2 Corporate Real Estate alignment

chapter 2	CRE alignment state of the art and scientific gap

Preference-based Accommodation Strategy (PAS) design and decision approach

Developing PAS		Testing PAS			Evaluating PAS
chapter 3	chapter 4	chapter 5	chapter 6	chapter 7	chapter 8

fifteen basic concepts and definitions from decision, design and management theory

2nd procedural rationality

3rd structural rationality

1st substantive rationality

steps

stake-holders & activities

model

steps

stake-holders & activities

model

chapter 9	Reflecting upon PAS

chapter 10	Conclusions and recommendations

2 Corporate Real Estate alignment

This dissertation aims to enhance CRE alignment by approaching alignment as a design and decision process as is explained in chapter 1. The current state of the art in CRE alignment modeling is summarized in paragraph 2.1. This sets the *context* of this research and will show that CRE alignment is complex and multidimensional. Thereafter, an assessment of CRE alignment models from a design and decision perspective is made in paragraph 2.2. Based on this perspective I identified the *scientific gap* of this PhD research. Most of the work in this chapter has been published before in the last 10 years. **Figure 2.1** shows the timeline of the important publications related to the two topics that this chapter addresses:

1 State of the art of modelling CRE alignment processes;
2 Assessment of structure models of CRE alignment from a design and decision perspective.

As can be seen in the figure below, the different topics have evolved at the same time. I have chosen to structure the chapter around the two topics and not follow the order of publication. Because the topics have evolved over time this causes some redundancy in and between paragraph 2.1 and 2.2. In the last paragraph 2.3 conclusions, they are brought together.

But before showing the state of the art, CRE and CREM are defined. Corporate real estate is a specific type of real estate. CoreNet Global (2015) describes it as the real estate necessary to conduct business—the bricks and mortar of office buildings, manufacturing plants and distribution centres, retail stores, and similar facilities. It can include owned or leased space, buildings, and infrastructure, such as power plants or even airport runways. Corporate real estate is closely related to commercial real estate, however, there is a distinct difference in business objectives. In the commercial real estate world, the business is the real estate. The goal for commercial real estate is to provide a risk adjusted return to the investor; whereas, in corporate real estate real estate supports the business function. In other words, corporate real estate represents the demand side or user side of real estate, while commercial real estate focuses on the supply side to meet that need.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
CONTEXT PhD research Comparison CRE alignment model	De Jonge et al. 1st ed. (R)	De Jonge et al. 2nd ed. (R)	Appel et al (JP)	Heywood (CP)						Heywood & Arkesteijn (JP)	Heywood & Arkesteijn (JP)
		Van der Zwart et al (CP)									
CORE PhD research Assessment CRE alignment models				start PHD research	Arkesteijn & Binne-kamp (CP)	Arkesteijn & Binne-kamp (BC)	Valks et al (CP)	Arkesteijn et al (JP)		Arkesteijn et al (JP)	

FIG. 2.1 Context and core of PhD research Note CP = conference paper JP = journal paper, R = reader, BC = book chapter and P = presentation. Dark purple publications (co-)author.

Corporate real estate is seen since 30 years by (Joroff, 1993) as the fifth resource of the business that needs to be managed besides capital, human resources, IT and communication. One of the big challenges in corporate real estate management is reducing the gap between the high speed of business and the slow speed of real estate, i.e. between the so-called dynamic real estate demand and the relatively static real estate supply. A decade later (Krumm et al., 2000, p. 32) described CREM as

"The management of a corporation's real estate portfolio by aligning the portfolio and services to the needs of the core business (processes), in order to obtain maximum added value for the business and to contribute optimally to the overall performance of the corporation".

One could say that the authors position CRE alignment in this definition as the raison d'être of CREM. Other authors (Heywood & Arkesteijn, 2017) position CRE alignment as one of the activities that CREM needs to perform. In this research, CREM will be seen as a wide range of activities that must be performed by the corporate real estate manager, while the alignment of CRE with the business will be seen as one of CREM's activities and is referred to as CRE alignment.

2.1 Corporate Real Estate alignment an overview of the state of the art

Thorough analysis and examination of the CRE alignment theory and their alignment process models is rare. A substantial critique of these models is that each is usually presented in isolation with little if any reference to previous modeling efforts. Heywood and Arkesteijn (2017) identified 20 different models. Some examples of thorough analysis of these models are (De Jonge et al., 2008; De Jonge et al., 2009; Van der Zwart et al., 2009; Appel-Meulenbroek, Brown, & Ramakers, 2010, Heywood, 2011). The first two examined six models to overview and compare their components, the second examined eight models to adopt one to study Dutch aged care CRE. The third identified components evident in ten alignment models.

Paragraph 2.2 is about the state of the art CRE alignment and is a summary of two papers that have been written in cooperation with Heywood from the University of Melbourne which have been published. The papers present their thorough examination of CRE alignment theory and models that developed and supersede part of the work of Heywood (2011) and De Jonge et al. (2008, 2009) and Van der Zwart et al. (2009). The papers are[3]:

— Heywood, C., & Arkesteijn, M. (2017). Alignment and theory in Corporate Real Estate alignment models. *International Journal of Strategic Property Management*, *21*(2), 144-158;
— Heywood, C., & Arkesteijn, M. (2018). Analysing fourteen graphical representations of corporate real estate alignment models. *Journal of Corporate Real Estate*, *20*(1), 16-40.

This examination of CRE alignment theory and models provides a state of the art overview. The overview enables us to understand the nature of CRE alignment as a phenomenon by summarizing part of the 2017 paper. From the 2018 paper the components and building blocks of CRE alignment models will be presented.

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3   The text is a summary of the two papers and relies mostly on existing text. Alterations have been made to represent the text logically in a condensed format. Therefore, I will not refer to the authors when summarizing the text. The text has been approved by Heywood.

TOC

The results of both papers are presented in the following order;

— Paragraph 2.2.1 understanding CRE alignment and definitions of CRE alignment;
— Paragraph 2.2.2 understanding the cognitive objects being aligned;
— Paragraph 2.2.3 understanding the alignment directionality;
— Paragraph 2.2.4 understanding the relationship between the business and CRE
— Paragraph 2.2.5 understanding forms of alignment;
— Paragraph 2.2.6 CRE alignment's building blocks and its constituents components;
— Paragraph 2.2.7 one of the alignment models is discussed; the DAS frame.

2.1.1   Understanding CRE alignment

Understanding CRE alignment's nature was developed by examining multiple models[4] of, essentially, the same phenomenon. Examining multiple representations should enable an enlarged and more complete understanding of the phenomenon to be developed.

Heywood and Arkesteijn (2017) deepened the understanding of CRE alignment through a meta-study of twenty existing alignment models (see **Figure 2.2**). A qualitative hermeneutic method interpreted the articles and their models. This holistic analysis found alignment to be more complex and pluralistic than the individual models assumed. Four dimensions operating simultaneously were evident[5] –multiple organizational and CRE accommodation concepts (as cognitive objects) to align, a multi-valent relationship between these objects, alignment in multiple directions and multiple alignment forms. Alignment theorization had positive and negative aspects. Positive is that good science was evident and had improved over time. Negative is that model theorization had occurred mostly in isolation and was constrained by simplifications required to make modeling tractable. The research makes a meta-theoretical contribution through a more complete theorization of CRE alignment as a phenomenon. This addresses a disordered sense to prior theory, thereby representing a major conceptual improvement. A new alignment model is not proposed; rather through developed understanding a basis is provided to point towards how good alignment models can treat the four dimensions.

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4   In this study models aligning CRE and organizational strategy were selected that were a diagrammatic, real estate-based model and an associated textual material in an 'article'.

5   In this chapter the order in which the four dimensions are presented is changed
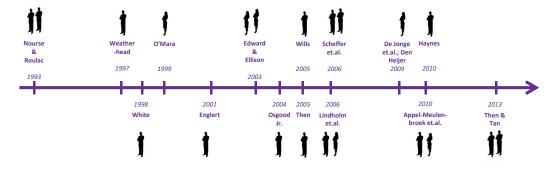
FIG. 2.2 Timeline of CRE alignment authors (Arkesteijn & Heywood, 2013)

They conclude that very few articles specifically define alignment. Then & Tan (2013) assemble several quotes from Kaplan and Norton (2006) to infer a definition because Kaplan and Norton do not actually provide one. Englert (2001) provides an important definition highlighting the vertical alignment between organizational and CRE strategies, and horizontal alignment across the business units. The models from TU Delft rely on the definition Krumm et al. (2000) of CREM that includes alignment in CREM's raison d'être.

2.1.2 Understanding the cognitive objects being aligned

In understanding CRE alignment it is important to know what is being aligned, because part of CRE alignment theory's evident disorder is attributable to the various cognitive objects[6] that the articles say should be aligned. The analysis showed six distinct cognitive objects – three business-related ones and three real estate-related ones as are shown in **Figure 2.3** (Heywood & Arkesteijn, 2017). This provides a wider range of objects than displayed in Krumm et al. (2000)'s definition of CREM.

While all the cognitive objects appear relevant to CRE alignment, they are different and need to be more clearly recognized as such. This distinction was not always evident in this analysis which places strategy (business and CRE) as pre-eminent concepts, as informed by strategic management theory. In business, this pre-

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6   This paper uses 'cognitive objects' as the concepts that are the focus of knowledge production efforts. 'Objects' recognizes that these have a formal existence, albeit one that is a product of, or contained within, mental (cognitive) efforts (Whitley, 2000)

eminence is based on strategy responding to internal and external contexts, drivers and resources, producing performance and also creating the 'needs'. In CRE, the strategy produces the CRE objects and the CREM practices. This suggests that CRE and business strategies are the primary alignment objects, with the others being secondary and consequential alignment. Nevertheless, all cognitive objects need alignment, suggesting that alignment's proper conceptualization requires all cognitive objects be included. It was also evident that, based on the six cognitive objects, nine permutations were possible with different authors using one of more permutations of the entities to be aligned.
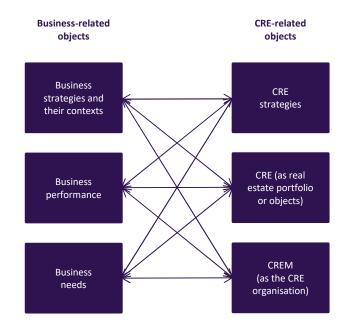

FIG. 2.3 Business and CRE–related cognitive objects in the alignment models Note adapted from Heywood & Arkesteijn, 2017, p. 150

2.1.3 Understanding the alignment directionality

Englert's (2001) alignment definition notes its multi-directionality; vertically between corporate and CRE strategies and horizontally across the business units and across the Corporate Infrastructure Resources (CIR) (Dunn et al., 2004; Materna & Parker, 1998). De Jonge et al. (2009) refer to a multi-stakeholder approach indicating different directions. This multi-directionality contrasts with the often-made assumption of CRE strategy just following corporate strategy. Although, this is important CRE alignment is multi-directional, that is, iteratively vertically between the organizational and functional levels, horizontally across the business units and the corporate infrastructure functions, and between demand and supply. This supply may be available from the existing portfolio or sourced externally from the real estate market. Five nested directions are identifiable as shown in **Table 2.1** (Heywood & Arkesteijn, 2017).

TABLE 2.1 Alignment directionality Note adapted from Heywood and Arkesteijn, 2017, p. 151

Direction	Variants
Internal vertically	Top-down driven - the usual conception.
	Bottom-up - corporate strategy informed about CRE.
Internal horizontally	Across the business units for a coherent portfolio approach.
	Together with other support infrastructures.
Externally	Organizational demand and availability of supply in the real estate market.

Many models contained top-down vertical alignment corresponding to conventional wisdom that CRE strategy is linked to corporate strategy, being derived from and consistent with it. Bottom-up vertical alignment was less evident and when evident it was more in terms of supporting the business strategy. Internal alignment was by-and-large the modelling's focus and explicitly considers current and future demands for CRE from the current and future portfolios. External alignment refers to the external real estate market's satisfaction, or not, of the CRE requirements by way of availability, quality, quantity, cost, location, and technology (Osgood Jr, 2004).

2.1.4 Understanding the multi-valent relationship between the business and CRE

A multi-valent relationship between CRE and the business was clear with many words used to capture different values. A value hierarchy was evident suggesting that higher value words are more important in theorizing and describing alignment. However, alignment is not one of these things, it is many or all of them as is displayed in **Table 2.2** (Heywood & Arkesteijn, 2017).

Interpretive examination of the words for the relationship reveals, based on their semantic qualities, a hierarchy of meaning. This revealed a multi-valent relationship (that is, multi-valued or strength) with a hierarchy of significance within the relationship (**Table 2.2**). Plotting the analysis this way shows a semantic progression from lesser to stronger and more valuable connection levels within the synonyms' multiple value senses. At the lower end there is 'just' having a relationship and two derivation-related links where corporate strategy 'informs' CRE strategy allowing the latter to be 'derived' from the former. At the upper end there is a utility relationship where the CRE strategy is 'useful' to, and even better, actually 'strengthens' corporate strategy. In between are the words that have to do with the relationship's closeness, that is, the two are 'consistent', 'integrated', and have 'moved' closer together. To ascertain the degree of proximity 'assessment' is required. Outcomes of that assessment are likely to lead to conclusions about the utility of CRE strategy.

TABLE 2.2 Alignment' words and their relationships' semantic quality. Note adapted from Heywood and Arkesteijn, 2017, p. 147

Words	Relationship's semantic quality and valency	Number of authors
Linked	A relationship exists between the two concepts	8
Informed	An awareness-based relationship.	1
Follow, Derived	A derivation-based relationship.	4
Coherent, Align , Moving (together), Synchronized	A consistency-based relationship.	10
Incorporate, Integrated	An integration-based relationship.	6
Align, Moving (together), Synchronized	A movement-based relationship.	7
Correctly applied, Value-maximizing, Match/Mismatch, Appropriate, Conflict absence	An assessment-based relationship.	7
Effective, Optimal (CRE solutions, contribution, balance), Value-adding	A usefulness-based relationship.	8
Support, Value-creating, Value-adding, Value-maximizing, Reinforce, Plays a role , Enable	A strengthening-based relationship.	10

There is a sense in some articles and models that just 'deriving' CRE strategy from business strategy is enough. While this needs to be done, it does not fully capture (Weatherhead, 1997) inference of a strengthening quality through corporate strategy that includes (corporate) real estate. This two-way relationship is important in achieving strategic CREM and is of a higher order than deriving CRE strategy. When verbalizing CRE strategy it would be better to use higher level words. It was evident that patterns of word usage did not vary much over time though recent years has seen 'value-added' quite widely used.

2.1.5 Understanding forms of alignment

When trying to understand alignment's existence within the models, it was evident that different things are meant. First is understanding alignment's forms or modes of existence in the models. Conceptually, the business alignment literature identifies three alignment forms – two noun forms (a state of being, and a strategy or plan) and a verb (a set of actions that make up a process) (Kaplan & Norton, 2006; Labovitz & Rosansky, 1997). These provided an initial thematic framework with which to analyze the articles. Additionally, interpretation needs to be open to the presence of alternative or additional themes, which resulted in one emergent one. The four forms are shown in **Figure 2.4** (Heywood & Arkesteijn, 2017) and are:

— A defined *strategy* or *plan* for alignment which can be inferred as existing as a document making it some type of artefact;
— A *process* which is defined as a set of actions or the management tasks to achieve greater alignment;
— A *state* which is the degree of alignment, now or in the future. It refers to how 'much' alignment is achieved; and
— *Behavior* which is having a strategic mind-set as an emergent form suggested by (O'Mara, 1999) and was informed by (Joroff, 1993) 'Business strategist' inferring the importance of strategic-oriented behavior. While a mind-set is a cognitive state, having it constitutes behavior, that could prove instrumental in achieving strategic outcomes when faced with a flood of operational and tactical pressures.

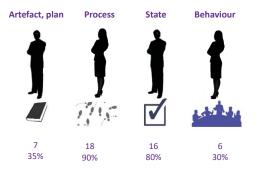| Artefact, plan	Process	State	Behaviour
7	18	16	6
35%	90%	80%	30%

FIG. 2.4 Forms of alignment
Legend: number of autors and % of total authors that mention the alignment form. Note adapted from Heywood & Arkesteijn, 2017, p. 147

The models combining multiple alignment forms suggest two distinctly different CRE alignment types. First is a 'process-based' type where a model provides a series of steps, a plan for greater alignment and/or a state of greater alignment for individual CRE objects or the portfolio as a whole. A process is useful and constitutes an explanation of what is otherwise hidden behind the professional expertise that is prevalent in current CREM practice. The second type is 'behavior-based'. Here, having a strategic mind-set at every opportunity is important for assessing strategic potential – positive and negative – of the tactical and operational actions. Behavior is combined with process and could also produce more aligned states.

2.1.6   CRE alignment's building blocks

The analysis of fourteen corporate real estate models' graphical representations in Heywood & Arkesteijn (2018) established the most complete map yet of CRE alignment's modelling requirements which to date has been disguised in multiple models. Their meta-study of CRE alignment models used a qualitative hermeneutic method to inductively understand the models' constituent parts. The analysis showed that twelve components have been used to model CRE alignment which are categorized into four Building Blocks: Understanding corporate strategy; Understanding real estate performance; Making real estate strategy; and Implementing real estate strategy as is shown in **Figure 2.5** (Heywood & Arkesteijn, 2018). While all representations contained the four Building Blocks, few models contained all twelve components, though all contained at least seven. Completeness of representation should not be inferred as equating to effectiveness as an alignment process. Underneath each building block and its components is briefly discussed followed by the various feedback mechanisms which were also evident between the components. Lastly the graphical representations of the models are discussed.
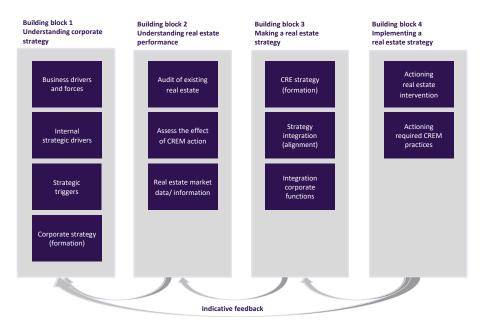
Building block 1 Understanding corporate strategy	Building block 2 Understanding real estate performance	Building block 3 Making a real estate strategy	Building block 4 Implementing a real estate strategy
Business drivers and forces	Audit of existing real estate	CRE strategy (formation)	Actioning real estate intervention
Internal strategic drivers	Assess the effect of CREM action	Strategy integration (alignment)	Actioning required CREM practices
Strategic triggers	Real estate market data/ information	Integration corporate functions	
Corporate strategy (formation)			

Indicative feedback

FIG. 2.5 CRE alignment building blocks and components Note from Heywood & Arkesteijn, 2017, p. 17, NB. This categorization differs slightly from previous publication in Heywood (2011) as subsequent work has tested and refined the original work resulting in different components and names.

Building Block 1. This Building Block is about understanding the corporate strategy, the factors that give rise to strategies, and the strategizing itself. This means that alignment is more than just knowing 'What is the business and its strategy (ies)?'or the business 'needs', it is also understanding its strategic basis, the dynamics of that basis and the organizational strategy creating process. This understanding is very important in CREM where the real estate objects' service lives exceed business cycles.

— *External business drivers and forces.* This component identifies the organization's external impacts that require strategic responses. They are the underlying external operants that affect the business creating something like a 'force-field' in which the business operates. We distinguish between external and internal drivers because these are the two perspectives organizations must resolve in making strategy (Heywood & Kenley, 2008).
— *Internal strategic drivers and forces.* This component is considered in two ways. One, relates to those generated through internal support functions – the CIR-IRIS concept (Dunn et al., 2004; Materna & Parker, 1998). A second way of understanding

internal drivers and forces is the so-called 'soft' or 'social' management dimensions, for example, leadership styles and methods, entrepreneurship, culture, and organizational structures.

— *Strategic triggers.* This component is for understanding what it is in the organization's operating context that creates organizational change. This indicates the underlying frequency with which strategic triggers emerge. Specific change in the drivers and forces – changes in magnitude and timing – are clear strategic triggers.

— *Corporate strategy (formation).*This component includes the identification of the corporate strategies and how the organization forms strategy because what is required is more than 'just' knowing what the strategy is.

Building Block 2. This Building Block's three components are about understanding the real estate objects' performance in relation to alignment. They refer to the state of the portfolio and its individual real estate objects, knowing how CREM actions change alignment states, and grounding CRE alignment decisions within real estate markets. Performance and its measurement have long featured in CREM. Performance's evaluative basis is unspecified here but various ways are suggested for how to do this for the various roles CRE performs in organizations – as a factor of production, a corporate (balance sheet) asset, a corporate investment, a real estate commodity, and in contributing to the public realm (Heywood & Kenley, 2013).

— *Audit of existing real estate.* This component assesses the current state of portfolios and individual properties prior to alignment actions, thereby benchmarking future assessments.

— *Assess the effect of CREM actions.* This component is for assessments, other than an original audit, of the effect of possible CREM alignment actions. Usually this is post-alignment but pre-knowing the effects of CREM actions helps decide the CRE strategies in Building Block 3, and Building Block 4's interventions to use.

— *Real estate market data/information.* This component captures the information required to evaluate a portfolio and its real estate objects. This data/information provides a foundation for creating CRE strategies that are 'commercially viable'. This means that real estate products are available or potentially available in locations and at prices to satisfy alignment requirements. Where specific real estate objects sit in the real estate market (and aggregated to the whole portfolio) needs to be understood and market information and data provides this.

Building Block 3. These three components form the actual CRE strategy making. They represent the strategy itself and its formation, an act where the corporate and CRE strategies are actually aligned (ahead of Building Block 4's implementation), and relationships with other corporate functions through the CIR-IRIS concept.

— *CRE strategy (formation).* This component recognizes the models' two related dimensions to CRE strategy – listing or documenting various strategies (the models contain CRE strategies), and ways of creating CRE strategy. Some models list possible CRE strategies. Other models develop ways of creating CRE strategies without necessarily predefining them. Others, suggest where strategies are required. *Strategy integration.* This component recognizes that CRE and corporate strategies need bringing to an actual alignment state. Based on dictionary definitions (*Oxford English Dictionary*) either the corporate or the CRE strategies could move.

— *Integration with other corporate functions.* This component recognizes that CRE strategy is rarely enacted alone and often requires other corporate functions, like HR and Finance to achieve desired strategic outcomes. Forms of inter-functional coordination are important for enterprise value (Kaplan & Norton, 2006).

Building Block 4. This Building Block is about making the actual changes to reach alignment in two components. These are the operating real estate and management decisions that are core CREM practice.

— *Actioning the real estate intervention.* This component involves the portfolio changes to individual real estate objects that are necessary to actualize aligned CRE and organizational strategies. Various authors suggest types of decisions, also referred to as applicable types of real estate interventions. From their implications these operating decisions may also be called strategic real estate options but essentially they are transaction-based decisions about 'acquiring, controlling, managing, and disposing of real property interests' (Nourse & Roulac, 1993, p. 486). It is a working assumption that over time, the portfolio's alignment improves from more aligned real estate objects. Business dynamics raises questions as to whether perfect alignment is ever achievable because over time context and requirements change. At best, alignment might be partial in the portfolio, though more complete for any one object.

— *Actioning the required CREM practices*. This component recognizes that CREM practices are also required to reach alignment. These are extensive with at least 162 being identified (Heywood & Kenley, 2008).

Feedback in models

Another important aspect of graphically representing CRE alignment was the models' treatment of feedback. Most models explicitly included some feedback. Various approaches were evident but broadly can be categorized as occurring between components in one Building Block and another:

- (Formulating) CRE strategy (a Building Block 3 component) and the CRE itself (Building Block 4) (Edwards & Ellison, 2003);
- Performance evaluation/management (Building Block 2) and (formulating) CRE strategy (Building Block 3) (Edwards & Ellison, 2003);
- Aligned CRE and core business(Building Blocks 1 and 3) (Then, 2005; Wills, 2008);
- Future requirements and current provision (of CRE) (Building Blocks 2 and 3) (De Jonge et al., 2009; Then, 2005);
- Within corporate strategy processes (Building Block 1) (with CRE embedded in that in some way) (Building Blocks 2 and 4) (Lindholm, Gibler, & Levainen, 2006; Osgood, 2004; Weatherhead, 1997; White, 1999);
- Double-headed arrows within the diagram between the model's elements were often used indicating action and feedback (De Jonge et al., 2009; Englert, 2001; Nourse & Roulac, 1993; Then & Tan, 2013);
- Inferred within management practices as a vehicle for improvement/performance (Scheffer, Singer, & Van Meerwijk, 2006).

Graphical analysis

There are three key approaches evident in graphically representing. The first approach uses simple geometrical structures, for example, triangles and rectangles, as a basis of representation. A second approach is a (often) circular strategic management diagram with the main CRE specific alignment model following that diagram. A third approach provides a structured, linear process. Some of these have relatively few steps. Some linear models are considerably more complicated. These complicated flowcharts while appearing comprehensive could be difficult to implement.

Several approaches were also evident in the models' degree of prescription, that is, how much they prescribed specific methods to follow. One approach was to provide detailed, prescriptive step-by-step processes (in effect, an algorithm to follow). A second approach presented loose-fitting, accommodating 'frameworks'. Framework models offer more strategic and flexible alignment, both theoretically and practically. They are strategic by setting an overall, future-shaping direction with tactical and operational level tools and techniques delivering that direction. Because different organizations will have different strategies, over time and even in the same market, a flexible framework seems more useful as theory in accommodating those differences. That flexibility also means not locking alignment into a rigid plan or process, a loose-fitting model offers that.

Designing an Accommodation Strategy frame (DAS)

As graphical representation a flexible framework seems more useful as theory because different organizations will have different strategies, over time and even in the same market. The DAS frame[7] (De Jonge et al., 2008, De Jonge et al., 2009; Den Heijer, 2011; Van der Zwart et al., 2009) as developed at the TU Delft is such a flexible framework. They describe DAS as a cyclic and iterative process that moves along two axes, from demand to supply and from current to future and can be started at different points (see **Figure 2.6**).

FIG. 2.6 DAS frame (Den Heijer, 2011 adapted from De Jonge et al., 2009)

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7   In this thesis the DAS Frame will be abbreviated as DAS.

There are four tasks in the framework:

1. 'What we need' versus 'what we have': determines the mismatch between current demand and current supply;
2. 'What we need in the future' versus 'what we have now': determines the mismatch between future demand and current supply;
3. 'Alternatives of what we could have': design, evaluate and select solutions for the mismatch;
4. 'Step-by-step plan to realize what we want to have in the future' i.e. how to transform the current supply into the selected future supply (De Jonge et al, 2009).

The building blocks from paragraph 2.1 and the DAS frame overlap as follows. Building block 1 understanding the corporate strategy equals current and future demand from task 1 and 2. Building block 3 making a real estate strategy equals task 3 generating future models while Building block 4 implementing a real estate strategy equals task 4 defining projects to transform. Building block 2 understanding real estate performance can be found in multiple places in the DAS frame. First and foremost in determining the match between demand and supply and weigh and select alternatives, but also in task 4 defining projects to transform.

The strength of DAS is its simplicity, as has been noted by (Heywood & Arkesteijn, 2018; Van der Zwart, et al., 2009). It shows clearly and conveniently the necessary steps in designing an accommodation strategy. In appendix A DAS is explained more in detail.

2.2 Assessment of CRE alignment models from a design and decision making point of view

The state of the art of CRE alignment was presented in paragraph 2.2 which showed that CRE alignment was complex and pluralistic with four dimensions and four building blocks. Furthermore, CRE decision making is not defined as a specific building block or as a component by Heywood and Arkesteijn (2017). The component closest to decision making is "assess the effect of CREM actions". However, in this component the focus lies on the assessment of specific actions and

not how to choose the best solution. In this paragraph, the scientific gap of this research is discussed when the alignment models are assessed from a design and decision making point of view. This means that (most of) the models identified in paragraph 2.2. are assessed.

The results of the assessments have been published as part of the following publications:

First assessment
Arkesteijn, M. H. & Binnekamp, R. (2013) 'Real estate portfolio decision making' in Gheorghe, A. V., Macera, M. and Katina, P. F., eds., *Infranomics: sustainability, engineering design and governance*, Dordrecht: Springer, 89-99.

Second assessment
Arkesteijn, M. H., Valks, B., Binnekamp, R., Barendse, P. & De Jonge, H. (2015). Designing a preference-based accommodation strategy: a pilot study at Delft University of Technology. *Journal of Corporate Real Estate*, 17 (2), 98-121.

Third assessment
Arkesteijn, M., Binnekamp, R., & De Jonge, H. (2017). Improving decision making in CRE alignment, by using a preference-based accommodation strategy design approach. *Journal of Corporate Real Estate, 19* (4), 239-264.

A preliminary assessment of CRE alignment models is made in the book chapter (Arkesteijn and Binnekamp, 2013) and will be discussed in paragraph 2.3.1. Although, there is overlap with the second assessment, it takes a slightly different perspective and because the conclusion from this paper is also used in the second publication it is worthwhile to present here.

The second assessment of CRE alignment models from the paper (Arkesteijn et al., 2015, pp. 99-103) will be discussed in paragraph 2.3.2. It must be noted that when this paper was published, the research in paragraph 2.2. was not yet finished and published but most of the analysis has been done. This assessment will argue that in order to determine whether alignment is reached, it is necessary to look at the alignment form *state* and that at a certain time alternatives need to be 'made/ formulated/designed in order to enable to determine whether value is added and how much.

The third assessment of CRE alignment models from the paper (Arkesteijn et al., 2017) will be discussed in paragraph 2.3.3. This assessment will look at the models from a decision making point of view specifically and used three decision making perspectives to do so.

The structure of this paragraph is visualized in **Table 2.3**, showing the amount criteria and the amount of models in the different assessment rounds.

TABLE 2.3 Criteria in the three assessments

Assessment	1st	2nd	3rd
# assessment criteria	2 criteria	3 criteria	2 criteria
# models	7	14	14
paragraph	2.2.1	2.2.2	2.2.3

2.2.1 First assessment of CRE alignment models[8]

In the strategic alignment within CREM s well as in public real estate management (PREM) *adding value* and *optimally attuning* are central concepts. In this paragraph the focus is on how preference is measured in certain alignment models and how the stakeholders' interests are integrated, i.e. how a strategy is selected, i.e. how an optimal solution is determined. This is explained using an example from municipal real estate management.

The importance of preference as main concept in this thesis is mentioned in the summary and introduction. However, if before reading the assessment of preference measurement in alignment models, the reader wants more understanding of the concept of preference and correct measurement as used in this thesis the following paragraphs can be read first paragraph 3.1.5, paragraph 3.1.9, paragraph 3.1.10 and paragraph 3.2.

[8]   This paragraph is mostly based on (Arkesteijn & Binnekamp, 2013) but to make it logically readable some captions have been added and sentences have been deleted or altered. The cited text is purple.

Municipalities own 42 million square meter gross floor area size in the Netherlands, which almost equals the size of the Dutch office market (Vastgoedmarkt, 2011). The book value of this portfolio is estimated at 15 to 20 billion euro by Teuben et al. (2007), with an estimated market value of 30 to 37 billion euro. Tazelaar and Schonau (2010, p. 6) indicated that the professionalization of PREM for municipalities in the Netherlands currently is important because of three reasons: (1) the need for more efficient use of municipal real estate; (2) the increasing demand for public accountability; and (3) the quality of municipal services.

Consider the following example of such a selection process: a municipality acquired a substantial number of buildings within its city to serve societal goals. However, some buildings (might) no longer serve societal goals and could be sold or, conversely, buildings that could serve societal goals can be acquired. More than one decision maker decides which intervention to select. Choosing the intervention that meets the different goals best is in essence a multi-criteria group decision making problem. Multiple Criteria Decision Analysis (MCDA) methodologies enable the aggregation of the performance rating of alternatives on different criteria into an overall performance rating. Alternatives are rated on preference on each criterion. Given that criteria are properties by which to measure the portfolio's performance on a goal we can expect that MCDA approaches help to find the combination of interventions that aligns the portfolio to the organizational objectives.

For these MCDA models within corporate and public real estate management the work of Barzilai (2007) and Binnekamp (2010) is relevant because Barzilai (2007, p. 2) focuses on measuring preference (synonymous to value and utility) and found errors at the foundations of utility theory[9]. Most CREM models use an algorithm-based approach according to Heywood (2011, p. 6) which he defines as a series of defined steps, meaning that although indicated by the terminology mathematical operations are not necessarily used. In order to determine whether these models are based on mathematically sound foundations CREM and PREM models are evaluated. Firstly, it is determined whether mathematical operations are used and secondly, for the methods using mathematical operations, if strong, proper or weak scales have been used.

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[9]   The concept of correct measurement is based on the work of Barzilai (2010) and is explained in-depth in chapter 3.

TABLE 2.4 Assessment of CREM and PREM models.

Domain	Authors	Use of mathematical operations	Scales used
CREM	Nourse and Roulac (1993)	Yes	Not indicated
CREM	Edwards and Ellison (2003)	No	N.A.
CREM	Osgood (2004)	No	N.A.
CREM	Scheffer et al. (2006)	Yes	Weak
PREM	Brackertz and Kenley (2002)	Yes	Weak
PREM	Wilson et al. (2004)	No	N.A.
PREM	Van der Schaaf (2002)	Yes	Weak

As can be concluded from **Table 2.4**[10] in three of the four models that *use* mathematical operations weak scales were used, which means that the conditions are *not* satisfied in order for the operations of addition and multiplication to be applicable to scale values. For the three models that do *not use* mathematical operations it can be deferred from the models or case descriptions that mathematical operations are performed when evaluating the performance and/or selecting a strategy. However, in their texts it is not explicitly shown how the preferences were measured and how the overall performance rating was determined. Brackertz and Kenley (2002, p. 62) for instance use employee satisfaction and a customer satisfaction ratio as performance measures. Nourse and Roulac (1993) indicate that they use linear programming but do not specify how. Binnekamp (2010, pp. 2, 59-61) also found a major problem relating to the use of linear programming for solving group decision making problems; the end result is a single objective function that aims to reflect the goals of all decision makers. Edwards and Ellison (2004, pp. 27-28) indicate that their framework is a heuristic tool and as such should be used to order information and to facilitate understanding of property problems. The selection and implementation of strategies are brought together in general in the framework and addressed through the case studies. In some case studies they refer to 'overall performance rating'.

We conclude that, as yet, no methodology for designing a portfolio exists which incorporates proper preference measurement.

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10 In this preliminary assessment CREM and PREM models were used; only four authors overlap with the other assessments that focus on CREM models.

Second assessment of CRE alignment models[11]

In order to be able to determine whether or not alignment is reached I will argue that three requirements need to be satisfied. First of all, that the CRE alignment model[12] needs to be a design method and not only an evaluation method. Second of all, that the model needs to enable the measurement of quantitative and qualitative requirements. Lastly, that the performance on criteria need to be aggregated into an overall performance rating in order to be able to determine whether or not maximum or optimum value is added by CRE to the organization.

Requirement 1: CRE alignment models need to be a design method

Arkesteijn and Heywood (2013) group CRE alignment components into four building blocks: (1) understanding corporate strategy, (2) understanding real estate performance, (3) making a real estate strategy and (4) implementing a real estate strategy. Alignment as a *state* becomes most evident in the building block understanding real estate performance. Arkesteijn and Heywood (2013) position three components in this block: (a) audit of existing real estate, (b) real estate data/information and (c) assess the effect of CREM actions. In an audit of existing real estate one can determine the *current state of alignment* of the CRE portfolio. However, only after 'making and implementing a real estate strategy' one is able to determine whether the CRE portfolio resulting from this new CRE strategy has been optimally attuned. This is done in the component assess the effect of CREM actions. Therefore, the authors argue that a CRE alignment model cannot only be an evaluation method but also that it needs to be a design method.

In a design method one or more alternative real estate strategies are made. Examples found in literature are Nourse & Roulac (1993) and Roulac (2001), who identify eight real estate strategies resulting in specific operating decisions. The accommodation strategy is a combination of one (or more) of these strategies (together). In a design method, the objective is to design the best possible alternative. In an evaluation method the current real estate strategy, with its current real estate portfolio, is evaluated. The objective of an evaluation method is to assess the current situation. The combination of making and implementing a real estate strategy consists of multiple CREM actions resulting in alternative

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11 The text is mostly based on Arkesteijn et al. (2015) but to make it logically readable in this paragraph some captions have been added and sentences have been deleted or altered. The cited text is purple.

12 In the paper the reference is made to an alignment method, while in a later stage the reference is made to a model. Both words can be used interchangeably in this paragraph.

real estate portfolios. The word strategy is used both as process and content: as Chaffee (1985, p. 89) states, "the study of strategy includes both the actions taken, or the content of strategy, and the processes by which actions are decided and implemented". Identifying and analyzing alternatives, selecting the best alternative with a view to future developments and executing the strategy are considered an integral part of strategic management, according to Snyder & Glueck (1980, p. 73) and Mintzberg (1994, p. 9). When addressing 'making a real estate strategy' the alignment models refer both to strategy as a content and strategy as a process. When studying the alignment state, the authors will refer to the alignment reached by the strategy content.

In CREM, research into alignment is focused more on strategy as a process than on strategy as a content. De Jonge et al. (2009) studied the selection process in six models and concluded that most models briefly touch upon the selection process and only indicate the type of selection. Osgood (2004), for instance, uses cause and effect relationships and states that "the author interprets the concepts and develops ideas that describe ways that real estate can align with and reinforce the strategy" (Osgood, 2004, p. 75). O'Mara (1999) follows Porter (in O'Mara, 1999) and positions three generic strategies between the dimensions 'strategic uncertainty' and 'view on action'. She also states that "Although learning about the struggles other companies have gone through can help you see patterns in your company's behavior, there is not one set of rules to follow in developing a strategy that will work best for your company (O'Mara, 1999, p. 189)". Roulac (2001) uses conceptual linear programming: he gives tables in which he addresses eight alternative accommodation strategies in terms of alternative choices that enterprises are confronted with concerning the places in which they operate. The eight alternative real estate strategies can be related to the seven contributions of the superior corporate strategy for competitive advantages.

The result is that alignment models can be difficult to employ when looking at the selection of an accommodation strategy, as is concluded by Arkesteijn and Binnekamp (2013). They find that the models suggest selecting the best alternative but did not have a well-defined procedure for doing so. In their view a well-defined procedure would allow a real estate manager to use the model without needing extra information or help from the author(s). This procedure needs to be operational and their view is that if alignment is perceived as a state, it should be measured. This leads to the second requirement.

Requirement 2: CRE alignment models need to measure quantitative and qualitative requirements

Measuring the alignment state often includes qualitative (subjective) and quantitative (objective) data. According to Gerritse (1999, p. 9), the meaning that people assign to the term quality often leads to confusion. ISO (2005; chapter 3.1.1) has defined quality as "Degree to which a set of inherent characteristics fulfils requirements". In this definition, quality reflects the judgment of one or more persons with regard to a characteristic or set of characteristics. This judgment is bound by time, place and culture. Furthermore, in the summation of characteristics relating to quality, another problem is found: how to measure the quality of these characteristics. In CREM the same issues are relevant, the CRE alignment models also indicate the importance of both quantitative and qualitative criteria, indicators or variables. However, in CREM instead of referring to quality, mostly the term value or adding value is used. The authors' position of alignment as a state requires a value measurement which should be able to include both quantitative (e.g. carbon emissions) and qualitative (e.g. architectural value) characteristics.

On measuring the quality of an object or characteristics of an object, Barzilai (2010, p. 71) states the following: "value (or utility, or preference) is not a physical property of the objects being valued, that is, value is a subjective (or psychological, or personal) property. Therefore, the definition of value requires specifying both what is being valued and whose values are being measured". Put in the terms used in the definition given by International Organization for Standardization (ISO): although most characteristic of an object can be objectively measured, the degree to which it fulfils the requirements remains subjective. The requirement needs to be set by someone. Value, utility or preference can therefore not be defined objectively.

Requirement 3: CRE alignment models need to aggregate performance on criteria into an overall performance rating

When selecting an intervention or a series of interventions in CREM, there often is an existent real estate portfolio with an existent value: in other words, the portfolio is already aligned to a certain degree. In the process of selection, the question is: which interventions result in the most *added value* to the real estate portfolio? In CREM strategies are usually made to provide the answer to this question. When selecting a strategy in order to achieve the state of alignment, one needs to determine (1) the value of the current real estate portfolio and (2) the value added by the different strategies. The strategy that maximizes the added value is selected.

Assessment of the requirements

In summary, the authors argue that the following aspects can be used to determine whether alignment as a certain state is reached:

— Is the method an evaluation or a design method?
— Are scales used to determine whether quantitative and qualitative requirements are met and are they established directly by decision makers?
— Is the performance on criteria aggregated into an overall performance rating?

In **Table 2.5** the existing CRE alignment models are reviewed based on these three aspects. This is done to determine if an existing method is able to determine alignment as a state as defined by the authors.

TABLE 2.5 Second assessment of CRE alignment models

Authors	Design or evaluation method	Scales used by decision makers	Aggregation of overall performance
Nourse &Roulac (1993)	design	implied	no
Weatherhead (1997)	design	no	financial
White (1998)	design	implied	no
O'Mara (1999)	design	no	no
Englert (2001)	design	implied	financial
Edwards and Ellison (2003)	design	implied	no
Osgood Jr. (2004)	design	implied	financial
Wills (2005)	design	no	no
Haynes (2008)	design	no	no
De Jonge et al. (2009b)	design	no	no
Then and Tan (2010)	design	implied	no
Den Heijer (2011)	design	yes	no
Scheffer et al. (2006)	evaluation	yes	yes
Appel-Meulenbroek et al. (2010)	evaluation	n.a.	n.a.

The evaluation methods assess the current alignment between the organization and CRE (strategy). Scheffer et al. (2006), on the other hand, predefine added values based on which they assess the current CRE strategy. In the model scales are used to measure the alignment and the state of alignment is calculated in an overall measure, defined as 'the percentage use of the added value contributing to the specific driving forces' while they also indicate 'the percentage use of other added values'. The other two evaluation models do not use an overall measure of alignment. Appel-Meulenbroek et al. (2010) use scales to validate the alignment table of Nourse and Roulac (1993) but do not measure the state of the CRE portfolio and is therefore not applicable in the comparison. The evaluation models use experts in real estate or facility management as decision makers, however, none of the models involve other decision makers to measure whether the CRE strategy content fulfils their specific requirements.

Of the CRE alignment models that are a design method, five do not use scales to measure value, while six imply to use scales. However, they do not show how and by whom this is done. Only the model of Den Heijer (2011), which follows De Jonge et al. (2009), uses scales to measure value. O'Mara (1999) also uses scales but to measure the context of the organization (e.g. strategic environment uncertainty) and not the values that the decision makers want to achieve with their CRE strategy. Then and Tan (2010) for instance indicate how the alignment can be assessed with their model and indicate which alignment criteria should be taken into account. These criteria are quantitative as well as qualitative and therefore imply scales will be used. In the conceptual model it is not clear if or which scales are used to measure the criteria. In their model they indicate that existing and new facilities can be assessed, however the design of the new real estate portfolio is not discussed.

Only three models have an overall performance measure. Englert (2001) uses EVA and RONA as overall financial performance measure while Osgood Jr. (2004) also mentions EVA and shareholder value. Weatherhead (1997) uses the highest net present value. But by doing so, they do not take into account other attributes than financials in their CRE strategy design, at least not in their overall measure. None of the models have a measurement made by the decision makers to establish their own criteria and their desired performance.

From **Table 2.5** we conclude that currently no method exists that 1) allows designing a portfolio, 2) makes use of scales for direct measurement of added value/preference, and 3) allows the aggregation of individual ratings into an overall performance rating.

Third assessment of CRE alignment models[13]

In this paragraph, the existing CRE alignment models are studied from a decision making perspective Arkesteijn et al. (2017) in line with the previous study of Arkesteijn et al. (2015) (see paragraph 2.3.2) to determine if in the existing models it is clear when, by whom and how is the (optimal) alternative chosen?

Requirement 1: is CRE decision making a black box or a transparent glass box?

The first observation is that CRE decision making is not defined as a specific building block or as a component by Heywood and Arkesteijn (2017). The component closest to decision making is 'assess the effect of CREM actions'. However, in this component the focus lies on the assessment of specific actions and not how to choose the best solution. Therefore, a closer look is given to the underlying CRE alignment models.

In the CRE alignment models, decision making receives little attention. In the graphical representations of these models, nine models do not have a specific graphical *box* representing decision making (Weatherhead, 1997; O'Mara, 1999; Englert, 2001; Osgood, 2004; Then, 2005; Wills, 2005; Scheffer et al., 2006; Haynes, 2008; Then and Tan, 2010), while five models have a specific *box* that at a certain point in the process indicates that one or more decisions need to be made (Nourse & Roulac, 1993; Lindholm & Levainen, 2006) refer to operating decisions, White (1998) to identify, evaluate options and agree strategic real estate plan, Edwards and Ellison (2003) selection of strategies, Den Heijer (2011) based on De Jonge et al. (2009), weigh and select alternative(s). However, this *box* often is a *black box* in which it remains unclear exactly how and by whom the best solution is chosen. Only some authors indicate which technique is used to decide, multi-criteria decision making or conceptual linear programming (Nourse & Roulac, 1993). In conclusion, in most models, decision making is only briefly touched upon and not elaborated upon.

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13   The text is mostly based on Arkesteijn et al. (2017) but to make it logically readable in this paragraph some captions have been added and sentences have been deleted or altered. This cited text is purple.

Requirement 2: do CRE alignment models have a substantive approach to decision making

To further clarify this statement, CRE alignment models are classified into three types of decision making as distinguished by Kickert (in De Leeuw, 2002, p. 256), which De Leeuw refers to as three types of rationality. The classification scheme is as follows: the *first type* is *substantive rationality*, which is about the choice of an (optimal satisfactory) alternative. Whereby, De Leeuw states that there are different subtypes but all of them are about the choice – with or without handicaps – of an alternative. This type is characterized by the fact that there is only one decision maker and the aspect of time is mostly disregarded. In the *second type*, the *procedural rationality*, the focus is not on the content of the decision but on the way that the decision is made. decision making processes are seen as time ordered steps leading to a decision. In this type, a meta level is present, since it is about decision making. The *third type* is *structural rationality* – which is, like the former, a kind of meta level. It addresses the question of what is an appropriate (the best, satisfactory) organization for decision making. The decision problem is the order in which the various participants need to be dealt with by whom in the decision making process. The decision is seen as the result of a decision making process in time in which more decision makers participate.

Most models take a procedural rationality approach to decision making. This is also concluded by Heywood in his 2011 paper in which he refers to them as an 'algorithmic' approach as well as by Heywood and Arkesteijn (2017) where they refer a 'process' as one of the four CRE alignment forms. The procedural rationality models of Weatherhead (1997), White (1998), Edwards and Ellison (2003), Osgood (2004), Wills (2005), Then (2005), Haynes (2008), De Jonge et al. (2009), Then and Tan (2010) and Then et al. (2014) indicate what needs to be taken into account and give a certain order to reach alignment.

The structural approach is only present in Englert's (2001) CRE alignment model. His message is to have a horizontal dimension to strategic planning based on Porter's (1985) competitive advantage through a managed process. This process consists of communication networks, which are a trick, as Englert (2001, p. 9) explains, to link and integrate strategies to engineer collaborative results that tie to organizational objectives.

There are no models that have a substantive rationality approach in which they offer a well-defined procedure how to select the best option. A substantive approach is only partially present in four existing CRE alignment models: O'Mara (1999), Nourse and Roulac (1993), Lindholm and Levainen (2006) and Den Heijer (2011). O'Mara (1999), for instance, has three strategies organizations can choose from:

standardization, incrementalism and value based. She indicates (in her Figure II.1) that the choice for a strategy varies according to strategic uncertainty (ranging from low to high uncertainty) and also on the theoretical bases of decision making criteria (ranging from rational instrumental to valuational symbolic). However, next to this, she also has a 'basic model of a structuring process' which has a procedural rationality approach. Nourse and Roulac (1993) and Lindholm and Levainen (2006) explain how alternatives can be generated by combining several real estate strategies. Their list of strategies is: increase value of assets, promote marketing and sale, increase innovation, increase employee satisfaction, increase productivity, increase flexibility, reduce costs which they, amongst others, based on Nourse and Roulac (1993). Den Heijer (2011) has a similar but longer list based on De Jonge (1994) and they call this 'ways to add value'. Den Heijer's research is focused on universities and presents models (traditional, network or virtual university or the university college) that organizations can choose from. Den Heijer provides information to support real estate decisions; the management of the organization itself needs to make the decision. In general, one can say that these CRE alignment models function like so-called reference models. De Leeuw (2002, p. 301) indicates that stakeholders can use explicit reference models (also called performance measurement systems), when defining their problem situation. A very well-known example is the balance scorecard (Kaplan & Norton, 2006). The models with a partial substantive rationality approach help the stakeholders to translate objectives into concrete variables (also called performance indicators).

If a closer look is given to this substantive approach, it is important to realize that Englert (2001), for instance, indicated that one of the potential barriers to alignment is that 'higher level strategies may not be clear or may be difficult to implement'. Having a clear vision and well-defined metrics to measure progress is therefore essential according to him. He even stresses that it is the single most important initiative to achieve alignment to establish corporate metrics and targets (Englert, 2001, pp. 8; 15). Of the four partially substantive CRE alignment models, one does not have well-defined metrics O'Mara (1999), and while Nourse and Roulac (1993), Roulac (2001) and Lindholm and Levainen (2006) translate the strategies into operating decisions, the decisions are not at the level of well-defined metrics. Den Heijer (2011) does have well-defined metrics. Other CRE alignment models (from the procedural decision making approach) confirm the importance of metrics implicitly or explicitly, like White (1998), Then (2005), Haynes (2008), De Jonge (2008, 2009), Then and Tan (2010) and Then et al. (2014). It is clear that all CRE alignment models aim to add value to the organization and to use well-defined metrics for this; however, it is not clear how the best option can be chosen.

2.2.4 Summary of assessment criteria

In this paragraph, CRE alignment models have been assessed in three rounds on different criteria. In **Table 2.6**[14] is given as well as the main conclusions.In CRE alignment decision making is often a *black box*. The maximum that these models deliver is to indicate which technique can be used. Currently no method exists that 1) allows designing a portfolio, 2) makes use of scales for direct measurement by the stakeholders of added value / preference, and 3) allows the aggregation of individual ratings into an overall performance rating.

TABLE 2.6 Summary of assessment criteria

1st	Assessment of seven CRE alignment models	conclusion
1	Are mathematical operations are used?	Some models use or imply to use mathematical operations
2	For the methods using mathematical operations, have strong, proper or weak scales been used?	No methodology for designing a portfolio exists which incorporates strong scales for preference measurement.
2nd	**Assessment of fourteen CRE alignment models**	**conclusion**
1	Is the method an evaluation or a design method?	Most models are design methods
2	Are scales used to determine whether quantitative and qualitative requirements are met and are they established directly by decision makers?	Most models want this, i.e. involve stakeholders and indicate that different criteria need to be used, both qualitative and quantitative. In some models it is indicated that scales need to be used to measure the qualitative criteria but it is not clear if they are directly set by the stakeholder . The models that want this do not have an overall performance rating
3	Is the performance on criteria aggregated into an overall performance rating?	The models that use an overall performance rating use a financial measure, and do not satisfy criteria 2 at the same time.
3rd	**Assessment of fourteen CRE alignment models**	**conclusion**
1	*Black box* or transparent *glass box* for decision making	Decision making is a *black box*
2	Do the models have a substantive approach in which it is clear how the (best) alternative is chosen	It is clear that all CRE alignment models aim to add value to the organization and to use well-defined metrics for this; it is however not clear how the best option can be chosen.

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[14]   In the conclusion of this chapter the criteria are given a label to streamline them and draw a conclusion. In appendix B the link between the assessment criteria and the labels is given.

Conclusion

One of the long-standing issues in the field of Corporate Real Estate Management is the alignment of an organization's real estate to its corporate strategy. CRE alignment is even defined by some as the raison d'être of CREM, as the range of activities undertaken to attune corporate real estate optimally to corporate performance. From an apparently disordered theory of the many models, the analysis by Heywood and Arkesteijn (2017) shows CRE alignment to be complex and pluralistic, being several things simultaneously and they indicate it is not possible to show CRE alignment as a singular, definitive 'thing'. Though complex, their analysis represents a significant conceptual improvement in the field. This understanding point towards how good alignment models should treat the four dimensions they have found.

CRE alignment should occur between multiple cognitive-objects, with three evident on the business side (business strategies and their context, business performance and business needs) and three on the CRE side (CRE strategies, CRE and CRE management). There is a multi-valent relationship between these objects and many words have been used to capture different values. CRE alignment is also multi-directional, that is, iteratively vertically between the organizational and functional levels, horizontally across the business units and the corporate infrastructure functions, and between demand and supply. CRE alignment consists of multiple forms of two distinct types – process-based and behavior-based. Either mode of existence is about changing alignment states for the better. From their subsequent publication (Heywood & Arkesteijn 2018), arrived inductively at four Building Blocks, twelve components of CRE alignment modelling and feedback between the components and Building Blocks. As graphical representation a flexible framework seems more useful as theory because different organizations will have different strategies, over time and even in the same market.

Even though extensive research into these existing CRE alignment models has provided us with valuable insights into the building blocks, components, relationships and variables that are needed in the alignment process, these models still fall short in two ways. Most models pay little to no attention to the design and selection of a new portfolio that adds the most value to the organization. This is the focus of the research as can be seen in Figure 2.7.
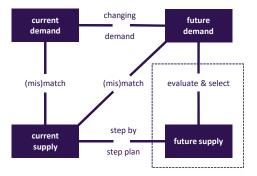
FIG. 2.7 Focus of this research visualized in DAS Note adapted from De Jonge et al., 2009; Den Heijer, 2011; Van der Zwart et al., 2009

In three assessments, it has been logically argued what is needed in a CRE alignment model. Over the years, the formulation of the requirements and the focus in them has shifted. A comprehensive overview has evolved into an integrated list of eight requirements. Each requirement has been given a short label to be recognizable during the thesis. Next to that, the requirements were divided over three groups following DAS: formulating demand, designing alternatives (supply) and selecting an alternative.

The following logic and assessment is given.

Formulating demand

— an alignment model needs to be able to involve all relevant stakeholders and specify all types of requirements, i.e. values, (quantitative and qualitative), because research has shown that they are important in a CRE alignment process. This requirement is labelled *integral*. From the assessment it is concluded that most models want to be integral, however, these models are not indisputable or correct at the same time, because they do not use an overall performance measure or correct measurement;
— an alignment model needs to be able to use well-defined decision variables to measure their real estate vision. A well-defined decision variable is also referred to as a concrete, tangible or operational variable. A real estate vision is similar to a strategy or objectives/goal. This is important because to it makes clear what the goals exactly mean. This requirement is labelled *tangible*. From the assessment it is concluded that most models have or encourage the use of well-defined tangible decision variables.

— an alignment model needs to be able to ensure that each decision variable is established by a specific stakeholders, because as Barzilai (2010) explained "value (or utility, or preference) is not a physical property of the objects being valued, that is, value is a subjective (or psychological, or personal) property. Therefore, the definition of value requires specifying both what is being valued and whose values are being measured". This requirement is labelled *personal*. From the assessment it is concluded that most models involve stakeholders in the CRE alignment process, but none of them makes an explicit and continuous link between a stakeholder and their decision variables. Some models put emphasis on the CREM manager instead of the stakeholders.

Designing alternatives

— an alignment model needs to be able to make/formulate/design alternative real estate portfolios, because the added value of a CRE portfolio cannot be calculated if the value of the current and future portfolio is not known. Therefore, a future portfolio need to be made/formulated/ designed. This requirement is labelled *design*. From the assessment it is concluded that most models are design methods: they state that alternatives need to be made or offer a choice of preset strategies, but often this stays at the level of visions/strategies and is not translated to the physical level (portfolio);
— an alignment model needs to have a feedback loop (between demand and supply) for stakeholders to understand the effects of their choices. This requirement is labelled *iterative.* From the assessment it is concluded that most models have a feedback loop.

Selecting an alternative

— an alignment model needs to be able to aggregate the performance of an alternative on individual decision variables into an overall performance measure to be able to choose the best alternative. This requirement is labelled *indisputable*. From the assessment it is concluded that the models that use an overall performance measure, i.e. a single-valued objective, use a financial measure, however these models are not integral;
— an alignment model needs to deliver an indisputable result but is preferably also able to choose an optimal alternative because it might be that apart from the best alternative there a more optimum alternative possible. This requirement is labelled *optimal*. From the assessment it is concluded that most models strive for a multi-valent relationship between CRE and the organization, however, none of the models can determine which alternative is the optimum.
— an alignment model needs to ensure that if measurement scales are used to measure non-physical properties strong scales are used to enable the application of addition and multiplication to arrive at an overall performance score. This requirement is labelled *correct*. From the assessment it is concluded that none of the models uses correct measurement.

Scientific gap

When formulating the demand, most CRE alignment models take a similar approach. The authors indicate that all relevant stakeholders need to be involved to formulate an integral set of well-defined tangible (qualitative and quantitative) criteria to measure their real estate strategy/vision/objectives. In the models, stakeholders are involved, however, it is not clear whether they set their own criteria and are as individual or group personally involved throughout the process. Although, most CRE alignment formulate alternative CRE strategies at visionary level, which are mostly translated to well-defined tangible criteria. Often, however, they are not translated to the corporate real estate itself, i.e. to the portfolio and building level. At least, it remains unclear how new alternative real estate portfolios are made/formulated/ designed. Most problems in CRE alignment occur when selecting an alternative; none of the models have an overall performance measure that incorporates both quantitative and qualitative criteria, and use correct measurement. Therefore, they do not produce an indisputable result.