdrawn in 2004.[205] The status quo remained and only De Principaal continued to invest in the existing buildings, undertaking some maintenance in 2006. Jeruzalem returned to a slumber.

A second rude awakening followed when in 2007 both the RDMZ and the BMA learnt that new plans for the neighbourhood had been submitted by Rochdale to the borough had and been accepted in principle.[206] In this plan only four blocks belonging to De Principaal would be retained and the rest of Jeruzalem demolished for redevelopment up to six storeys high.

This rear-guard action of Rochdale came at a particularly poignant moment. The *Ministerie van Onderwijs, Cultuur en Wetenschap* (Ministry of Education, Culture and Science, OCW) was just then preparing its list of Top-100 Reconstruction Monuments 1940-1958[207] in the Netherlands. The Frankendaal public housing was included in the list. When published on 15 October 2007, this listing effectively listed the entire Frankendaal public housing estate–by now more often than not called Jeruzalem–as National Monument as, so called *voorberschermd* (provisionally protected).[208]

A political impasse followed, in part because the borough supported Rochdale's redevelopment plans. The RDMZ and BMA, bolstered by the publicly vocal support of the inhabitants, however, opposed them. Consensus was only reached in 2008,[209] leading to a master plan for the neighbourhood being approved by the Oost-Watergraafsmeer Borough in 2009.[210]In this master plan, the original 2004 idea to protect approximately 50% of the Frankendaal public housing was resurrected. The entire neighbourhood would be developed as a ground-breaking energy-neutral neighbourhood.

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205 (Schilt, 2010, p. 29).

206 (Schilt, 2010, p. 29).

207 "Top 100 wederopbouwmonumenten 1940-1958." (Rijksdienst voor het Cultureel Erfgoed, [s.a.]c).

208 (s.n., 2007).

209 (s.n., 2008). The procedure to get to this compromise has been succinctly described by Jeroen Schilt who was intimately involved in the process (Schilt, 2010).

210 (Stadsdeel Oost-Watergraafsmeer et al., 2009).

FIG. 7.29 Urban development vision developed by Karres & Brands Landscape Architects in collaboration with HVDN architects (Stadsdeel Oost-Watergraafsmeer et al., 2009, p. 16).

This decision was embedded in the adopted urban design framework for the redevelopment of the neighbourhood: "The city and the borough Oost-Watergraafsmeer have as aim to reduce CO2 by 40% in 2025 in relation to the reference 1990."[211] The retained courtyard-landscapes of the to be protected housing blocks was to be renovated in keeping with the intention of their original Mien Ruys design. A year later (May 2010) all of the Merkelbach & Elling public housing at Frankendaal–the entire Jeruzalem–was designated as an Order 1 ensemble by the City of Amsterdam in May 2010.[212] In December of that same year, six blocks, two belonging to Rochdale and the four De Principaal blocks, with their associated landscapes, along with the neighbouring H-plan school, were listed as national monument.[213]

211 "De centrale stad én het stadsdeel Oost-Watergraafsmeer hebben de doelstelling om 40% CO2 te reduceren in 2025 ten opzichte van de referentie 1990." (Stadsdeel Oost-Watergraafsmeer et al., 2009, p. 94).

212 (Gemeente Amsterdam Bureau Monumenten & Archeologie, 2010).

213 (Rijksdienst voor het Cultureel Erfgoed, 2010).

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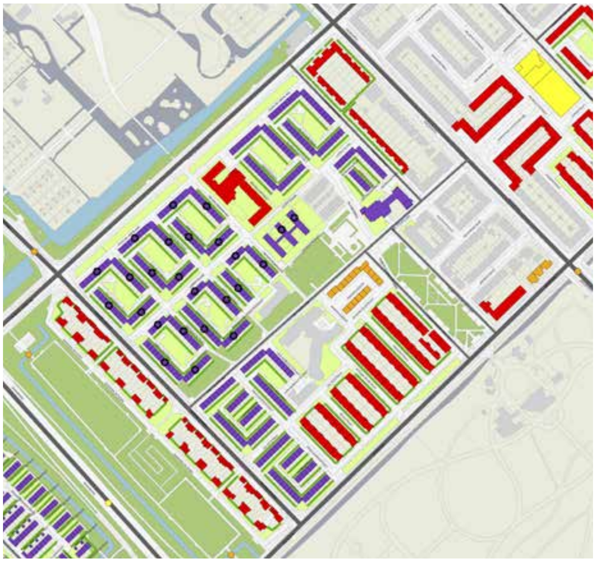

FIG. 7.30 The 'ordekaart' developed by the BMA indicating in purple the 'Order I' buildings, those with black stars protected as national monuments (Gemeente Amsterdam Bureau Monumenten & Archeologie, 2010).

Unfortunately for the inhabitants of the four valourised blocks at Frankendaal, a last rude awakening lay in waiting. The decision to list the blocks as a national monument had an unexpected economic consequence, due to Exosystemic changes. A cabinet decision at the national level led to the *Woningwaarderingspunten* (Home grading points) system which regulates rental prices of special housing in the Netherlands to be reviewed to specifically include the status of a dwelling as 'monument' into calculation as a beneficial quality.[214] The 2013 amendment of the Woningwaarderingspunten system added 50 points to the scale, pushing the housing out of the protection of the social system. Market-related rental prices could now be charged without the owners undertaking a single physical intervention to improve in the home economy or living comfort of the dwellings.

7.5.2 Abstract conceptualisation–an experiment designed for learning

It had become abundantly clear that the Frankendaal public housing was so highly regarded that at least some needed to be retained even before the listing of part of it as national monument.

214 (De Huurcommissie, 2013, p. 39).

The ‘monument-worthy’ renovation ambition presented by the Atelier Quadrant masterplan had already presented the dilemma: how to future-proof the dwellings that were to be retained when they had not even met early post-War dwelling comfort criteria, being built more than 50 years before?

While plans were being developed for the larger neighbourhood, investigations where underway to show the adaptive 2E+Co upgrade possibilities of the Frankendaal housing that was to be retained. The Werkplaats voor de Architectuur feasibility study for the reconfiguration of the listed housing blocks proposed repair of the architectural qualities of the buildings, improving the technical aspects and creating a more diverse dwelling typological offering in the neighbourhood. The Werkplaats proposals included a new box-in-box thermal and acoustic inner-skin as well as sanitary improvements. This would mean that the full interior, including the inner skins of the outer walls, would be removed and replaced.[215] Their proposals went beyond only un-duplexing the dwellings according to the original Merkelbach & Elling plans and even proposed merging three dwellings into two large houses.[216] These proposed interventions assumed a higher load-bearing capacity for the foundations and that the façade would remain stable when the inner-skin block walls were removed. In order to re-establish the original architectural qualities, Werkplaats proposed reinstating the end-wall panels of the blocks, while insulating these in the resultant cavities. The timber-framed curtain glazing façades to the south-east façades would be reinstated, mimicking the original design, but executed in double-glazing. These plans, like the Atelier Quadrant masterplan, were shelved due to their cost.

It was only in 2009, the year the agreed to master plan was adopted, that the first renovations were attempted. Owner De Principaal appointed Hooyschuur architects to reassess the housing, design an ambitious intervention and implement this design at one unit as an experiment. The ambitions were clear: addressing the defects of the dwellings while at the same time reversing the past interventions, including the brick-and timber end walls that had been added in the 1980s, and were seen as detrimental to the original design. It was also important to find ways to insulate the units without reducing the already sub-norm floor area of the units.[217]

The inhabitants of Jeruzalem had by now been opposing the demolition of their homes for nearly a decade, but they were not blind to the shortcomings of their

215 (Werkplaats voor Architectuur Utrecht, 2003, p. 3).

216 (Werkplaats voor Architectuur Utrecht, 2003, p. 6).

217 (Hooyschuur Architecten bna & Balthussen, 2009).

dwellings. These are listed as part of Hooyschuur's investigations leading to the experimental renovation. The walls, both interior and exterior, were moist and especially the showers had a mould problem. Gas-, water- and drainage pipes leaked, as did the roof in places. Doors and windows, both timber and PVC, were worse for wear and did not close properly and electrical short circuits were common. Inhabitants also complained about blocked rainwater downpipes, the splaying of the concrete panels, leaking joints between the panels and the poor level of maintenance of the chimneys. The creaking timber floor planks of the top unit floor were a source of much irritation.[218]

To add insult to injury, the inhabitants had come to learn that the floor coverings and chimneys contained asbestos through all the investigations undertaken by the housing institutions. In 2009 Rochdale undertook a study to identify possible occurrence of asbestos at Lorenz Avenue 91 (a top-floor unit). The study identified an asbestos trapdoor under the stairs and an instance of asbestos coring, providing heat isolation where the flue of a 'gevelkachel' penetrated the wall. This was removed, but only at Lorenz Avenue 91.[219] Of course the rest of the neighbourhood became aware that their homes contained asbestos, which can only have added to concerns about the existing houses.

But these complaints were not the main drivers for setting the ambitions for the proposed redevelopment project: the energy neutral neighbourhood ambition was.

The cost of such an intensive renovation project could not be recuperated within the payback-period of 40 years, that the housing corporation had to achieve.[220] A commission, which included the borough, municipal monuments department and the housing association De Principaal/de Key, was established in 2009 to investigate potential external subsidies and grants, especially as it was clear that the six blocks would become the Jeruzalem national monument. Support for the renovation project was garnered from the European Foundation for Living.[221] The team also looked to the national *Besluit Rijkssubsidiëring Instandhouding Monumenten* (Decision National Subsidy Monuments Maintenance, BRIM), which by default excluded residential buildings, only coveing general maintenance of a monument, not upgrades.[222] These subsides could contribute to the energy upgrade

218 (Hooyschuur Architecten bna, [s.a.]).

219 (Search Ingenieursbureau, 2009); (SAA [Stadsdeel Oost]: 54700, 4105 B.T. 1949).

220 (Hooyschuur Architecten bna, 2011, p. 8).

221 (Gemeente Amsterdam Stadsdeel Oost-Watergraafsmeer & Koeneman, 2009).

222 (Hooyschuur Architecten bna, 2011, p. 46).

interventions needed to achieve the 2008 vision for a restructured Jeruzalem as a future energy neutral neighbourhood.[223] Other sources for funding needed to be found.[224]

VROM identified the neighbourhood as eligible for the *Mooi Nederland* (Beautiful Netherland) innovation project, freeing up funding for the planned integrated energy networks.[225] Jeruzalem's wider urban environment was inventoried as energy-landscape to be able to capitalise on solar, wind, biomass and waste energy sources–such as industrial waste energy and sewerage as heat source–without reducing the spatial quality. This process was co-supported by *Agentschap Nederland* (Agency Netherland) that identified Jeruzalem as 'excellent area'–areas where new construction aimed at higher than the norm insulation qualities (EPC). The project was to be monitored and publicized by Agentschap Nederland.[226] Additionally € 1,5mil was allocated from the *Stimuleringsfonds Volkshuisvesting* (Stimulation fund for public housing) to afford the development of strategies for the restoration/renovation of the Jeruzalem monument, and implement the test case.

The aim was to develop a three-pronged renovation strategy that was:

- in line with the values of the valourised buildings and landscapes;
- that would develop a sustainable energy system for the entire neighbourhood; and
- provide well-functioning dwellings in the monument with longevity.[227]

Developing a sustainable energy system became the driving theme, mandated by the Stimuleringsfonds Volkshuisvesting subsidy. To this aim the renovation was designed to achieve energy-label A+,[228] requiring high-level insulation coupled with

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223 Jeruzalem was identified as an 'excellent area' areas where 'innovative new construction projects' would be used to develop methods for energy-neutral construction by 2020 (Projectorganisatie Jeruzalem, 2011, p. 14).

224 (Gemeente Amsterdam Stadsdeel Oost-Watergraafsmeer & Boddeus, 2009).

225 (Van der Tol, 2010).

226 (Projectorganisatie Jeruzalem, 2011, pp. 14–15). Agentschap Nederland was an agency of the Dutch Ministry of Economic Affairs, and was a 'one-stop shop' for sustainability, innovation and international entrepreneurship.

227 (Projectorganisatie Jeruzalem, 2011, pp.14–15).

228 Personal communication Ron Balthussen, 13 June 2016.

heat recovery installations. This ambition was set by the project team: the architects, housing institutions and the municipal authorities.[229] The test case was undertaken with financial support from both De Principaal/De Key and Rochdale.

All new build housing in the neighbourhood was envisaged as energy-neutral as well as the renovation of the remainder of Jeruzalem to be insulated to a high degree to achieve an Energy Label A+ status.[230] Heating would be provided by either a pallet-fired Combined Heating and Power (CHP) plant or an aquifer thermal energy storage system, both of which would require a low-temperature heating installation, such as floor heating.[231]

A new floor heating system could easily be installed as a new floor covering on new insulation, provided that the foundations could carry the extra load. Insulating the roof was also not too challenging, and solar panels could be incorporated out of sight on top of the near-flat mono-pitch roofs.[232] But insulating the façade, however, would prove to present the next dilemma.

7.5.3 Active experimentation: The 2E+Co of Cycle 1

To achieve the ambitious renovation goals, the unknown Dotremont-Ten Bosch prefabricated construction system would need to be studied in situ. Somewhere a section of a façade had to be deconstructed.

No. 127 Hugo de Vries Avenue, one of the six dwelling units that had not been ‘temporarily’ split at the time of construction,[233] had recently been damaged by fire. It presented an ideal guinea pig for a destructive investigation and a trial renovation.[234] With prior approval from the municipal and national monuments authorities destructive research was undertaken on this component of the national monument. The process included demounting the concrete panel façade and

229 Personal communication Ron Balthussen, 13 June 2016. In 2014 a renewed Energy-label system was introduced in the Netherlands with A as the highest class (Kuijpers-van Gaalen & Staal-Guijt, 2014).

230 Personal communication Ron Balthussen, 13 June 2016.

231 (Hooyschuur Architecten bna, 2011, p. 10).

232 (DWA Installatie- en energieadvies, 2009).

233 A so-called type A7 unit, of which six were constructed. (Merkelbach & Elling architects, drawing ‘Bebouwingsplan Frankendaal’ dated ’22.7.49’. (SAA [Stadsdeel Oost]: 54700, 4105 B.T. 1949.).

234 (Zijlstra, 2013, p. 44).

investigations into the physical aspects such as foundations.[235] At the same time the architects actively engaged the inhabitants in a process to develop new floor plans (i.e., better sanitary facilities and linking the kitchen and lounge). Historical colour research was also undertaken on the original building elements.

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FIG. 7.31 The trial block at 127 Hugo de Vries Avenue with the façade panels removed (Hooyschuur Architects 2010); [2] Connection of the new façade of the trial unit with the unrenovated façade of the adjacent shop (2019).

The façade panels, 60–65mm thick, were already in a rather poor condition, splayed, painted, and having had holes drilled through them. The 1980s layer of paint had led to accelerated corrosion of the steel reinforcing.[236] An even more important conclusion of the destructive investigations in the experimental unit was the discovery that Merkelbach & Elling had used the inner-skin block wall to add to the lateral stability of the blocks.[237] Removing the outer-skin panels would therefore be structurally risky and would call for the addition of permanent bracing, although would be very difficult to secure the structural stability of the dwellings in this way.[238]

Eventually the choice fell to removing and replicating the façade panels, replacing the original vibrated concrete panels with a 20mm thick fibre-reinforced

235 (Hooyschuur Architecten bna, 2011).

236 Personal communication Ron Balthussen, 13 June 2016.

237 Hooyschuur Architecten bna, 2011, p. 20).

238 This also means that the 2003 Werkplaats voor Architectuur box-in-box proposal would also have been unworkable.

cement panel,[239] freeing up space in the cavity for insulation. The resultant 35mm cavity would allow for repairing the concrete posts, where needed. The floor area of the units would not be impinged upon. There were additional benefits to this strategy. Research indicated high levels of chlorides in the concrete which leads to pitting of the reinforcing steel in the posts when in contact with moisture. The demolition- and-replication approach would allow for a damp barrier to be installed over the refabricated posts, as recommended by a consulted concrete specialist.[240] That this replication of the façade panels may constitute an infringement of Dotremont's 1964 patent seems to have gone unnoticed to all.

To complete the aesthetic skin renovation, the paint on the chimney was cleaned off, but the conclusion of this specific aspect of the project was that the process had been too abrasive and needed re-assessment.[241]

A total energy-package was developed for this stand-alone experiment. The low-temperature floor heating was serviced by a gas combination-boiler, trickle vents were included in the new window-frames with the original chimneys functioning as exhausts. A mechanical extractor system was installed on top of the roof and incorporated a heat exchanger to harvest heat from the exhaust air. HR++ glazing was installed all round. The glazing for the exposed southern curtain wall façade was augmented with a low-e coating to limit summer heat gains. This addressed the systemic problem of excessive summer solar ingress, a potential problem that had been manifestly clear to the architects during the design phase. Inlet and exit points were provided to link the unit to an anticipated neighbourhood heating system,[242] which was to be installed when the larger neighbourhood got renovated.[243]

The interior of the unit also received a facelift, all the walls were replastered and all sanitary provisions upgraded. Internal doors and ironmongery were retained after being serviced. All services, including electrical reticulation, gas, water, IT infrastructure and the entire sewerage system were replaced. *Skin* and *Services* were addressed in a total and integral approach–an ideal strategy to achieve the maximum energy gains for ecological reasons, with positive effects on comfort.

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239 (Hooyschuur Architecten bna, 2011, p. 30).

240 (SGS, Klitsie, & Winkel, 2011).

241 (Hooyschuur Architecten bna, 2011, p. 37).

242 An aquifer thermal storage system was envisaged, as had been applied at the Justus van Effen and the Koningsvrouwen van Landlust renovation project.

243 (Hooyschuur Architecten bna, 2011, pp. 27; 32).

On 11 February 2010 the Minister of Education, Culture and Science unveiled a commemorative plaque in the façade of the experimental renovation unit, memorialising the 'protection and renewing' of the six housing blocks, school and landscaping, now known as the Frankendaal monument, though also still referred to often as *Monument Jeruzalem*.

7.5.4 Concrete experience and reflective observation

The 2008–11 Jeruzalem renovation/restoration was a rather exceptional experiment in part because it was undertaken in close collaboration with the RCE and BMA. It was exceptional because of the way the experiment had been designed: in effect it was to cover all the phases of the Kolb learning cycle. The reflective observation of the actors (architects, monuments specialist, and housing institution representatives) included the concrete experience of housing institutions as well as those of the inhabitants. The abstract conceptualisation included stakeholders whose opinions were factored in; the experiment– including investigations through deconstruction–was to be put into practice and the concrete experience of the inhabitants monitored. All of this was to be retrospectively evaluated by the project team in 2011 as informant for the future large-scale renovation.

A post-occupancy monitoring was planned to run from 2011–17. Important energy-related aspects were to be monitored. These included assessing the air-tightness of the renovated unit and investigating the effects of the insulation installation thermographically, in order to check if an A+ energy label had been actually been achieved by the renovation. The damaged chimney bricks were to be monitored while a new approach was to be developed to clean the paint off the chimneys. The new façade panels were also going to be monitored continuously.[244]

The monitoring project quickly became a victim of the 2009 global economic recession, which wreaked havoc in the Dutch public housing world. Rochdale was nearly bankrupted when the housing market collapsed and the sales forecasts of housing units were not met. The result was that projects such as the Frankendaal newbuild project, depending on the sale of new houses, were immediately halted and

244 (Hooyschuur Architecten bna, 2011, p. 6).

all renovation plans shelved,[245] despite the fact that Rochdale had already relocated some inhabitants to temporary dwellings.[246]

The project to monitor the experimental renovation was abandoned, without which the project team was unable to confirm that they had in fact reached the energy use reductions required for an A+ Label in reality.[247]

The project was put on the back burner. In 2011 the director of Rochdale, René Grotendorst, had to admit to his tenants at Jeruzalem that: "[w]e cannot fulfil our promises, and for this we feel very ashamed. Delaying [the project] was a difficult decision and [is] a setback for inhabitants."[248] Rochdale hoped to be able to restart the renovation project in 2014, De Key (formerly De Principaal) projected was only able to start in 2016.

The Jeruzalem learning experiment came to a premature grinding and inconclusive halt. The inhabitants, having fought to stay and, having being promised the world, were subsequently left disenchanted. One party did its best to complete the learning cycle: an internal assessment by the architects[249] aimed at achieving a good record of the experimental renovation as well as self-critical assessment. The conclusion was clear: despite all the positive progress made, including encouraging perspectives from RCE and BMA, the experiment had simply been too costly to replicate.[250]

7.5.5 Learning Cycle 2: 2E+Co in the Actor Factor Set Ecosystem

The period of Macrosystemic liberalisation brought a gradual evolution to the Frankendaal public housing. The liberalisation of housing institutions, with the subsequent requirement for profitability in public housing had a direct result on the longer-term perspectives of Frankendaal, especially when taking into account lease-hold investments. The long-running Macrosystemic national urban renewals

245 (s.n., 2011b).

246 (Rochdale, 2011, p. 83).

247 Personal communication Ron Balthussen, 13 June 2016.

248 "We kunnen niet waarmaken wat we hebben beloofd en daar schamen we ons flink voor. Het uitstel was een lastige beslissing en een tegenvaller voor de bewoners." (s.n., 2011a).

249 (Hooyschuur Architecten bna, 2011).

250 Estimated at roughly 120-130% of newbuild (Personal communication Ron Balthussen, 13 June 2016.) at approximately € 80 000 per unit for an un-duplexed dwelling, i.e. ±40m2 (Hooyschuur Architecten bna, 2011).

polices influenced local authorities plans on Exosystem and worked through to the Microsystem. These two Macrosystemic factors were to have a decisive influence on the evolution of the Frankendaal neighbourhood, countered by the growing appreciation of the heritage value of the estate.

The residents of Jeruzalem made clever use of this growing appreciation on the Exo- (municipal) and Macrosystem (national) scales. Seen from the Micro- and Macrosystem, the voice of the tenants was an Exosystemic factor that needed to be managed, but was easily overshadowed or overruled by, for instance, financial considerations. Concerned by both potential higher rental costs and the prospect that they might need to move from this ideal location in the city, residents used arguments for the retention of the cultural-historical value, generated by monuments care practitioners in the Macrosystem. This served as a vehicle to legitimise their claims and to amplify their interests from their position in the Macrosystem to the Microsystem actors (owners, architects, and others plotting futures) and the Exosystem (municipal authorities, including monuments services) and Macrosystem actors (national authorities and society in general).

The in-principal valorisation of the Frankendaal public housing estate made the incursion of the national and municipal monuments services into the Microsystem possible. This, however, had financial implications for the housing corporations' own home economy on the Exosystem. Subsidies, where available, were the only way to overcome the strictures of accounting regimes. Conclusions contained in documents such as the 2001 CHER were strong enough factors that they could steer the implementation of long-running national policy.

It took a very long period to find a way forward that accommodated all factors, or mitigate those that could not be accommodated. Rochdale's 2007 application for demolition was a provocation; a call to action. It led to an experiment as a method to find common ground. The 2009 Hooyschuur in situ trial renovation was a unique experiment, especially as it had been conceptualised to be a true learning process. But this learning cycle, embedded as part of the larger renovation process, was not immune to financial considerations. These not only dominate all bioecological scales, but to a large extent drives the Mesosystem dynamics.

Over this dysfunctional learning cycle, high ambitions were set for the Frankendaal monument, especially that of integrating it into an energy neutral neighbourhood. The upgrades of the monument Jeruzalem therefore, had as drivers: energy efficiency and the economy of these interventions. Inhabitant comfort only played a secondary role, with a potential home-economic spin-off, focussed on mutating skin, services, and where easy wins could be achieved, a space plan.

At the same time the heritage significance of the monument became important. Jeruzalem had to achieve the appearance of a dignified monument: it had to look like Frankendaal was intended when new. The 2E+Co advancement since the building of the housing was to be felt and experienced in the dwellings, but not seen on façade.

7.6 Learning cycle 3 (2014–18)

The global financial crash following the 2007–10 American sub-prime crisis led to near-complete construction stop in the Netherlands. When the economy started to recover, the resultant housing crisis led to new perspectives, among others, a downward adjustment of domestic space requirements.

Where before the crisis, the ambition had been to provide a differentiated housing stock with a choice of housing sizes, this ambition had now evaporated and the norm for new construction in Amsterdam was brought back from an average of $100m^2$ to $50m^2$.[251] The housing crisis and shortage of homes in Amsterdam spurred innovation on. Suddenly the Frankendaal duplexes were not too small to be inhabited any more. The duplex response to the housing crisis after WW II was again appropriate to the housing crisis after the 2009 financial recession.

For Frankendaal, the period 2011–14 is a period of stagnation, at least from the perspectives of inhabitants. De Key and Rochdale undertook limited maintenance to Jeruzalem: painting, repairing wood rot and ensuring that doors and windows were serviceable. Most of the neighbourhood was earmarked for demolition after all.[252] In anticipation of the planned, but delayed redevelopment of the neighbourhood, new tenants were only given temporary rental contracts.The parts of Jeruzalem earmarked for development slowly transformed into a transient neighbourhood. The social sustainability of the once close-knit neighbourhood was slowly being eroded, despite efforts by inhabitants to counter this trend.[253]

251 (Personal communication Ron Balthussen, 13 June 2016).

252 (s.n., 2011c).

253 As late as 2015 the inhabitants of Jeruzalem formed a corporation named Wooncorporatie Jeruzalem (o.o) and commissioned a report to show the value of specifically blocks G and H, pleading for the national monument to be extended to include their homes (Liesbeth Boeter Architect, 2015). Their pleas were in vain: these blocks were demolished during the first half of 2018.

Despite the lack of formal monitoring, lessons had been learnt from the 2010 experiment by virtue of the diligence of the architects. The prefabrication construction system and its limitations were better known and strategies to achieve a high level of energy use improvements; with consequent comfort and heating economy improvements had been developed.

All of the woonhof blocks in ownership of De Key at Frankendaal was declared national monument (Blocks A, B, C & D plus their courtyard landscapes). Rochdale owned only two valourised blocks (Blocks E & F plus their courtyard landscapes). The rest of its public housing stock at Frankendaal (Blocks J, K & L and G, H & I) remained identified as Order 1 by the City of Amsterdam, the main value being identified did not reside in the buildings, but in the urban layout.[254]

7.6.1 S•E•T

The 2009 economic crisis hit Dutch housing institutions hard, not only in their pockets, but also in terms of civic society and governmental trust in them. The proposed redevelopment of Frankendaal aimed at capitalising on an existing asset; not as affordable public housing stock, but as a brownfields redevelopment site in an ideal location. But the financial crisis not only affected the sales of units by housing institutions; their investments, especially those made in the financial markets, evaporated. Tthe country's largest housing corporation Vestia came to the verge of bankruptcy when the value of its derivate-based investments evaporated. The state intervene financially by taking over the debts of Vestia. Other high-profile cases further eroded public and political trust in the Dutch housing institutions, spurring on national policy changes.[255]

Rochdale was not spared embarrassment when its director was removed from his position because of financial misappropriation and a judicial inquiry launched in 2009.[256]

254 The Willem Drees retirement home (Block N) and the Ingenhouszhof building (Block M) were designated Order 2 and Order 3 respectively. (Gemeente Amsterdam Bureau Monumenten & Archeologie, 2010).

255 The most publicized was the miscalculation of housing corporation Woonbron in purchasing a historic ship, the SS Rotterdam, and attempting to convert it into a hotel and conference facility, with disastrous consequences. The Woonbron housing corporation had to sunk ±€ 230 mil into the ship before it was sold under duress on instruction of the government (Boon, 2012).

256 (ANP, 2009). The former director of Rochdale, Henk M., was found guilty of fraud and money-laundering by the Amsterdam criminal court in July 2017.

De Key took the step of firing two of its directors and instituting criminal charges for alleged corruptions relating to property transactions in 2010[257] and in 2013 the Minister of *Wonen en Rijksdienst* (Housing and National Agency)[258] placed De Key under enforced financial supervision of the *Centraal Fonds Volkshuisvesting* (Central Fund for Public housing). The reason: De Key's long term financial sustainability was under threat of overly ambitious plans that required a too-high level of debt.[259]

A parliamentary enquiry into housing institutions was initiated in 2012 due to these and other scandals. The Commission van Vliet, concluded in 2014 that housing institutions should be limited to their core task in their scope of work: the building and renting out of public housing. Commercial exploits were an over-reach to be avoided.[260] The renewed Housing Act (*Woningwet*) of 2015 echoed these recommendations that institutions have to focus on providing affordable public housing and that at least 80% of the stock of each institution be allocated to tenants below a government-defined income threshold.[261] Even before this change in legislation the Amsterdam housing institutions, united through the *Amsterdamse Federatie van Woningcorporaties* (Amsterdam Federation of Housing Corporations) signed a covenant with tenants associations and the city in May 2013. In this covenant, housing institutions, including Rochdale and De Key, committed themselves to maintaining at least 50% of their stock as low-income rental housing.[262] After emerging from this imposed supervision in 2014 and under a new directorship, De Key enacted a new strategic plan. It set a new ambition to reduce its debt and go back to basics: providing affordable liveable public housing.[263]

For De Key and Rochdale–the latter still under a cloud because its former director still featured regularly in both the dock and the national press–the playing field had by substantially changed during the crisis. The pre-crisis norm for public housing renovations had set a 40-year lifecycle as investment ambition. This was now brought back to 25 years.[264] The accounting regime, which in the past had dictated

257 (Rengers, 2010).

258 A minister without portfolio, created in 2012 as member of the cabinet Rutte II. This minister was tasked with, amongst other housing policy, that lay within the ambit of the Ministry of Internal Affairs and Kingdom Relations.

259 (Blok, 2013).

260 (Parlementaire enquête woningcorporaties & Van Vliet, 2014).

261 (Koninkrijk der Nederlanden, 2015a, Article 45).

262 (Amsterdamse Federatie van Woningcorporaties, 2014).

263 (De Key, 2015, pp. 5; 16).

264 (Personal communication Ron Balthussen, 13 June 2016).

decisions, was now more easily modified. These changing conditions called for re-thinking the future of the Jeruzalem monument.

7.6.2 Abstract conceptualisation

Four redevelopment approaches were eventually applied at Frankendaal. The most dramatic redevelopment saw Rochdale demolishing blocks G, H, I, M & N from 2012 onwards. This demolition, completed in 2018, freed up brownfields land for newbuild housing construction. The new three-storeyed woonhof blocks were constructed following the 2009 Master Plan, which replicated the 1947 urban plan in broad terms.

In 2014 Rochdale revised its plans to demolish blocks J, K & L, opting for a thorough refurbishment of the 194 dwellings starting in 2018. Rochdale itself reports that this was because a 2014 review of the neighbourhood indicated that even now, still 80% of the inhabitants of these blocks wanted to remain in their homes! During 2015, the Amsterdam city council decided to provide six housing institutions active in the city with € 5 mil. subsidy each from its *Stimuleringsfonds Volkshuisvesting* (Public housing Stimulation Fund) to stimulate renovation projects.[265] Rochdale allocated this additional funding to Jeruzalem. The subsidy made the Rochdale renovations at Jeruzalem financially feasible and allowed the renovation date to be brought forwards by two years to 2016.[266] Retaining the existing duplex dwellings in the non-monumentalised section of Jeruzalem also contributed to Rochdale's stock of low-cost rental housing, as mandated by both the 2013 Housing Covenant and the new legal mandate for the housing institutions.

For the De Key stock at Jeruzalem–all part of the national monument–the housing foundation's change in tactics meant that only the street-side façades were to be upgraded and the most necessary defects at its 278 Jeruzalem units were to be addressed. To justify this, De Key told its long-suffering tenants that this was "[b] ecause of the financial crisis and changes in legislation for housing institutions, the choice eventually went to a smaller intervention that will bring the complex up to a

265 (Van der Molen, 2015).

266 (Rochdale, 2017, p. 28).

good and sound standard”.[267] The renovation budget was approved by the De Key board of directors in 2015.[268]

With the € 5mil. subsidy in place, the economic feasibility of the project was secured. Yet even now the renovation did not include un-duplexing the dwellings. The Amsterdam housing crisis persisted. The small duplex dwellings remained viable. A large number of small units was more desirable than a smaller number of large units, not only financially, but because so many inhabitants had expressed the wish to return to their homes after renovations.

Stimulated by the subsidy from the Stimuleringsfonds Volkshuisvesting, the ambitions for the renovation of the 193 dwellings of the non-valourised Rochdale blocks JK & L were high. Renovating these small units would contribute to its own commitment to retain a 50% affordable rental housing in its stock.[269]

Both housing institutions individually appointed Hooyschuur Architects to develop a renovation strategy and seek municipal approval for the interventions. The 2009 Master Plan had already set the ambitions for the renovation of the monument Jeruzalem: the conservation and restoration of the urban morphology of was deemed of paramount importance.[270] The uniform and authentic image of the woonhof-blocks with the associated landscapes was the ideal; an energy neutral future was an ambition. This was reflected in the 2010 statement of significance for the monument, thereby keeping opportunities for 2E+Co renovations open ended.

The positive approach to the renovation is notable in that the Microsystem team again decided to implement a full learning cycle embedded in the larger renovation project. Rochdale took the lead and executed a first trial renovation in an unoccupied unit, Korteweghof 7 (Block J) in the portion of Jeruzalem that was not protected as national monument. Despite all the lessons already learnt from the 2010 renovation,

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267 “Door de economische crisis en de veranderende regelgeving voor woningcorporaties is er uiteindelijk gekozen voor een kleinere ingreep die het complex op een goed en degelijk niveau brengt.” (De Key, 2014, p. 2).

268 (De Key, 2016, p.11). De Key allocated its financial windfall from the Stimuleringsfonds Volkshuisvesting, an amount of Euro 5 mil, to the renovating of its Columbusplein, Amsterdam housing stock (Van der Molen, 2015).

269 The first redevelopment of Block I at Frankendaal undertaken by Rochdale Marktontwikkeling B.V. had already been redeveloped as 24 free-market rental houses, replacing 41 public housing units (Rochdale, 2017, p. 62).

270 Personal communication, Emile Grotenbreg (Architect, Monumenten en Archeologie, Amsterdam), 8 October 2018.

Hooyschuur devised an experiment to test and learn before implementing the renovation project at the non-valourised blocks J, K & L.

The ambitions for the entire neighbourhood had changed dramatically, despite still being steered by the 2009 urban vision plan for Jeruzalem. The decision to demolish blocks J, K & L and construct two and three storeyed private housing with basement parking and the ambitions for an energy-neutral neighbourhood had been abandoned. The ambition for the renovation of both non-valourised and valourised dwellings in Rochdale ownership was set at Energy Label B, from a range of E, F & G, upward depending on the location of a dwelling.[271] The 2010 experiment at the Van 't Hoffweg had brought a new insight: that because the units have a small *skin* surface-to-volume ratio and were sandwiched in rows, dramatic façade insulation was simply not required to improve the energy performance. With the energy-use ambitions tempered and the problem of dealing with the concrete panel façades solved, the renovation became much simpler.

DPA Cauberg-Huygen B.V., a company specialising in building physics, fire design and acoustic design, was commissioned to undertake an investigation into the problems and possible solutions for the Jeruzalem housing. Its conclusion was that by replacing all doors and windows with insulating elements (timber frames with HR++ glazing, applying 100mm roof insulation), and installing both a CO2-driven mechanical ventilation system and an energy-efficient combination gas boiler to heat a smart central heating system, would be sufficient to achieve the energy aims. End-units would need their end-walls insulated. This would not necessitate to demount the façades or replace the façade panels at all! The canvas awnings over the windows (south-east and south-west facing) were removed in the process. The low-e coating that had been experimented with in 2010 was, however, not repeated, leaving the façades vulnerable to overheating once again.

Noise transmission between units would also be addressed. Structure-borne contact noise (especially footsteps transferred from top to ground floor dwellings) was the most problematic acoustic issue leading to aural discomfort. The vertical dividing walls between dwellings conformed to the requirements set for new build housing.[272] Installing a new suspended ceiling consisting of a 100mm mineral wool insulation blanket carried on a double layer of gypsum board (12,5mm each) would serve to successfully ameliorate acoustic problems while at the same time meeting

271 (Rochdale, 2017, p. 28). Energy Label B equates to an energy index (EI) ≤ 1,41. See also (DPA Cauberg-Huygen, 2015).

272 (Bouwbesluit 2012.)

contemporary fire requirements.[273] This would unfortunately lower the ceiling height on the ground floor, which was already a low 2,4m, and thereby reduce the ground floor dwellings units' internal volume. Based on these new insights, a trial was planned under the supervision of Hooyschuur to test the approach, before continuing with the extensive renovation of blocks J, K & L and later, blocks E & F.

The Rochdale experiment at the Korteweghof 7 was used to test the renovation approach and correct detailing in preparation of the building permit application and renovation contract documentation. The *Commissie voor Ruimtelijke Kwaliteit* (Commission for Urban Quality, CRK) in Amsterdam is one of the bodies that needs to assess WABO[274] applications in the city against the pre-defined *welstandseisen* (urban quality norms). The experiment served as basis for the statutory approvals process. In the case of this application, the non-binding advice from the City of Amsterdam's BMA was sought because of its status as Order 1 urban enable by the City and deemed to be a *monument in wording* (monument in becoming). In short, it was treated as if it were already a National Monument.[275] The experiment had in fact served as part of the abstract conceptualising for the larger renovation project. After the experimental project at Korteweghof 7 had been executed and approvals for the renovation had been obtained, the rest of Blocks J, K & L was undertaken.

Lessons from the 2010 experimental project included the observation that the replacement of the façade panels was not really required: a thorough cleaning would suffice and defects could be repaired. As Jeroen Schilt of the BMA said: "We can go to the moon. Then we can repair these concrete panels."[276]

The CRK decision regarding the renovation application for Blocks J, K & L is illuminating: The repair of the construction system was seen as important and the uniform replacement of doors and windows following the outline of the original design in both street-side and garden-side façades was welcomed. The technical upgrades proposed were seen as imperative; "technically indispensable maintenance",[277] but inserting new trickle vents was only deemed appropriate if these were incorporated in such a manner that they were not

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273 (DPA Cauberg-Huygen, 2015, pp. 22–3).

274 The Wet Algemene Bepaling Omgevingsrecht (General Provisions on Environmental Legislation Law, WABO) of 2010 streamlined Dutch Environmental legislative procedures providing a one-application process for all environmental issues.

275 (Commissie Ruimtelijke Kwaliteit Gemeente Amsterdam, 2016).

276 "…we kunnen naar de maan. Dan kan je ook een beton tegel restaureren." (Schilt, 2016).

277 "technisch noodzakelijke onderhoud." (Commissie Ruimtelijke Kwaliteit Gemeente Amsterdam, 2016).

visibly expressed.[278] The trickle vents, a technical necessity from a 2E+Co perspective, were only allowed if they did not interfere with the ideal image of the monument. The complete renovation of the interior, including space plan changes is mentioned in passing only, and approved without any specific mention. Building on the lessons learnt at blocks J, K & L, Rochdale's blocks C & F, which form a part of the Frankendaal monument, received a similar treatment, with minor detail variations.

De Key took a very different approach: its renovation was conceptualised to tide the *Skin* of its housing stock at Frankendaal over for a period of 25 years and not to holistically renovate its stock.[279] The experiment at Hugo de Vries Avenue had set an aesthetic precedent for what the Jeruzalem monument should look like. Because of the monument status, tenants were paying extra rental for their monumental houses, but only the 2010 experimental unit looked like the Frankendaal monument complex should. It was inevitable that at the very least the street-side façades were to be restored to the original appearance as far as feasibly possible.

To save money, the housing corporations only appointed the architect to develop the renovation designs up to the point of council approval. Hooyschuur's supervisory and quality control role at both Rochdale and De Key's renovations was severly limited. The contractors were appointed on a design-and-build basis and were tasked with developing details for the project where problems arose during the project execution. Hooyschuur was given an advisory role in developing details for the Rochdale renovations, but these were not always followed by the contractor Banksma Groep, the party responsible for quality supervision. This means that the architect was excluded from the real active experimentation (the project roll-out), despite having been the only party who really 'learnt' during the experimental renovation.

7.6.3 Active experimentation

The Rochdale experiment at Korteweghof 7 was set up to follow Hooyschuur's modus operandi already utilised in the 2010 experiment: first undertaking destructive research (pulling a single unit of a series of housing units apart). The Korteweghof 7 renovation was used to developing the renovation approach for the rest of the complex. Rochdale's blocks J, K & L had never seen their façades painted,

278 "Echter mogen ventilatieroosters niet in het zicht worden geplaatst, deze dienen derhalve verdekt te worden gedetailleerd." (Commissie Ruimtelijke Kwaliteit Gemeente Amsterdam, 2016).

279 (De Key, 2014, p. 2).

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and so, before the monument Jeruzalem could be renovated a second experiment was undertaken, this time at De Key's Eijkman Street 5 duplex-unit (Block B). This experimental renovation project, again undertaken under supervision of the BMA, aimed at testing the methodology for cleaning the paint off street side façades against repainting them.[280]

FIG. 7.32 The façade cleaning and restoration experiment at Block J Korteweghof 7 (2017).

The paint was cleaned of all the front façades of the remaining Jeruzalem public housing, both monument and non-monument, although this was not necessary at blocks J, K & L as they had never been painted. The concrete panels were repaired and gutters and downpipes replaced, as were windows and doors, including reproduction Bakelite door handles, to mimic the original. Only garden-façade elevation concrete panels, brickwork and balcony railings received a new layer of paint. The De Key blocks only saw the street-side façade roof edges renovated.

280 The contractor Coen Hagendoorn Bouwgroep, developed a systematic approach for cleaning the paint off the concrete panels at 5 Eijkman Street. Initially re-painting was considered, with the conclusion that this would not be an appropriate solution. The contractor then experimented with different high-pressure cleaning methods and developed an own approach to cleaning the façade panels. Once approved by BMA, this was then applied throughout Frankendaal, also to the Rochdale stock. Personal communication Harmen van Vlissingen, Project Manager Coen Hagendoorn Bouwgroep, 22 June 2017.

7.6.3.1 2E+Co of the Jeruzalem public housing renovation

Improved home economy, a reduction in energy use and improved comfort would result from improving on the insulating quality of the skin. This would be achieved by installing new doors and windows throughout and insulating the roofs, coupled with the installation of a new central heating system.

The most visible effect of the renovation at Jeruzalem related to the skin, most notable the varied sidewall solutions.

Rochdale: Rochdale chose to replace the shiplap boarding added to the first floors of the end-walls in the 1980s to better insulate the buildings. A rough-plastered exterior insulation system was applied instead, after discussion and final approval of the BMA. This plasterwork finish was coursed in an attempt to mimic the appearance of the original panelled end-façade while reducing the energy use and improving the home economy of the top-floor end units. Blocks C & F, formerly presenting a uniform appearance with its co-valourised blocks A, B, D & E, now presented an entirely new image at Frankendaal and also didn’t look similar to blocks J, K & L. Despite the architects having detailed this detail a different solution was applied which does not harmonise with the monument.

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FIG. 7.33 [1] Corner detail of the plasterwork finish on insulation on not-national monuments blocks. The imitation panel finish now stands proud of the brick skin which was already an addition to the end-walls (2018); [2] Repurposed (cleaned and cut-back) prefabricated rain shields, on-site, ready for reinstallation. The circular grinder cut marks on the top left .of the first panel indicate where the upstands have been cut back (2017).

This unfortunate variation was possible because of the lack of quality control that the supervision of an architect would have brought to a project. In situ inspections also indicated alterations to the pre-cast concrete front door rain-shields: alterations the architect professed not to have been consulted about.[281] The small up stand at the back of these panels was cut off by the contractor to allow for the use of standard height doorframes in the renovation.[282]

The new windows all have visible trickle vents included in the windows in both the street-side and garden-side façades as in blocks J, K & L. This is a deviation from the CRK approvals specifically in relation to ventilation. The timber-louvred openings on the street-side façades, effectively part of the Service layer, were renovated to continue serving as ventilation openings, now with a double-glazed inward-opening panel behind.

The garden-side façade window replacements of the Rochdale dwellings do not reinstate the original Merkelbach & Elling design but match the PVC predecessor in design. Even the balcony windows–the last-remaining original timber framed windows of the garden-facing façade–were replaced following a new partitioning design. This was done at the entire Jeruzalem monument, both Rochdale and De Key opting for this choice! The reason being: tenants had expressed their preference for *draai-kiep* (combination hopper-casement) windows over the casement window setup originally installed here.[283] The new windows do not mimic the original window divisions with top-light hopper and bottom fixed spandrel, but have fixed top and bottom panels and an inward opening central frame. This inward-opening central window should not lead to ventilation issues as it effectively replicates the original top-light hopper.

At the national monument blocks C & F (and later at De Key's Blocks A, B, C & D) no deviations from the original appearance were allowed in street-side façades. This meant that only the north-east facing windows were provided with trickle ventilators and only the balcony windows were replaced with draai-kiep frames.

While one could speak of a restorative approach to the façades of Jeruzalem, all the Rochdale units' *Space plan* was thoroughly remodelled. Temporary duplex dwelling designed to accommodate families were turned into one-bedroom units.

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281 Personal communication Ron Balthussen, 13 June 2016.

282 Personal communication Harmen van Vlissingen, Project Manager Coen Hagendoorn Bouwgroep, 22 May 2017.

283 Personal communication, Emile Grotenbreg (Architect, Monumenten en Archeologie, Amsterdam), 08 October 2018.

FIG. 7.34 A renovated north-east facing façade of an un-duplexed unit: the ‘temporary’ aluminium enclosing of the veranda is visible in the bottom right (2018).

On the ground floor the wall between kitchen and living room was removed and the shower integrated into a remodelled toilet. On the first floor the second bedroom was sacrificed throughout to house a new kitchen, the former kitchen remodelled as bathroom and the former toilet-cum-shower turned into storage. In both cases this intervention turned the units into much-appreciated *doorzonwoningen* (lit. through-sun dwellings).

The fact that many tenants wanted to return to their homes presented a dilemma. Some tenants had in the past enclosed their balconies with glazed sliding doors approved by the housing corporation. Seeing as this attained right could not be retracted, individual balconies needed to remain enclosed. The solution: somewhat unsightly but cheap aluminium framed glazed sliders were installed at these specific units, with the intention of removing them when the existing tenants move out one day. It will therefore take a number of years before these unsightly temporary glazed screens have all been removed.

This remodelling led to a complete replacement of all services, including all the sanitary fittings and finishes. The entire sewerage system was upgraded, linked to new services: new bathrooms and kitchens were installed and all electrical and water reticulation runs replaced.

FIG. 7.35 'To do, or not to do'–fuzzy façades of the De Key housing component of the Jeruzalem monument: new timber windows to the balcony, old PVC to the lounge (2018).

The original ventilation system–the Van Loghem window-buoyancy stacks system–was reused, albeit without the project team being aware of the origins or significance of this system. Instead of hopper and awning windows, the trickle vents in the opening sections of new windows on both sides of the dwellings (and only the north-west side of the monumental Blocks C & F) provided the required fresh air while reducing discomfort due to draft. They serve as inlet to a mechanical ventilation system, which utilises the original vertical ventilation ducts. Unwittingly one of the more noteworthy climate design choices of the original design was given a new lease on life.

Not only the thermal comfort received attention: the aural comfort was improved by insulating the interleading floors with the resulting reduction in ceiling height.

At the De Key blocks only the most urgent indoor upgrades and maintenance were undertaken–inhabitants remained in their homes during the entire process. The De Key project, did address 2E+Co in a limited fashion but piggy-backed on the aesthetic intervention. The restoration of the street-side façade called for replacement of the doors and windows. Here many of the original elements, single glazing and all, were still in place on the street-side façade. Replacing these predominantly south-facing doors and windows with airtight closing double-glazing would both have improved comfort and decreased energy use. Remodelling or insulating the end-walls was not included in the building permit application and despite attempts by the contractor to develop a detail to insulate these critical points,[284] no action was undertaken.

284 Personal communication Harmen van Vlissingen, Project Manager Coen Hagendoorn Bouwgroep, 22 May 2017.

The 1980s north-facing PVC living room windows were deemed as serviceable by De Key and with the HPL bargeboards were retained after maintenance was done.Yet, similar to the Rochdale renovation, the remaining original timber windows onto the balconies were replaced with in-ward falling or opening double-glazed new timber-framed windows with a new division, resulting in an unfortunate hodge-podge.

Other measures benefitting home economy and increasing comfort were only undertaken where incidental measures were needed. Where ceilings were unsightly, these were replaced and a 150mm rock-wool insulation blanket added at the same time. The Space Plans were not altered.

As general services upgrade all gas boilers older than 8 years and all gas-fired hot water boilers were replaced with high efficiency condensing boilers at no cost to the tenants. This is already an exception as De Key policy planned for the lifecycle of boilers at an average of 15 years.[285] Not all dwellings had central heating installations yet, some were still relying on in-room gas burners for space heating. The tenants were offered the option of central heating installation at an additional cost, but some opted to retain the out-dated in-room gas burners.

Aware of the often-reported moisture problems of the housing, De Key reinstated the Merkelbach & Elling ventilation system. Grills were opened up and the ducts were serviced. Inhabitants were cautioned not to cover over the openings again to avoid a recurrence of moisture build-up.[286] Mechanical ventilation was introduced. In-pipe extractor fans were mounted onto the original ventilation duct for ground-floor homes. The location varied: where the shower was still located in the kitchen, the extractor fan was installed in the kitchen ventilation duct. Where a remodelling had already taken place and the shower and toilet were located in the same room, the fan was installed in the duct servicing this space. In both cases the original louvered ventilation openings in the south façade provided fresh air.

Top floor ventilation would only be addressed when new tenants moved in (at the moment of tenant 'mutation'). A central mechanical ventilation unit linked to both bathroom and kitchen was hung in an acoustically insulated box above the stair. The often-reported complaint regarding the sound isolation of the first-floor floors was not addressed and will remain an irritation to tenants for the foreseeable future.[287]

285 (De Key, 2017).

286 (De Key, 2014, p. 4).

287 (De Key, 2014, pp. 3–5).

7.6.4 Learning Cycle 3: 2E+Co in the Actor-Factor-Set Ecosystem

Financial considerations remained the paramount factor, cross-cutting all scale levels of the ecosystem in which the evolution of the Frankendaal monument took place during the third learning cycle. The changing financial realties also meant that factors, deemed to be cast in stone before, became liquid. The payback period of financial investments and comfort norms changed dramatically due to the global financial meltdown (Macrosystem). Economy and comfort requirements proved to be more malleable than the actors in the ecosystem during the second learning cycle would have accepted. The 2009 master plan for the redevelopment of the neighbourhood remained the lodestar for all actors, not so much because it was a legally binding document, but because its negotiated conditions were broadly accepted.

The privileges of the Frankendaal masterplan were implemented without conforming to the full conditions and obligations for their initial agreement. The main condition: maintenance of the urban morphology was maintained. The energy neutral neighbourhood ambitions were abandoned and the intention to renovate the landscape component of the monument still remains to be fulfilled.

In meeting the ambition of maintenance of the urban morphology, the south-west façades take a leading role, hence their aesthetic importance. The north-east façades, screened by private gardens and in half of the cases, by the courtyard block gardens, were deemed of lesser importance.

The Frankendaal housing estate has undergone a divergent evolution. Some sections are extinct, demolished, others are protected as monument and others not, and the monument has two owners. The protected status (both national monument and the Order 1 municipal designation) has been a stabilising factor in the evolution of the housing estate, bringing with it a level of oversight, without which Frankendaal would have seen a very different future. This resonates with Kolb's position that learning is a continuous process, grounded in experience.[288]

The other stabilising factor was the continued engagement of the architects who brought lessons from the second learning cycle into the third. This had a positive effect, even to the extent of reuse of the principle of the original Van Loghem-raam system, an important factor in the 2E+Co strategy for the housing stock at Frankendaal. Yet, the third learning cycle was also not completed: the architects were

288 (Kolb, 1984).

not employed to oversee the continuous development of construction details, which led to a further divergent evolution of these blocks, most notable in the various detailing solutions to end-walls, but also visible in changes in smaller detailing and colouring, such as the painted chimneys. In the vacuum of oversight and quality control the municipal monuments care services, BMA, was forced to reposition its role from Exosystem to Microsystem.

Subsidies (a Macro- and Exosystemic factor) and institutional economy (an Exosystemic factor) were the primary drivers in the evolution of the Frankendaal public housing. Improvements in home economy and inhabitant comfort were dependent on their prescripts and limitations.

7.7 Conclusions

This case study is an attempt at reflective observation of the evolution, both before and after valorisation of a portion of the Frankendaal public housing. It has shown that the genesis of the Frankendaal housing estate can be traced not only to the designers of the estate–Mulder, Merkelbach Elling, Ruys and Van Eyck and as a new discovery, Frits Fortgens–but also the designers of the Dotremont-Ten Bosch system, Louis Herman de Koninck and engineer Raes and Wim ten Bosch, who assisted and advised Philippe Dotremont, as well as Piet Zwart, designer of the Bruynzeel kitchen.

The application of the Dotremont-Ten Bosch prefabrication system at Frankendaal was not an anomaly in the Dutch post-WWII reconstruction period even if it was the only ever application thereof by the office of Merkelbach & Elling. It was a direct result of post-WWII material shortages, ambitions for the post-war economy and possibly even personal ties. Scarcity was the driver for innovation in the project. The stressed ecology of this period: very limited financial resources coupled with a limited material availability and urgent housing need, meant that even when it was constructed, this housing estate was below par in home economy and comfort. Importantly, however, it was not seen as emergency or temporary housing. Rather, it had an evolutionary mechanism built into its AR-DNA. As time evolved, this did not manifest itself. In practice, the duplex-dwellings, which pushed the *Existenzminimum* principles to the limit when designed, remained small: 30–40m^2. The number of inhabitants per dwelling, however, decreased over time. Space norms (comfort) mutated as the post-War Netherlands population became wealthier.

The Frankendaal public housing estate has undergone a number of mutations since its construction; effectively experiencing a divergent evolutionary process, which commenced just after the construction of the housing units when it was transferred to three owners. These initially operated in the same economic and political climate, and therefore the small mutations undertaken, minor maintenance and upgrades, reflect the same economic, aesthetic and political paradigm. The large-scale maintenance at the end of the 1980s was driven by new and challenging maintenance regimes–economic considerations–with some thought to comfort and home economy. This was in part due to the radical shift from far-reaching centralised state involvement in public mass-housing during the first post-WWI decades to the total disappearance of a specifically designated Ministry of VROM in 2010.

Such is the city's of control on the public housing, that the Amsterdam alderman for *Wonen* (Living), in 2021 proposed that the city should buy up and manage public housing being sold off by housing corporations to safegaurd especially the inner-city public housing.[289] It is somewhat astounding that just over a century after the establishment of the Gemeentelijke Woningdienst (GWD) Amsterdam in 1915 under the enlightened leadership of Arie Keppler and a mere 27 years after the privatisation of its successor, the Gemeentelijk Woningbedrijf in 1994, the city feels the urgency to effectively re-establish a city-owned housing service and buy up housing, of which some had previously been under the ownership and management of the GWD.

Most decisions at Frankendaal were driven by Macrosystemic financial considerations, especially ambitions for writing off investments over time. But these financial prescripts proved to be highly flexible, to the level of embarrassing those parties who control this factor in the Micro- and Exosystem. The recognition of the cultural-historic value of the Frankendaal monument introduced a more constant factor that transcends the various spheres of the estate’s ecological system. The communal social origin of the monuments status also assisted in democratised the decision-making process, which in became an important factor in deciding on the future of the buildings and of their inhabitants.

The project was awarded with the Mooi Noord-Holland Arie Keppler prize for *Buurtreparatie* (Neighbourhood repair) in 2020, because it achieved a “…future-proof solution in cooperation with the residents, an eye for social cohesion in the neighbourhood, a successful interpretation of living pleasure, love for cultural heritage and a sensitive urban development intervention with attention for public

289 (Couzy, 2021).

space."[290] This, despite the fact that this so-called 'repair' of the visual unity of the neighbourhood was achieved through the demolition of three *woonhoven* (housing), the Ingenhouszhof and the historically significant Dreeshuis old age home.

Today, about half of Jeruzalem is extinct. The three parts that survived, have their own distinct characteristics and are located in parallel ecosystems. These ecosystems overlap, either through ownership (in the case of the Rochdale stock) or in status (in the case of the De Key and Rochdale's national monument blocks.)

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FIG. 7.36 Block-ends of the Frankendaal national monument: divergent evolution due to different ownership regimes (2018).

The renovations executed at the surviving Frankendaal housing estate blocks were dramatically different due to the varying ambitions of the two landlords. The divergent evolutionary process at the Frankendaal housing estate accelerated in time. The isolation and facing of the end walls of the blocks serve as example. Four different solutions are now in place in what remained of the Frankendaal housing

290 (MOOI Noord-Holland Adviseurs omgevingskwaliteit, 2020, p. 53). MOOI Noord-Holland is a nonprofit advisory service that assists municipal authorities in evaluating urban, architectural and cultural-historical aspects of development proposals.

estate: the 1980s full-brick; the 1980s half-brick-half timber; the 1980s half-brick-half and the 2018 poorly detailed rough-cast plaster wall end, with the single exception of precast panels at the 2009 experiment.

Even the protected Frankendaal monument became further fragmented with the original genotype now presenting three phenotypes: the 2009 experimental dwelling, the extensive Rochdale renovations and the limited De Key façade upgrades. The status as monument changed the way in which the AR-DNA evolved. Their status as monument now possibly creates a common ground again for these buildings under different ownership regimes for their future evolution. This is a socio-cultural role that economy, a factor with a fickle nature, cannot fulfil.

The valourisation of public housing institutes a new evolutionary stimulus. In the case of Modern Movement monuments, the ideal image is clearly that of the buildings as 'new'; their most dignified manifestation. Where previously the buildings evolved or grew towards the economic conditions, sometimes coupled with comfort ideals, the heritage valourisation brought about growth towards the ideal image of what the monument should be.

That the image of the building is of importance, can be seen in the decision-making regarding the allowing or not of trickle vents in window frames on the most visible façades of the Frankendaal monument. Had the knowledge of the Van Loghem-raam principle been revived at the time, this might eventually have been welcomed as a heritage-sensitive reinterpretation of an important moment in the historical development of climate installations in residential architecture in the Netherlands. Frankendaal presents possibly the first precursor of the current commonly applied device of low-energy ventilation: locating trickle vents in the perimeter of homes and coupling these with a (later mechanical- and today heat-recovery units) exhaust located centrally to the floor plan.

Energy use reduction was initially driven by economic and comfort requirements, but it is now a global imperative. 2E+Co stimulates development towards a more energy-sustainable use. And so, we see Frankendaal evolving both divergently due to the differing regimes, but also convergently parallel towards the ideal in terms of home economy, ecology and comfort coupled with the ideal image of the monument, based on historical images. Due to its holistic intervention, the Rochdale renovations sent its housing stock further along this evolutionary path and will more likely prove resilient because it went further in mitigating the inherent conflicts of the 2E+Co requirements and built heritage values than the superficial intervention of the De Key renovations.

The Frankendaal case study also highlighted the importance of seeing all architectural interventions as part of a learning cycle: the third learning cycle contained a built-in experiment that was evaluated before application to the whole. This mini-learning cycle, which was successfully executed by Hooyschuur Architects in collaboration with the City of Amsterdam Monuments Care Division (BMA), shows that heritage learns through change. Unfortunately, unlike the 2009 experiment, the learning cycle had not been continued for the later renovations, in part because the role of the architects was hamstrung. The exclusion of the architects, with the resultant short-sighted decision on renovation details, will have long-term negative consequences for the maintenance of the built fabric of Jeruzalem.

Yet, the continuous commitment of the architects to the Frankendaal project brought some semblance of learning and it is due to their diligence that the original ventilation system was re-introduced, with success. This case study proved that despite much has been written about the genesis and evolution of Frankendaal in the past, more research into the technology of the original design prior to the renovations would have benefitted the renovation process as a whole.

The dominance of the nicknames of the Frankendaal estate over time is a response to the phenotypical manifestation of the buildings there. Initially *Luierdorp* (diaper town), the nickname *Jeruzalem* was prevalently referred to in articles, reports and other documents after the buildings were painted white remains, despite the main façades of the buildings being returned to their original grey appearance. This nickname itself has now been valourised. The return of the moniker *Jeruzalem* was a strategic choice by the inhabitants to give identity to the public housing The neologism Koningvrouwen was a renovation strategy. It was nevertheless crucial to the partial survival of Tuindorp Frankendaal.

The decisions for the inclusion of Efficiency and Comfort technologies (2E+Co) at Frankendaal were initially driven by the Exosystemic economic accounting regimes of the housing institutions that owned them. This was heavily influenced by national (Macro-) and Exosystemic (municipal) subsidy systems over time. These set the ambitions for the technical and architectural interventions and the actors in the Microsystem (architects, project managers, building physics experts etc.) responded accordingly. Recently environmental sustainability and built heritage values almost simultaneously entered the Frankendaal ecosystem as factors. Balancing these factors in the face of a fickle financial system will require careful brinkmanship in the near future, which in turn relies on completing learning cycles by making resources available for a directed reflective observation.

Spreading the story of the Justus Quarter at the 2011 Dag van de bouw (Construction industry day (J Molenaar; Molenaar & Co Archive, Rotterdam).

8 Conclusions

The Story and the Stones

8.1 Recapitulation

This dissertation set out to identify the factors that informed decisions for the inclusion of Energy, Economy and Comfort (2E+Co) technologies in practice during the renovation of protected twentieth-century public housing complexes in the Netherlands. A second goal was to understand the consequences of the implementation of technologies for improved 2E+Co on the survival and robustness of this built heritage. To do so, ecosystemic evolutionary thinking informed the creation of a model that structured the analysis of selected case studies. The model combined the Experience Learning Model with the Bioecological Model to be able to track Dutch public housing heritage case studies' evolution in an ecosystemic perspective. This created a framework with which the building could be seen as evolving in context over time. The usefulness of the application of an ecosystemic evolutionary perspective in the field of heritage value-based management thinking has been proven, as it assisted in identifying causal linkages across scales and time, including hitherto unidentified negative effects of technological interventions on the survival of valourised housing complexes. Equally important, the Time, Learning Building and Society-Economics-Technology analysis method (TLB•SET) forced a deep investigation of the influence of actors, factors and environmental aspects as agents in the evolution of housing complexes protected for their historical values. The case studies have shown that learning is not a continuously conscious process in the Dutch public heritage housing environment.

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8.2 Urgency

This chapter completes this thesis as a single learning cycle, with the three case-studies as nested learning cycles. The three case study subjects, the Justus Quarter, the Kings Wives of Landlust and the Jeruzalem / Frankendaal public housing estates all underwent large scale renovation during a period defined as the "Golden Period of Renovation and Gentrification" of public housing in the Netherlands.[1] Their most recent renovations were, however, not their first such experience and their longer histories provided the opportunity to reflect on the decision-making for 2E+Co before and after they were heritage protected. The three cases together represent all the layers of legal protection provided for under Dutch legislation. In all three case studies, the public housing complexes' developments could be understood through the cognitive analogy of their continuous lifecycles, having gone through phases of homeostatic equilibrium, punctuated by rapid evolution.

This chapter presents conclusions on the lessons that can be drawn from these investigations. It also distils the critical factors that influenced the evolution of the cases over time, in order to come to ecosystemic recommendations. The relevance of these conclusions should be seen in the light of the environmental imperative.[2] The Netherlands is embarking on an unprecedented renovation project, which calls for a near total renovation of the Dutch housing landscape. The country plans to cease using natural gas for heating of buildings and for cooking by 2050 completely. This means that 700 homes per day will need to be converted to other energy sources, which calls for better thermal performance through improved insulation.[3] In 2018 the country set a target in the interim of transitioning 50 000 dwellings from gas by 2027, but by 2021 only 206 homes had been adapted. This leaves roughly 19 homes to be converted from gas per day, during the next six years.

If the country is to reach its climate goals of an energy-neutral built environment by 2050, roughly 1 000 houses will need to be renovated *per day*![4] This coming renovation wave has been called "…the biggest rebuilding in the Netherlands since the Reconstruction."[5]

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1 1995–2015 (Oorschot & De Jonge, 2019).

2 Refer to Chapter 1.4.

3 (Rijksdienst voor Ondernemend Nederland, 2017, s.n. [p. 3]).

4 (Keizers, 2019).

5 (Van den Berg, 2021).

The Netherlands case is not isolated. As part of its *Green Deal* the European Commission announced its *Renovation Wave* programme in October 2020, which aims to facilitate the deep renovation of 35 million so-called 'inefficient' buildings in Europe by 2030.[6] This includes, in the estimation of the Commission, 800 000 'social homes' per year![7] The Commission published seven *key principles* to guide the Renovation Wave. The last-mentioned aspect (the first being "Energy efficiency first") is a "Respect for aesthetics and architectural quality" which is explained as a respect for "design, craftsmanship, heritage and public space conservation principles".[8]

Not all Dutch homes are heritage protected or are public housing, but they all form part of a housing landscape with exceptional quality. Like the Economic and Environmental imperatives, the obligation of careful stewardship of public housing as Cultural imperative has become more urgent and critical than ever before the alongside Social imperative of providing affordable housing.

8.3 Back to Brand

Stewart Brand argued for the urgent need for reflective observation. He noted that in order to understand buildings, we need to both *look first* (observe) and *think first* (contemplate).[9]

This dissertation attempted to do both, closely investigating three selected public housing heritage case studies through an interdisciplinary ecosystemic perspective and developing a theoretical position through reflection. As for Brand's *How Buildings Learn, think first* came first for me too, This was also informed by a career as an architect (both doing and experiencing), on which I could reflect in turn. Brand called the think-first approach fundamental. In the same way, this dissertation hopes to create a fundamental departure from looking at built heritage (public housing) as evolving and not as in a static state. Brand described this fundamental shift as

6 (European Commission, 2020a, p. 2).
7 (European Commission, 2020b, pp. 20–21).
8 (European Commission, 2020, p. 4).
9 (Brand, 1994, p. 210).

a: "…shift from studying what buildings **are** to what they do…"[10] This is an equally fundamental prerequisite to create a much-needed shift in our understanding of built heritage to suspend the common misconception that conservation creates stasis. Architect and structural engineer Schmitt & Austen wrote of the instance when an architect managed to convince English Heritage that a Grade I building they had originally designed "…does not become frozen" as a unique circumstance.[11] The assumption that heritage designation of a building in principle opposes or can oppose change is, however, a delusion and frequently emphasised by Dutch and English heritage authorities.[12] Even though Lowenthal's view was that a building is a relic of the past, he also notes that such relics can undergo transformation, or change, in two distinct ways. The first is physical through: "…protection, iconoclasm, enhancement, reuse, which alters their substance, form, or relation to locale." His second "form of transformation" is: "…indirect… impinging on how [relics] are seen, explained, illustrated and appreciated."[13] Lowenthal did not turn to analogy as Brand does, but the message remains the same: buildings change.

Heraclitus told us that change is continuous, everything is *becoming*.[14] Brand's research into *how buildings learn* was based on his own perspectives as an evolutionary biologist that change is an ongoing process and that the biological world is not a definitive result, but that it is emergent. High-road, low-road or no-road, no building in use is actually frozen, whether it is listed or not. Or as architect and academic Edward Hollis so vividly put it in the blurb on the back of his book *The secret lives of buildings*: "…a building is a capricious thing: it is inhabited and changed, and its existence is a tale of constant and curious transformations."[15]

10 (Brand, 1994, p. 212) [Original emphasis].

11 (Schmidt & Austin, 2016, p. 122).

12 The Dutch term *Monumentenzorg* (like the German *Denkmalpflege*) refers to caring and in the German case to reflection, which inherently allows for the option for change. It is therefore not equivalent to the English *Conservation*, which, if taken strictly by definition, opposes change.

13 (Lowenthal, 2011, p. 264).

14 Plato: "I believe Heraclitus says that everything moves on and nothing rests, and comparing existing things to the flow of a river he says that you cannot step into the same river twice'; Plutarch: "According to Heraclitus it is not possible to step into the same river twice, nor the lay hold twice of any mortal substance in one permanent state". Quoted in (Guthrie & Chambers, 1992, p. 489).

15 (Hollis, 2010, back cover).

8.4 Beyond Brand: The Stories and the Stones

The tangible building itself is arguably the most important vessel of intangible meaning. Or as architect and academic Roger Fisher wrote: "The persistence of the artefacts preserves its agency as message bearer."[16] But the relationship goes further: the case studies have shown how the intangible clearly also influences the persistence of the artefact. My conclusion is that the narrative has agency in the way in which the buildings evolve.

Analogously, in buildings this would mean that AR-genes can over time express differently as phenotype due to the influence of the associated narrative.

The promises of 2E+Co and the idea of heritage are distinct narratives that often stand in opposition to each other as to their influence on the pace of and direction of change in public housing heritage. But their presence and persistence are undeniable.

Do these stories constitute a shearing layer of Brand's Shearing Layer model? Brand's Shearing Layer model is not a building. It rather represents a specific understanding of a building. Each of the layers represent an aspect of a building. Brand himself suggested the possibility to extend the model, noting that *Souls* could be added, but stopped short of doing so because he focussed on the physical fabric of buildings and the change over time.[17]

Schmitt & Austen extended the Sharing Layers model, adding *Surroundings* to the outer surface of the buildings layer scale, and augmenting it with *Social* (the humans in and around the building) as inner layer.[18] The addition of *Spirit of Place* by Marieke Kuipers and myself,[19] was made to allow for the exploration of intangible qualities of the building that we experience, and to accommodate the scale levels included in the ICOMOS *Approaches to the Conservation of Twentieth-Century Cultural Heritage.*[20]

16 (Fisher, 1992, p. 17).

17 (Brand, 1994, p. 17).

18 (Schmidt & Austin, 2016, p. 56).

19 (Clarke & Kuipers, 2017); and later further explored with our former colleague at the TUDelft, Sara Stroux, (Clarke et al., 2019).

20 (Clarke et al., 2019, p. 871).

Our appreciation and expectations are a vital factor in the pace of evolution that changes the rate and direction of the evolution of the individual layers. These narratives together can be called the *Story* of the building. This raises the question: How should we position this Story in relation to the Stones? This is a pressing question, specifically because the building does not change directly in sync to changes in its Story.

A building does not need to be formally protected as built heritage for this appreciation to influence its evolution. Once a positive appreciation of a building's past and the effects of its existance over time enters the Story, *heritage* becomes a factor in the evolution of its AR-DNA. Brand came close to this conclusion when referring to High-Road buildings as "…[b]y showing a deep tangible history, the building proposes an equally deep future and summons the taking of long-term responsibility from its occupants."[21]

Brand identified money, fashion and technology as drivers for change in buildings. Energy, Economy and Comfort (2E+Co) was identified as driver for change in public housing heritage in the Netherlands at the start of this study. The three investigated case studies showed that public housing heritage complexes change due to the imperatives of 2E+Co. Renovations were strategically planned and technologies were selected with the promise of improved 2E+Co performance.

Scarcity, however, modulated the decisions. It is important: it emerged as a defining historic driver in both the genesis and the evolution of the buildings. Scarcity is a crucial characteristic driving 2E+Co evolution. The urgency of the climate crisis galvanised the 2E+Co renovation of public housing heritage. This urgency has the same effect as scarcity: it stimulates innovation and often hastens its adoption and acceptance. Scarcity, however, also delays or cancels unnecessary interventions, which are often informed by the reigning fashion. Scarcity is a conservation-agent. Haste makes waste.

In contrast to scarcity, the 2E+Co narrative is beguiling because it promises future abundance, either through over-estimation of gains (in reduced resource use and operating and maintenance expense, coupled with improved comfort and reduced effort), or through technological innovation and consumption. That a public housing complex cannot always live up to these promises is because the 2E+Co promise is in part a fairy tale, or simply because the 2E+Co narrative was not attuned to the reality of the building. The commonly held 2E+Co prophecy of a more comfortable,

21 (Brand, 1994, p. 35).

green and especially less expensive future certainly influenced the renovation decisions. It is this narrative, this promise, that drags public housing heritage in the Netherlands through continuous renovation cycles.

The renovation cycle of public housing is not noticeably slowed down by heritage protection. Heritage protection changes the ecosystem dynamics of a public housing complex. Different actors and factors come into play and its evolutionary trajectory becomes forever different to that of a non-listed building. A new narrative becomes influential as an imperative: safeguarding the heritage value of the public housing complexes.

The case studies presented in this thesis confirmed Lowenthal's view that we have two ways of changing buildings: we can physically change them, and/or we can change the way in which we see them. This can take place without strategic intervention. Like the *telephone game*, in which a message needs to be passed along a chain of people, our continuing perception of a building is constantly being reused or recycled, with mutations taking place with each re-telling.

These perceptions are not about what a building is, but rather what it is supposed to be. Ideas about a building include our views and expectations. In the case of homes, these include ideas of refuge, safety and security, but also affordable comfort and a sense of pride and belonging, especially when compared to other homes. Brand was correct in stating that fashion plays a large role. In the case of renovations, these ideas are a prophecy of modern comfort and future performance. A home needs to be affordable, not only to purchase or rent, but also in operation and maintenance.

Lowenthal also referred to another narrative: appreciation as heritage. The case studies highlighted the role of the commonly held impression of the heritage value of the building. This commonly held view is not the same as the building's history or the official value statement created at the time of listing. This is what Lowenthal saw as *heritage*. *Heritage* sees the building as an important historical artefact that exhibits characteristics such as aesthetics that speak of times past. Age can together with or despite an appearance of newness, evoke feelings of nostalgia.[22] According to Lowenthal: "Fiction resist facts to persist as heritage."[23] This is very clearly illustrated by the Kings Wives of Landlust case, where the fictional association with Ben Merkelbach brought about the listing of the building as municipal monument. The relative obscurity of Gerrit Versteeg jr. meant that qualities of the building

22 (Halbertsma & Kuipers, 2014, p. 73–6) introduce nostalgia value as a new *Erinnerungswert* (Commemorative value) as addition to the Rieglian values system.

23 (Lowenthal, 1998 p. 10).

were not recognised. These fictions can also exist in parallel with reality, such as at the Justus van Effen Block, where after the first renovation, the officially published *redengevende omschrijving* (statement of significance) did not reflect the building any more when it was finally formalised due to juridical processes. Such juridical strictures, however, did not limit the writers of architecture guidebooks who continued to describe the buildings as if its 1920s manifestation still existed. These texts combined with visual documents such as photographs, kept the *Brinkman blok* legend alive and greatly influenced decision-making.

8.5 Rival Regimes in Public Housing Heritage in the Netherlands

Story is an essential addition to the Shearing Layers model, if we are to understand *how heritage learns* through public housing heritage in the Netherlands. The case studies have shown that two conflicting stories are predominant and influential: 2E+Co and the heritage narrative. Together the 2E+Co and the heritage narrative encapsulate the environmental, social and cultural imperatives that amplify the role and maintenance of certain characteristics (such as aesthetics of a façade/skin) over the permeance of others (for instance structure) in public housing heritage. These regimes can act on all layers of the shearing system. In public housing heritage (and other housing heritage) they are engaged in a continuous tug of war, like Brand's shearing layers, each pulling the building in its own direction and "...tearing the building apart."[24]

Of course, there are cases in which one is triumphant: for house museums like the World Heritage protected Rietveld Schröder House, the promise of 2E+Co was decisively conquered by the heritage narrative. Yet, we need to retain a distinction between these two rival regimes, which can be referred to as *2E+Costory* and *Heristory*.

In the built environment, Heristory is not only preserved by the building: it is replicated and enforced by vectors such as moving recordings, photographs,

24 (Brand, 1994, p. 13).

descriptions, and drawings. These can result in a *Heristory* that conflicts with the phenotypical expression of the building. Archival digitisation and online presentation are currently creating a *digital divide* by selecting, replicating and amplifying specific images and stories. Others are forgotten.

8.5.1 The 2E+Co- and Heristory in action

How did the Story, with its internal conflict between 2E+Costory and Heristory, modulate the built fabric of the case studies? On which layers did they have the most influence? And did the status based on heritage legislation or regulation have a marked impact on the way that these protected public housing complexes evolved? Table 8.1 gives an overview of the moments of punctuated rapid change.

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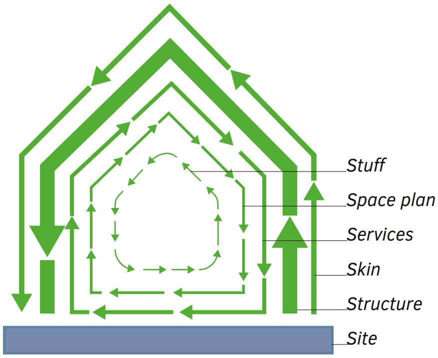
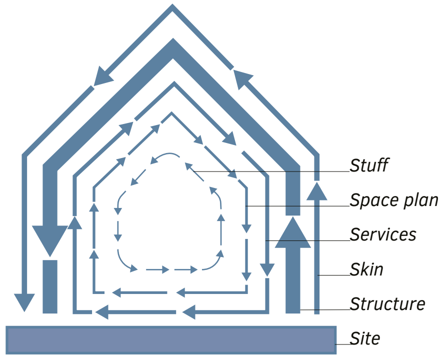
TABLE 8.1 The action of 2E+Costory and Heristory on the searing layers of the three case studies.

Cycle	The layers that changed in the renovation cycle influenced by 2E+Costory (Green)	The layers that changed in the renovation cycle influenced by action of Heristory (Brown)
Justus Quarter 1983–1985/9 Future National Monument		
		
	Justus van Effen Block, floor Plan remodelling (Leo de Jonge Architecten, 1 October 1986; Molenaar & Co Archive, Rotterdam).	Justus van Effen Block. Painted exterior (GJ Dukker, 1990; RCE: 276.798).

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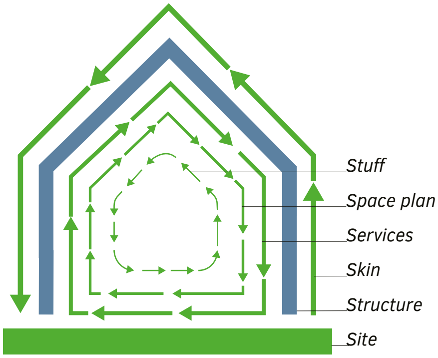
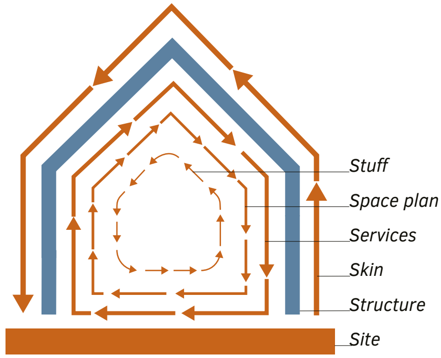
Cycle		The layers that changed in the renovation cycle influenced by 2E+Costory (Green)	The layers that changed in the renovation cycle influenced by action of Heristory (Brown)
Justus Quarter	2010–12 National Monument		
			
		Justus Quarter, interior renovations (2011).	Justus Quarter, exterior view towards bath house (2011).
		During the first renovation, 2E+Co ambitions led to a total space plan remodelling, all new services, structural interventions and modifying the façade, including painting it in 1989. The lack of any photographs of the drastic remodelled interior of the housing units in official archives highlight the singular focus on the appearance of the building as having heritage values. During the second renovation, the 100% Monument slogan aligned the 2E+Co- and Heristories. Heristory influenced the choices made. The previous restoration was de-restored and not conserved. Rather, a legendary appearance was restored. The 2E+Co changes were used to strengthen the Heristory even to the extent of arguing for the *aquifer thermal energy storage as a reinterpretation of the original communal block heating system.*	

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TABLE 8.1 The action of 2E+Costory and Heristory on the searing layers of the three case studies.

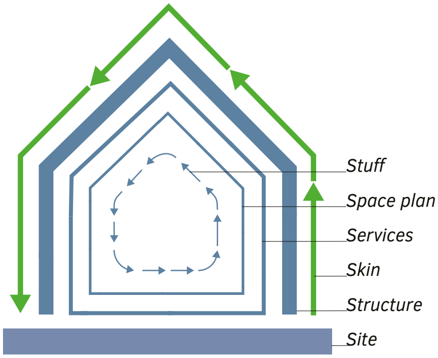
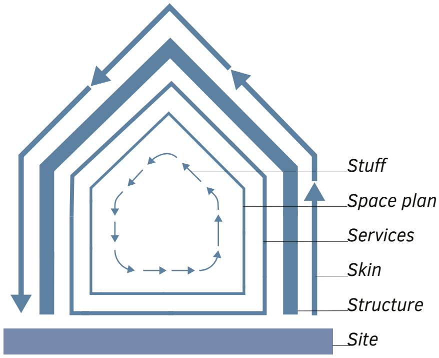
<table>
<tr><th>Cycle</th><th>The layers that changed in the renovation cycle influenced by 2E+Costory (Green)</th><th>The layers that changed in the renovation cycle influenced by action of Heristory (Brown)</th></tr>
<tr><td rowspan="3">Kings Wives
1984
Municipal Monument</td><td>
</td><td>
</td></tr>
<tr><td></td><td></td></tr>
<tr><td>The AWV Block with sunshades installed by residents (H van Gool, 1990; SAA: B00008000113_018).</td><td>The garden façcade of the AWV block before renovation to become the Koningsvrouwen van Landlust (P Breedveld, 2011; Archivolt Archive, Amsterdam).</td></tr>
</table>

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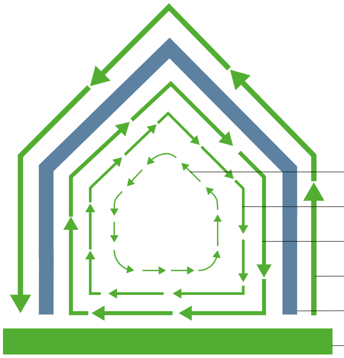
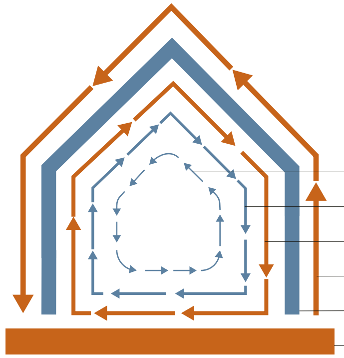
TABLE 8.1 The action of 2E+Costory and Heristory on the searing layers of the three case studies.

<table>
<tr><th>Cycle</th><th></th><th>The layers that changed in the renovation cycle influenced by 2E+Costory (Green)</th><th>The layers that changed in the renovation cycle influenced by action of Heristory (Brown)</th></tr>
<tr><td rowspan="4">Kings Wives</td><td rowspan="3">2009–12
Municipal Monument, but with a view to a future National Monuments listing</td><td>
</td><td>
</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Kings Wives of Landlust Dwelling interior, during the 2E+Co intervention (2012; Archivolt Architects Archive, Amsterdam).</td><td>Kings Wives of Landlust,. Exterior, with new windows and glazing addressing with the 2E+Co as Heristories, 2012 (2012; Archivolt Architects Archive, Amsterdam).</td></tr>
<tr><td></td><td colspan="2">The first renovation was a minimal intervention: it only addressed the windows. The choice was totally driven by the ambition to reduce energy use and increase comfort. During the Koningsvrouwen van Landlust renovation all shearing layers, except for the Structure were adopted to accommodate improved 2E+Co, including the Site through an aquifer thermal energy storage system. Even the Stuff layer was modulated, through a programme by which energy efficient appliances could be leased. Like at the Justus Quarter, this was also presented as a continuation of the original communal heating system. However, the greatest impact of Heristory was on the Skin.</td></tr>
</table>

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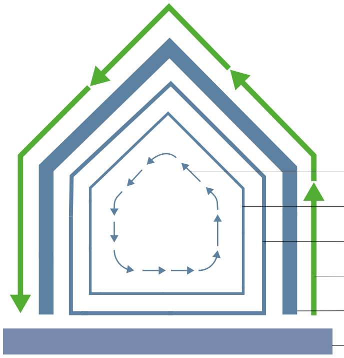
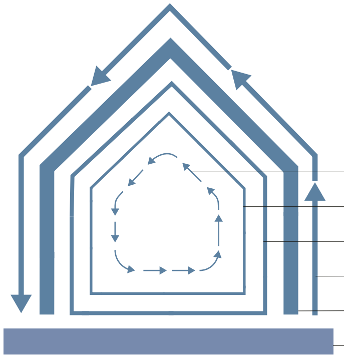
Cycle		The layers that changed in the renovation cycle influenced by 2E+Costory (Green)	The layers that changed in the renovation cycle influenced by action of Heristory (Brown)
Jeruzalem	1985–88		
	1984–47 No heritage protection		
		Jeruzalem, Frankendaal(F Busselman, 1986; cutout from SAA: B00000005286).	Jeruzalem, Frankendaal (H Zijlstra 2006).

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TABLE 8.1 The action of 2E+Costory and Heristory on the searing layers of the three case studies.

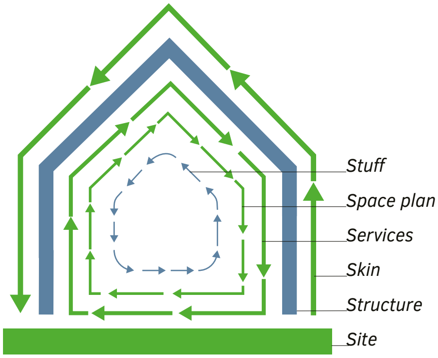
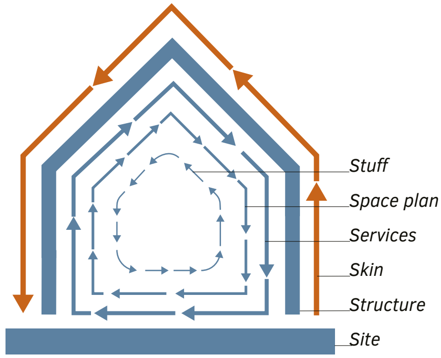
Cycle		The layers that changed in the renovation cycle influenced by 2E+Costory (Green)	The layers that changed in the renovation cycle influenced by action of Heristory (Brown)
Jeruzalem	2010–11 National Monument		
			
		Jeruzalem, experimental dwelling interior during renovations (Hooyschuur Architects , 2010).	Jeruzalem, experimental dwelling. Façade, with 2E+Co as Heristories-driven remodelling (H Zijlstra, 2011).

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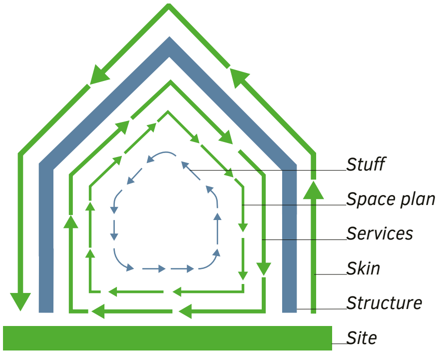
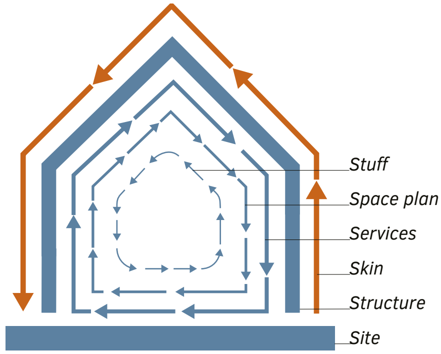
TABLE 8.1 The action of 2E+Costory and Heristory on the searing layers of the three case studies.

<table>
<tr><th colspan="2">Cycle</th><th>The layers that changed in the renovation cycle influenced by 2E+Costory (Green)</th><th>The layers that changed in the renovation cycle influenced by action of Heristory (Brown)</th></tr>
<tr><td rowspan="4">Jeruzalem</td><td rowspan="3">2014–18
National Monument and Aesthetics Policy bye-law protected.</td><td>
</td><td>
</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Jeruzalem. Renovation of Aesthetic Policy protected homes (2017).</td><td>Jeruzalem. Renovated façade of National Monument. Gutter detail (2017).</td></tr>
<tr><td></td><td colspan="2">The first renovations of the Frankendaal estate addressed the thermal performance and aesthetics of the Skin. The second, the experimental project, brought change to all layers except the structure. Even the façade was totally replaced, but this mimicked the original in appearance, to accommodate the Heristory. The last renovation, which was implemented in both buildings protected by byelaw and national legislation, saw different changes made to different blocks as result of different ownership and not directly in response to the two protection regimes. In short, the Space Plans of some of the National Monument and Aesthetics Policy protected houses were altered, services and skin were upgraded. Only in the case of the latter can we speak of the Heristory having had a direct impact. But the Heristory was also instrumental in the survival of the buildings in their totality. Without the Heristory, there would have been no protection. The entire neighbourhood would have shared the fate of demolition to make way a new neighbourhood and with it the promise of better 2E+Co performance.</td></tr>
</table>

The conclusions presented in Table 8.1 bear out much of what Brand already concluded on rates of change in buildings. A notable difference in the rate of change for the public housing cases investigated, is the rate of change of the Skin layer. It exceeds the rate of change of the Space Plan layer under the influence of the 2E+Costory. It is, however, also modulated by the action of Heristory, although the impact of Heristory on the building's evolution was, with one exception, mostly only skin-deep. The Justus Quarter renovation, underpinned by the 100%Mo**nu**ment slogan was the notable exception: here the Heristory was used to inform changes to every layer where the influence of 2E+Costory would be felt. This is a peculiarity of housing heritage and type and may not translate directly to other built heritage. Like 2E+Costory, Heristory cannot stand separate from the building. Where either of these stories outlives a building, it becomes history.

In public housing heritage, the influence of Heristory can be pervasive. It prolongs the persistence of Structure, influences, but does not accelerate or change the rate of the Services layer. It can, however, change the Space Plan. Its greatest influence is on the Skin, where it frequently actively counters change, with a focus on the retention of visually perceivable qualities.

In all three case studies, Rieglian Commemorative Values were subsumed into Present Day Values to find acceptable common ground. In the Justus case, the 100%Mo**nu**ment slogan neatly aligned the 2E+Co and Heristories. At the Koningsvrouwen van Landlust, the Heristory and 2E+Costory were used to embed a common vision amongst the residents and at Jeruzalem, the Heristory piggy-backed on 2E+Co ambitions.

The dialectic between 2E+Co and Heristory is most easily resolved in the Skin. This is where the greatest 2E+Co gains can often be made. When recreating a new image of the building in a historical likeness, Age Value is sacrificed and other historical values are subsumed by Newness and Relative Art Value, neutralising not only the internal tension in the Story layer, but also the tension between the Story and the Skin.

8.5.2 Learning

Brand's *think first* and *look first*, meant to denote two methods of knowledge production, also epitomises a key component of learning. Using the Kolb Learning Cycle model as lens for structuring the evolution of the case studies highlighted this critical deficiency: the lack of recording of the concrete experience and consequent limited reflective observation. The case studies highlighted how, in the management, maintenance and planning for change, learning was not a given. Rather learning only took place under very specific circumstances. Like Brand, Kolb, Boyatzis & Mainemelis divide people into *thinkers* and *doers:*

"In grasping experience some of us perceive new information through experiencing the concrete, tangible, felt qualities of the world, relying on our senses and immersing ourselves in concrete reality. Others tend to perceive, grasp, or take hold of new information through symbolic representation or abstract conceptualization – thinking about, analyzing, or systematically planning, rather than using sensation as a guide. Similarly, in transforming or processing experience some of us tend to carefully watch others who are involved in the experience and reflect on happens, while others choose to jump right in and start doing things. The watchers favor reflective observation, while the doers favor active experimentation."[25]

David Kolb, in describing the Lewian Action Research model, noted that: "Lewin and his followers believed that much individual and organisational ineffectiveness could be traced ultimately to a lack of adequate feedback processes…" the result of an "…imbalance between observation and action. He ascribes this to either a proclivity for decisions and action, or due to a tendency to become bogged down by data collection and analysis."[26] Lewin too advocated *think first.*

8.5.2.1 The missing link

The case studies highlighted that a think-first approach (reflective observation) is essential for the success of Dutch public housing renovations. In the Justus van Effen case the 1980s renovation did not allow for reflective observation to understand the interrelationship of the various layers of the building. Even during the initial conceptualisation of the second renovation cycle, the approach greatly reflected those of the first renovation. Fortunately, the complex owner reflected and noted that the failure of the block was mainly due to the deficiencies of the first renovation. This led to a delay in execution of the second renovation, during which reflective observation was implemented, leading to the 100%Mo**nu**ment approach. Unfortunately, the planned monitoring (reflective observation) of the performance of the Justus Quarter was abandoned due to financial restraints and the learning cycle stopped.

25 (Kolb et al., 2000 pp. 3–4) [Original emphasis].

26 (Kolb, 1984, p. 22).

In the King's Wives renovation project, small experiments were built into the project, creating nested learning cycles. These greatly benefitted the project. The willingness of the Eigen Haard Housing Association to see this renovation project as an experiment implemented a process of monitoring and recording the concrete experience of the inhabitants. This did not only benefit the complex itself, but also other public housing complexes owned by Eigen Haard.

In the case of the Jeruzalem Frankendaal renovation, the 2010 *proefwoning* was meant as a nested learning cycle, again with reflective observation included. Again, unforeseen fiscal constraints cancelled the monitoring project. Fortunately, the architects of the experiment took it upon themselves to reflect on the experiment. They were later appointed to conceptualise the 2E+Co upgrades to the housing in the estate. In so doing the whole of Jeruzalem profited from the reflective observation on the abandoned experiment. The renovation project was implemented, and is undergoing concrete experience. It now lacks monitoring, which will again handicap future reflective observation. Yet, reflective observation of a concrete experience is needed to inform problem-appropriate abstract conceptualisation. This is the missing and the weakest link in the renovation cycle in public housing heritage of the Netherlands. Reflective observation is the key success ingredient in the success of the renovations of all three cases studies.

Brand spoke of the need for looking and thinking. For a full learning cycle in public housing heritage, *thinking/looking* needs to be linked to *doing* and *feeling*, which is often not the case. In the built heritage environment, the *doing* community consists of heritage architects, building owners, contractors etc., while the *thinkers* are monuments care and academic institutions. In public housing the *feelers* are the inhabitants. In the successful heritage housing renovations, the *doers* were also *thinkers/lookers*. The success of the Kings Wives renovation was that the *thinkers/lookers* reached out to the *feelers* as part of the *looking* and *thinking*, thereby engendering empathy and understanding. Professionals dealing with our extant built environment need to *do/feel* and *think/look*. This is why selecting the *thinker/doer* actors (architects, builders/contractors and other specialists) in the Microsystem for the punctuated change of cherished buildings is so important. The selection of these actors should not, nay, cannot be based on financial considerations (lowest tender) alone. We also need to learn from the knowledge and experience of practitioners and craftsmen. It is therefore essential to nurture links between theory and practice; the thinkers and the doers.

The education of built environment professionals, especially architects is equally important. A decade ago, I, with erstwhile colleague, Roger Fisher noted how important it was to teach students in architecture to "…think, feel and do" noting that empathy is essential to thinking. "Empathy can only be engendered through engagement. It is only through empathy that appropriate design responses that 'fit' can be found."[27] This empathy needs to embrace past, present and future, people and, importantly, building. It is foundational to ethics in built environment practice. In his response to the rising wave of adaptation of the heritage of the Modern Movement, architect-educator Franz Graf noted that a departure is needed from the focus on the "chronological process of genesis…" where "…new construction begins with programmatic goals and ends with a finished object…" to education in adaptive reuse, which starts from "…the existing object in order to arrive at a mode of existence that is in keeping with that object."[28] In effect, Graf was calling for empathy and affection for the object and affection comes from knowing.

The Section of Heritage and Architecture has taken up this challenge at the TUDelft: engendering *thinking* as core to our method: "Our position is that a successful adaptive reuse design aimed at preservation often asks for a certain level of delay in the design decision-making until in-depth analysis of the original design ideas, the spatial structure, the technological nature and state, the evolution/changes imposed by people etc. and the heritage values of the existing building have been undertaken."[29] Challenges however remain, notably institutional rigidity that dictates timelines and outcomes. These are first steps in a promising direction. Creating a vision of what a heritage architect should be would be of great benefit. This calls for, amongst others, developing a framework of intervention ethics on which to graft the roadmap towards further evolving this fledgeling educational programme.

8.5.2.2 The weakest link

Reflective observation in its purest sense responds to first-hand experience, but public housing renovation professionals come from outside the Microsystem and don't have direct concrete experience. This is why it is important to record. The building is the most important information source, which is why some, such as heritage architect John Allen, see the monuments of the past as fossils,[30] markers on the timeline of architectural progress. Others, such as Voillet-le-Duc made a clear distinction between buildings, which in his view were alive, and archaeology,

27 (Fisher & Clarke, 2011, p. 21).

28 (Graf, 2008, p. 287).

29 (Clarke, Zijlstra, & De Jonge, 2019).

30 (Allan, 2007, p. 11).

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which he saw as dead. He insisted that the architect when dealing with an existing building needs to "understand the structure, its anatomy and its temperament"[31] "… for it is essential above all that he should make it live. The best way of preserving a building is to find a use for it, and to satisfy its requirements so completely that there shall be no occasion to make any changes."[32] It is not the buildings, but the sources frozen in time–photos, drawings, descriptions and histories–that are to the built environment what fossils are to the biological. Destructive investigations are like anatomical biopsies. Taken together these give a glimpse into the life of a building–a look under the Skin–and give some insight into change and the agents of change. But they are only snapshots. Brand lamented the "…shocking lack of data about how buildings actually behave…"[33] is a conclusion confirmed by this research. Very little is recorded of the concrete experience. Most of what could be found in archives is either anecdotal or relates to the economics of maintenance interventions. This lacuna handicaps holistic reflective observation. More disconcerting is the lack of recent archival evidence, due to both the fleeting nature of the digital medium and the decentralisation of monuments care in the Netherlands.

Official archives were an essential resource for this research. Official archives, however, tend to present a canonical history because they are curated, selected and thinned out to present a very specific narrative. These are often far removed from the building's lived reality. The archives of individual architects' offices were found to be more valuable than the official architectural and cultural-historical archives. Therein were found the really juicy bits: expert opinions, minutes of meetings. Even the prerequisite building archaeological reports are not included in official archives. These reports are more valuable, but unfortunately also more vulnerable.

To learn, we need to track the concrete experiences of buildings continuously; like a biologist living with their subject. Important decisions are, however, not often adequately recorded. In Wido Quist's research on the replacement of natural stone in the Dutch built heritage, he concluded that: "[t]he observed incompleteness of documentation and accountability regarding restorations and the related problems require broad attention."[34] Hielkje Zijlstra recommended that individual building-dossiers, from the moment a building is constructed would be useful "…during the first years, when the building has yet to prove itself, as well as for making of

31 (Jokilehto, 1986, p. 282).

32 Viollet-le-Duc 1875, quoted in (Jokilehto, 1986, p. 282).

33 (Brand, 1994, p. 213).

34 "De geconstateerde onvolledigheid van documentatie en verantwoording betreffende restauraties en de daarmee samenhangende problematiek vraagt om brede aandacht" (Quist, 2011 p. 246).

maintenance plans, incidental changes and large-scale long-term interventions. If the information is available centrally, cross-references can be made…"[35]

I underwrite this recommendation. It is urgent that the Cultural Heritage Agency of the Netherlands, as curator of the nations' most cherished heritage buildings, creates a vehicle to collect at the very least all the executed building archaeological reports on Dutch national monuments in a (publicly) accessible manner.[36] Municipal authorities should have the same responsibility.

8.5.3 Story and history

The published sources that exist are not infallible. This study did not set out to re-write the histories of the three cases studied: they were rather chosen because their histories had been well-published. During the course of the research, a new narrative had to be constructed for each of the cases investigated, as none of their canonised histories accurately reflected the evidence presented in the archival record, or accommodated the context (SET) of the period of genesis adequately. In the light of the evidence presented by the fossils, the histories came close to the realm of fairy tale in instances. These fairy tales contributed substantially to extending the lifecycles of these public housing complexes. The mythologising of architectural history has, however, serious consequences for heritage protection in the Netherlands, that relies on architectural histories to bestow status, on which in turn subsidies are awarded. Architectural histories create financial realities, which can mean life or death to a building.

The lack of published material on the development of building technologies, especially those related to indoor climate control (Brand's Services), means that reflective observation is hamstrung: we are often simply not able to identify what we are looking at… and have not seen technology as an essential part of our architectural built heritage, despite the contemporary omni-presence of climate technology in buildings. It is a field that is all-but ignored in architectural and historical research.

35 (Zijlstra, 2006, p. 136).

36 Such accessibility could be restricted to the direct decision-makers, or made available on request with conditions as both privacy arguments and intellectual property need to be addressed in an appropriate manner. This can be arranged through the existing *Wet Openbaarheid van Bestuur* (Public Access Act. WOB) or through open-access arrangements made when issuing assignments.

Over 35 years ago, Reyner Banham lamented in the second edition of his seminal *The Architecture of the well-tempered environment* that "…no matter how profound the changes wrought on architecture by the electric lamp or the suspended ceiling… the fact that such changes were not visible on the exterior of the building denied them a place in the history of architecture."[37] This unfortunately still remains the case. In all three case studies, essential technological aspects of their AR-DNA remained undiscovered and in cases were unwittingly sacrificed. These discoveries highlight the importance of analysing buildings from the perspective of an evolutionary building history (*longue durée*), rather than an architectural design history (*histoire événementielle)*. The latter, which is currently the norm, is too often based on the history of the (designers') personalities. We tend not to ask of the histories of younger buildings to tell us if a building changes or even why it does.

Change in buildings remains an inconvenient truth. Viollet-le-Duc concluded long before the historian Fernand Braudel or the biologist Brand that we should "… chercher les causes de ces transformations, à compter un à un tous les chaînons de cette longue chaîne si bien rivée quoique composée d'éléments si divers" to be able to know our buildings.[38]

In all three cases their first large-scale renovations did not live up to their prophesised expectations of benefit over lifetime. In many cases the original promises were not investigated: financial pay-back periods were deftly set aside. Unfortunately, there is no guarantee that they will do so this time around. This is concerning, seeing the economic and environmental resources that went into achieving their ambitions, either at the time of their construction or renovation and especially the technical upgrades. Where a full learning cycle was completed, expectations were better managed, with a greater chance that those renovations will live up to expectation. Continuous monitoring of the consequences of renovations of public housing complexes, while costly, would be to the benefit of residents, owners and society at large (society is the collective owner by extension after all) and to the buildings themselves. Brand has shown how buildings learn by accommodating change in their physical shearing layers. What is critical for the survival of public housing heritage is not *how* it learns, but *that* it learns. This is why ensuring monitoring of the lived-in concrete experience of a building and allowing for reflective observation, is essential to the renovation cycle. Documentation of the concrete experience, the lived realities of Brand's 'Souls', through regular post-occupancy evaluation is the key.

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37 (Banham, 1984, p.12).

38 "…look for the causes of these transformations, to count one by one all the links of this long chain so well riveted although composed of so various elements." (Viollet-le-Duc, 1854, Vol 1. pp. ix–x).

8.6 Managing Change

Two trends can be described from the analysis: the cases have been changed to *look*, at the very least, like what the Heristory prescribes, while growing as close as possible to the ideal 2E+Costory. These stories feed the growth; the buildings turn to them like in biology, a growth or turning movement is a response to an environmental stimulus, a phenomenon called tropism. We could speak of *2E+Co-tropism* and *Heritropism*.[39] They have a very important role to play in creating the desirability for implementing change: they amplify the desirability for change and the shared vision and create the first steps towards achieving the vision. The Bechard Harris change formula, presented in Chapter 3 already accommodates a 'clear and shared vision' as essential to overcome the resistance to change:

D•V•F>R

D= **D**esirability for change; V=Clear and shared **V**ision; F = there is a roadmap/way/plan/**F**irst steps to achieve change; The product of these needs to be larger than the **R**esistance to change before change will take place.

The resultant change is, however, the consequence of the content of the Heristory and 2E+Costories, which together dominate the Story in the case of public housing heritage. This could be seen as part of the Contextual Domain as defined by Richard Foqué: "…the complex of circumstances, objects, and conditions — both in the physical and in the socio-cultural sense — that will determine the outcome of the designing-building process and act upon it when in use."[40]

Story is, however, a single cultural entity that has its own evolution and mechanisms of replication. What is its relation to the AR-DNA and its mutation?

Richard Dawkins in his 1976 book *The selfish gene* defines a unit of cultural transmission that can replicate and evolve through the evolution of culture as a *meme*.[41] Dawkins echoes Vickers' 1968 idea of an ecology of ideas in which "[l] ike the life forms of the physical world, the dreams of men spread and colonize

39 (Fisher & Clarke, 2011) explored the notion of Ecotropism as the growth of buildings to have more fitness to their environment; adapting to their qualities to their conditions. In that, we didn't acknowledge the contribution of the meme as a factor.

40 (Foqué, 2010, p. 133).

41 (Richard Dawkins, 1978).

their inner world, clash, excite, modify, and destroy each other."[42] The meme can have a life of its own and, like Bateson said, transcend the life of the individual originator's mind.[43]

Dawkins' word *meme* is a reduction of the Greek *μίμημα* (mimema; to imitate), shortened not only because it would sound more like gene, and he knows that this would help it to replicate, but also because the French *même* means 'same'. He further refers to a group of memes that replicate together and co-adapt as a *memeplex,* short for *coadapted meme complexes*[44] or an ecosystem interdependent meme. Brand's Shearing Layers model suggests a section drawn through an archetypical house. It is a recognisable cultural unit (be that a melody, an idea, a diagramme or scheme, etc.), that can be transmitted both horizontally; (between people) and vertically (over time), while in the process, able to evolve. It is in itself a meme and the application of the model in this study is a perfect example of the replication (and evolution, through a specific understanding) of a meme.

Psychologist Susan Blackmore in her book *The meme machine* provides not only a further exploration of the meme, but also outlines a view of culture as a product of the replication of memes. An essential quality of a memeplex is that the individual memes can replicate easier as part of the memeplex than without it.[45] The nature of gene and meme interaction, which can be either competitive or complimentary,[46] results in a phenotypical expression.

According to Dawkins a meme needs to meet three criteria to replicate: fidelity, fecundity and longevity.[47] These are certainly present in the way in which buildings are depicted, described, discussed and documented. All architectural styles, movements and also the Conservation Movement can be understood individually as a memeplex, themselves forming part of the ecology of ideas. Architectural historians and others creating and publicising histories and analyses of origins of buildings, position them in narratives, which form part of meta-narratives and thereby create memeplexes for groups based on these narratives. The Shearing Layers model also presents the building as a memeplex, each shearing layer is a meme, representing the tangible building.

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42 (Vickers, 1968/2013, p. ix).

43 (Bateson, 1972, p. 467).

44 (Blackmore, 2000, p. 19).

45 (Dawkins, 2000).

46 (Blackmore, 2000, p. 110).

47 (Blackmore, 2000, p. 100).

Supplementing the Shearing Layers model with Story adds a shearing layer unlike any other. Like Site, it already exists before the building is created (the promise of the performance of a future building predates the creation of other layers) and can outlive it. Even more powerful than Site, Story continually modulates the Stones. If the conflict between the Story and the form, fabric and expression of the building (Stones) is strong enough, it can induce the AD-DNA modifications, changing the expression of genotype as phenotype.

The difference between the built environment and the biological is that the world of our creation evolves not because of a selfish *gene* but because of a selfish *meme*. The Stones create the Story, but then the Story changes the Stones to replicate itself. But Story is more than that, because the building is both the subject of the memeplex and the main vehicle for the meme. The Story layer (Meme) mediates between the qualities of the building and the environment. The Lewin change formula, already adopted for buildings in Chapter 3 needs to be augmented:

$$C=f(Q \bullet E \bullet M)$$

C=The resultant **C**hange (phenotypic expression); Q=Qualities of the building (AR-DNA/genotype); E=Environment of the building; M=Memeplex

In other words, once buildings exist, they continue to *become* (to use a Heraclitan phrase) through the engagement of gene with meme in an ecosystem. If Heristory forms a high-fidelity part of the meme, it engenders Heritropic evolution. But the Heristory memes also need to be credible. Archival sources serve to verify the Heristory. Of all three factors, the meme is the most malleable and therefore most used, even if it is often used unconsciously or not with high fidelity. A typical example is that of devaluation or pay-back periods being the change in the depreciation of the investment at Jeruzalem from 40 years to 25 years. This changed the promise baked into the 2E+Co memeplex making a different renovation possible.

For built heritage, the Heristory as memeplex is given agency in the Macrosystem through legislation. Individual Heristories can be created and modulated in either the Exo- or Microsystem, and if they are strong enough, they can influence the evolution of the AR-DNA. The Story as a memeplex is the one aspect of the building that can transcend the layers of the building's ecosystem. A building's Story is not only a shearing layer, it is also the most powerful proximal process in the Ecosystem, specifically because it allows for both horizontal (in time, fecundity; they can spread) and vertical (through time, longevity) transference (Figure 8.2).

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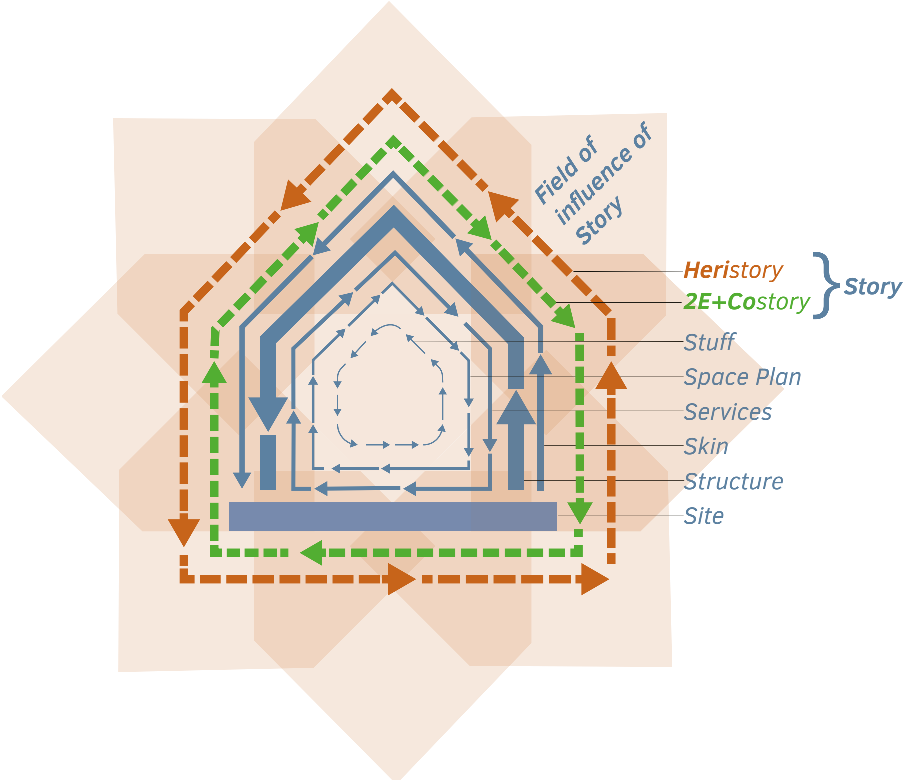

FIG. 8.1 *Story*, with its internal shearing layers *2E+Costory* and *Heristory*, both as additional shearing layer and force field, augmentin Brand's 6-layer model.

The meme needs to be clearly defined to have effect; i.e., have high-fidelity. Therefore, even the promise of future status as National Monument of the Koningsvrouwen van Landlust, had consequences for the way in which decisions were made and financial resources applied. It also needs to be recognisable; its source and content clear. Changing perception is the most efficient way of dealing with buildings as a resource.[48] The planned and publicised name changes to the Justus Quartier and Koningsvrouwen van Landlust were an astute strategy to establish and give high-fidelity and fecundity to a meme that predicted what these public housing heritage complexes were projected to become. This influenced the public discourse, uniting actors across spheres of influence in the ecosystem.

48 (Petzet & Grcic, 2012, inner cover).

8.7 Five lessons

When it comes to technologies, look first

Each renovation tweaks the amalgam that makes the building. Buildings are technological synergies. Architectural histories and often the Heristory of the twentieth century unfortunately focus almost only on the resultant expression, on the iconic images published on completion. If renovations are informed only by the already known, it is bound to be misinformed. It is essential and beneficial to undertake research into the technologies of the genesis and evolution of public housing monuments before renovations are planned. Low-tech (passive) systems that once served adequately, could provide sustainable answers for future-tech that delivers cost and waste reduction.

Listing matters, but is never enough

Heritage protection prevents complete demolition. It is one of the most effective tools to address the cultural imperative in the built environment.

Its agency often remains skin-deep, only stretching from the street to the front-door. Because the 2E+Costory follows the contemporary norms that would be applied to new housing, the protected public housing complexes effectively become newbuild behind the façade. In one instance the façade was even newly constructed, albeit as mimesis of the original. Great tangible and intangible sacrifices are made in the name of 2E+Co progress. No roadmaps, however, exist to guide project teams through the choppy waves where these opposing torrents meet. Statements of significance used for heritage listing don't provide guidance on the tolerance for change. Seeing the urgency of the environmental imperative and the extraordinary renovation project that lies ahead, we urgently need generic instructive guidelines to deal with the conflict between 2E+Costory and the Heristory in protected housing–both public and private–in the Netherlands. Each renovation design investigated, defines a future fixed-state for the building. But, to think of a renovation as reaching an end-goal is self-deceit. Like the maintenance cycle, the renovation cycle never ends. Renovation guidelines need to ensure that decisions made don't limit future decision-making. So-called 'no-regret' choices can never be guaranteed; every renovation will be made undone in the future, and it will often be sooner than expected. Caution is heeded.

Simply put, we need to know when the use value may prevail and when heritage value should take precedence in decision-making. This is a lacuna that the delegated national custodian for heritage management in the Netherlands, the Cultural Heritage Agency of the Netherlands (RCE), needs to address urgently, if the pending irreparable damage to the country's-built heritage through well-intended energy-renovations is to be limited. Urgent guidance is needed to safeguard the Dutch public housing heritage from unforeseen damage through 2E+Co renovations.

Concurrently, the renovation process needs to be adjusted to allow for in-depth pre-emptive analysis of the to-be-renovated building. This may include destructive investigations and built-in nested learning cycles. Transformation frameworks, which investigate the tolerance for change in housing, based on the heritage values and use needs, need to be created before any decisions are taken. One-size-fits-all standardised renovation packages, currently being promoted as fast and cheap solutions to the renovation challenge,[49] are not appropriate for public housing heritage. To guarantee the retention of heritage values, a prerequisite for value creation, each renovation will need to empower the Heristory, make time for critical reflective observation and keep the Ecosystem of actors flexible to allow for informed iterative abstract conceptualisation.

Because money talks, words matter

Subsidies are the most effective lubricant with which to direct change in the ecosystem of public housing heritage in the Netherlands. This will remain so as long as the country can socially and financially afford to do so. It is precisely these affordance controls that can be adjusted continuously and form one of the most important tools we have with which to pilot change.

Despite the given that public housing heritage is a significant national resource, no national subsidies specifically aimed at the retention of the heritage values of this stock, currently exist. This was the reality in the 1980s when the first Justus van Effen renovation was undertaken. It still is the status quo today. The RCE excludes public housing from its subsidy programme for the maintenance of national monuments, but does make provision for privately owned homes.[50] In all case studies, the retention of rehabilitation of fabric–deemed essential to the heritage values of the housing complexes–had to be afforded through other

49 (IVVD Kennisplatform, 2018).

50 The *Subsidieregeling instandhouding monumenten* (Subsidy scheme for the maintenance of monuments SIM) and the *Woonhuissubsidie* (Private homes subsidy). See (Rijksdienst voor het Cultureel Erfgoed, 2021).

means, such as subsidies meant to employ the unemployed, stimulate innovation, improve 2E+Co, or was simply afforded by housing corporations/associations. This means that the cultural imperative in protected public housing in the Netherlands is structurally disadvantaged.

Words also matter because of the equally improbable and specious distinction that is made between renovation and adaptive reuse, mirrored in the Dutch national subsidy system. While subsidies abound to make plans for the adaptive reuse of, for instance churches, no national subsidies exist for the renovation of public housing heritage. The case studies have shown that the distinction between adaptive re-use and renovation is no measure for the intensity and effect of interventions in protected buildings.

The urgency of the cultural imperative and the bespoke measures called for to achieve the renovation of public housing heritage, mandates that the Dutch monuments maintenance subsidy system be readdressed.

Branding matters. Archives matter. Curate the meme to conserve housing heritage

The Heristory is a vibrant dynamic and essential of public housing buildings, and is potentially one of the most important arrows in the quiver of sustainable maintenance of public housing. Dynamism makes it potentially fickle, but it can be nurtured and curated.

The relatively recent development of Building Information Models (BIM) as digital twin (meme) of buildings presents a vehicle for compiling and curating recordings on tangible and intangible information on buildings. BIM was originally developed as integrated digital design and construction management tool and it is now seen as an indispensable aid in the forthcoming Dutch renovation enterprise.[51]

Its application to heritage was first mooted in 2009 as the Heritage Building Information System (HBIM).[52] By 2017 Historic England published its first guidance document for the application of HBIM, confirming that the HBIM can be used to inform conservation, "…as a heritage management tool and as an archive

51 (Keizers, 2019).

52 (Murphy, McGovern, & Pavia, 2009).

information resource, to aid future investigations and research."[53] The worth of HBIM has already been demonstrated.[54] Dutch housing renovation project teams have already adopted BIM for housing renovations, such as the recent renovation of the National Monument Het Schip public housing complex in Amsterdam.[55] Where these already exist, BIM models should be transformed to HBIM by populating them with historical material and HBIM should be implemented for the continuous management of protected public housing heritage in the Netherlands.

There are pitfalls inherent to the ephemeral digital world: maintenance, migration and redundancy of digital systems, but the potential benefit far outweighs these pitfalls. Linking the HBIM to regular post-occupancy evaluation would not only create a record of the concrete experience and material for reflective observation, but would also provide feedback for evaluation and addressing of challenges that arise during the phases of homeostatic equilibrium, or plainly put, help with maintenance dictions.

Exploring HBIM's great benefit not only for its potential benefit, but also its potential pitfalls could be coordinated further by the RCE, with partners such as research institutions, Aedes (The National Umbrella Organisation of Public Housing Corporations) and the National Renovation Platform.

Teach heritage to learn

Built heritage is a construct of our own fabrication. It is the entanglement of an ecology of ideas with the physical fabric of our built environment. For **heritage** to really *learn*, it is up to us to instruct by completing the learning cycle, creating and depositing reliable fossils, and continuously curating the Heristory.

53 (Antonopoulou & Bryan, 2017).

54 (Lopez et al., 2018); (Leon-Robles et al., 2019).

55 Personal communication Philip Breedveld, Archivolt B.V. 22 March 2016.

8.8 Coda

Real-estate financial models construct limited life-cycles for buildings on order to predict return on investment. Heritage designation takes a longer view, hoping to extend the life of a building as the container of values, indefinitely. The successes booked by the Dutch approach to conservation has shown that two views can be reconciled in renovation or adaptive-reuse and be mutually beneficial, if concessions are made.

The urgency of the social, environmental and cultural imperatives, however, now calls for new perspectives on buildings and their inevitable or intended change. The focus of the renovation wave currently lies in immediate energy use reduction in home operations. The environmental imperative, however, demands that we take a long view. It demands an assessment of the total environmental impacts of our buildings over their entire life-cycles. Buildings are containers of embodied energy, defined as: "the initial energy investment required to produce a material or product. It includes the energy needed for the extraction of natural resources, manufacturing, transportation and installation."[56] Heritage buildings, like all other, represent embodied energy. Building reuse has obvious environmental impact reduction potentials. Not all building reuses are equal. The 2011 report of the National Trust for Historic Preservation in the USA on the *Greenest building: Quantifying the environmental Value of building reuse* concluded, that of the six building reuses it investigated by converting warehouses, reuse did not outperform new-build from an environmental impact perspective over a course of a 75-year life-cycle in only one instance. This was: "due to a combination of factors, including the amount and type of materials used" in the warehouse conversions.[57]

Despite the fact that these conclusions relate specifically to the context of various American cities, it gives food for thought on the appropriateness and long-term environmental efficacy of deep-renovations of Dutch housing and public housing heritage. This is critical considering that none of the cases investigated were even programmed to reach a 75-year life-cycle despite the radical fabric interventions and investments made. Much more research is needed to establish the life-cycle impacts of 2E+Co renovations of housing in the Netherlands, specifically seeing the enormous social, environmental and cultural outlay that this will call for.

56 (The Preservation Green Lab, 2011, p. 20).

57 (The Preservation Green Lab, 2011, p. VI).

Replicating a theoretical Life Cycle Assessment for Dutch housing (including public housing heritage) following from the *Greenest Building* study in the Netherlands is urgently necessitated as a matter of urgency to check the long-term efficacy of proposed 2E+Co measures and/or set minimum life-cycles for their operations before replacement commences.

Public housing heritage not only represents embodied energy but, like all built heritage, it also represents generations of cultural enterprise and investment, of which the residue is more than just aesthetic. It is a stratified record of ecologies of ideas, created through the aspirations and labour of successive generations. Our built environment is an enormous vessel of (sometimes-dormant) embodied cultural energy.[58] The conservation task for public housing heritage therefore, extends considerably beyond preserving the *Skin* and accommodating the adaptation of *Services* to modern comfort requirements.

Heritage is a trophic force. Cultural energy begets cultural energy. It is a renewable source that self-replicates. The careful future curation of public housing heritage should not only provide sufficient and suitable social housing, it should also provide a sense of pride and a familiarity of the living environment.

In the Netherlands, heritage is presented as an asset for development. Publications abound on adaptive re-use, driven to an extent by the current fashionability of the adaptive reuse aesthetic and is stimulated by national agencies. The internationally notable significance of Dutch public housing heritage and the relevance of public housing heritage renovation to the urgency of the social, environmental and cultural imperatives are indisputable. Yet, no single oversight work, which presents analyses or reflects on the recent adaptations of Dutch public housing heritage through deep renovation, has been published. Some first attempts have been made,[59] but much more reflective observation needs to be done so that we can be more certain that the choices we will make during the fast-approaching *renovation wave* will in fact, be *no-regret* choices.

For public housing heritage specifically, it is the task of the heritage architect to be able to curate the buildings' Story, mitigate the rival regimes presented in the Heristory and 2E+Costory memes, including managing expectations for future building performance.

58 Posited in (Clarke et al., 2019, p. 150).

59 The NWO-financed *Beyond the current* research project of the Faculty of Architecture at the TUDelft made significant first steps in this direction. (TuDelft, (s.a).]

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Curriculum Vitae

Nicholas John Clarke was born in Pretoria, South Africa on 17 November 1976. He studied at the University of Pretoria, completing his Bachelor in Architecture (B.Arch, cum laude) in 1999. Following a couple of years concurrently in practice while teaching at his alma mater, he enrolled at the University of Cambridge in 2004. After completion of a Master's Degree in Philosophy (MPhil) in Environmental Design in Architecture 2005, he returned home, first working in practice before joining the University of Pretoria as full-time lecturer in 2007. Here he taught a wide range of subjects and led numerous design studios.

From 2008 he also curated the architectural drawings and documents archive of the Department of Architecture, and created, with a dedicated team, an online built environment heritage resource. He played a key role in developing the C19 and C20 Dutch-South African shared heritage research field. This led to research projects such as Eclectic ZA-Wilhelmiens, Re-centring Tshwane, and NZASM Footsteps along the Tracks and the currently running Tectonic ZA-Wilhelmiens project.

Nicholas commenced teaching at the TU Delft in 2011, on a part-time basis, serving as Design, Construction and Values supervisor for Heritage and Architecture (H&A) Master's students, while concurrently undertaking his PhD research and contributing to H&A research projects. With Marieke Kuipers he developed a method for analysis of heritage buildings as an integral step in re-use design practice. He has served as coordinator of the NRP Academy module Verduurzamen since 2018 with the Nationale Renovatie Platform (NRP).

He is also active as World Heritage expert advisor to the International Council of Monuments and Sites (ICOMOS) International Secretariat regarding properties in Africa and Europe. Alongside all these activities, Nicholas is a member of the South African Institute for Architects, is registered in the Netherlands with the Bureau Architectenregister, a member of the Suid-Afrikaanse Akademie vir Wetenskap en Kuns (South African Academy for Science and Arts) and involved with the Events Committee of Het Zuid-Afrikahuis, Amsterdam.

Nicholas has received various awards for his architectural, research and publication work, including the Pretoria Institute for Architecture's President Award (2014) and two South African Institute for Architects (SAIA) Awards of Excellence (2016; 2018).

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21#14

How Heritage Learns

Dutch Public Housing Heritage Evolution in Ecosystemic Perspective

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How Heritage Learns explores the dynamics that come into play when public housing becomes valourised as heritage in the Netherlands and how that, in turn modulates the evolution of this protected housing. It builds on the foundation set by the thesis of Steward Brand, that *buildings learn* through the adaptation of their fabric to external forces: changing fashion, technologies and economy. This dissertation investigates different key drivers for change: Energy, Economy and Comfort (2E+Co).

To understand how and why the housing heritage evolved over time, an ecology of ideas is developed that sees buildings as organisms evolving and learning in their environments, providing a multi-sided theoretic model for analysis.

Three case studies are extensively explored: the Justus van Effen Quarter in Rotterdam (1921–22) and the King's Wives of Landlust (1937–38) and Jeruzalem public housing complexes (1949–52), both in Amsterdam. These are all exemplary monuments of Dutch public housing and all three have undergone repeat renovations since their construction. The research not only highlighted their various learning cycles, but also uncovered exciting new information on their origins and histories.

What sets public housing heritage apart is the presence of a *Story*. However, the case studies reveal that the *Stones* were modulated by dominant 2E+Co ambitions common to all public housing. Above all, *How Heritage Learns* shows that past promises of increased performance and efficiency were never fulfilled. Without structured reflective observation we are doomed to repeat the same mistakes. Such lessons are all the more important at a time when the built environment stands at the cusp of another revolution driven by environmental imperatives.

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