EJTIR

Issue 10(1)
March 2010
pp. 89-102
ISSN: 1567-7141
www.ejtir.tbm.tudelft.nl

Digging through the Heart of Reunified Berlin: Unbundling the Decision-Making Process for the Tiergarten-Tunnel Mega-Project

Deike Peters[1]
Centre for Metropolitan Studies, Berlin University of Technology

The Berlin Tiergarten tunnel project (VZB) consisted of a joint planning approval procedure for one road and several rail tunnels (inter-city, metro rail and city subway). The tunnels lead through the heart of re-unified Berlin, starting at the site of the new Central Railway Station, cutting underneath the River Spree and the new Federal government quarter, as well the Tiergarten Park and the new entertainment complexes at Potsdamer Platz. This paper traces the decision-making processes for this crucial post-Berlin Wall mega-project, and raises important questions regarding optimistic forecasts, cost overruns, the role of prestige in large infrastructure projects, and the limits of public review procedures. It provides particular insights into a complex case where multiple urban transport mega-projects were bundled together for joint approval and implementation.

Keywords: Mega-projects; Berlin; rail; urban restructuring

1. Decision-Making for large Urban Infrastructure Projects: From Mega- to Giga-Projects?

The Berlin Tiergarten tunnel mega-project reaffirms several key assumptions and conclusions from the pre-existing academic literature on urban infrastructure mega-projects, especially concerning persistent problems such as optimistic forecasting, cost-overruns, the crucial role of prestige in large-scale engineering projects, as well as insufficient public participation and review procedures (Flyvbjerg et al., 2003; Flyvbjerg et al. 2008). Beyond a confirmation of these well-known problems occurring in practically all mega-projects, this case study[2] aims to provide

[1] DFG Noether Group on Urban Megaprojects, Center for Metropolitan Studies, Technical University Berlin, TEL 3-0, 10587 Berlin, Germany, T: +49 30 314 28408, E: deike.peters@tu-berlin.de

[2] In planning- & policy-related inquiries, "case studies are the preferred strategy when 'how' or 'why' questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context" (Yin 1994:15). Case studies' distinctive place in research is to "explain the causal links in real-life interventions that are too complex for the survey or experimental strategies" (Yin, 1994:15). The insights from the present study were drawn from a review of a wide variety of both secondary and primary sources as well as twenty-five fully transcribed interviews with various stakeholders, including senior

particular insights into the dynamics of high-profile infrastructure mega-projects in complex urban settings involving multiple modes of transport. The most crucial issue at hand is the practice of 'mega-project bundling', i.e. the practice of linking multiple urban infrastructure mega-projects for joint approval and even implementation. So this case study is structured around two central propositions related to mega-project decision-making. For one, 'giga-project' decisions create political and financial path dependencies and early 'points of no return' that often push forward even those elements of the bundle which would not have been built on their own. Secondly, once the desired new infrastructure mega-projects are completed, the project promoters have an obvious interest and even public obligation to ensure that these are utilized as much as possible – even at the expense of other viable (and perhaps even preferable) alternatives. This article will illustrate these worrisome dynamics using the example of Berlin's new North-South railway tunnel and the related new Central Crossing Station at its Northern end. The related bundle of tunnel mega-projects was officially termed 'Transport Facilities in the Central Area' or '*Verkehrsanlagen im zentralen Bereich*' in German, hereinafter abbreviated VZB. Due to Berlin's wall-related idiosyncrasies, the VZB project and the related comprehensive restructuring of the entire rail network is probably more a 'superlative' case than a 'paradigmatic' or 'prototypical' one, and certainly cannot be generalized in its entirety (Beauregard, 2003; Brenner, 2003; Flyvbjerg 2006). Comparable situations are nevertheless likely to occur in other urban-regional contexts, especially in large globalizing cities. Three recent tunnel infrastructure mega-projects with similarities to the Berlin case are the (in)famous "Big Dig" Central Artery/Tunnel Project in Boston (see esp. Hughes, 1998, p. 199), the Channel Tunnel Rail Link in London (Dimitriou, 2007), and the Western Harbour Crossing and related Airport Rail Link in Hong Kong (Pretorious and Ng, 2008).

2. The Context: Berlin Before and After 1989

Berlin has a unique history as a divided city. The ramifications for Berlin's transport systems were dramatic, with key inner-city road and rail connections abruptly severed in 1961, and subway and regional rail transit services divided between authorities in West and East Berlin. (Select West Berlin lines did continue to transverse East German territory, but they did not stop at the East German stations, creating the (in)famous Ghost Stations.)

The project 'Transport Facilities in the Central Area' was never a mere tunnel project but rather the linchpin project in a comprehensive, large-scale restructuring of the entire Berlin railway network. Some plans for one of the several infrastructure problems the VZB tunnel project sought to address and solve, namely the re-arrangement and re-routing of rail based activities near the centrally located areas of Gleisdreieck and Potsdamer Platz in fact pre-date the fall of the wall in late 1989. Already in the 1980s, at a time when most believed that the physical and political separation of the city would continue for decades to come, transport and land use planners on both sides of the wall had begun to once again plan for a future where Berlin might be reunified.

Then, in 1989, the fall of the Berlin wall presented transport planners with a unique opportunity to comprehensively re-plan and re-link Berlin's road and rail infrastructures. Even before the Cold War, Berlin - similar to London or Paris - had been a metropolis without a main rail station. Instead, long-distance and regional rail lines had ended at various terminals located at the eastern, northern, western and southern ends of the urban core. So ever since the early 20th century, the construction of a new Central Crossing Station and the related construction of a North-South tunnel serving long-distance trains had been a long-cherished dream of (some)

officials at German Railways and the Berlin Senate Department for Urban Development, local politicians, senior engineers, as well as other project opponents and facilitators.

transport planners and engineers. (For reasons explained further below, others were sceptical of the need for such a station.) The historic moment of re-unification in 1989 re-awakened this desire. The ambitious plans to thoroughly revamp the city's transport infrastructures and once again turn Berlin into a first-rate railway metropolis were supported by several crucial political decisions: In 1991, the German Federal Government passed the multi-billion mega-investment program 'Traffic Projects German Unity'. The German parliament also passed the so-called 'capital resolution' which stated that Berlin should once again become the seat of the Federal government. And in July 1992, after a period intense discussion among city, state, and federal government and railway officials, the Federal government officially decided the realization of the so-called 'mushroom concept' (*Pilzkonzept*) as the key plan for the restructuring of Berlin's rail network. The core elements of this plan were the construction of a new central crossing station at the (approximate) site of the old Lehrter Bahnhof (now renamed *Hauptbahnhof*, i.e. Central Station) and a new North-South rail link connecting this new central station with the newly designated southern crossing station at Papestraße (now renamed *Südkreuz*, i.e. Southern Cross) and the renovated *Gesundbrunnen* crossing station along the Northern ring.

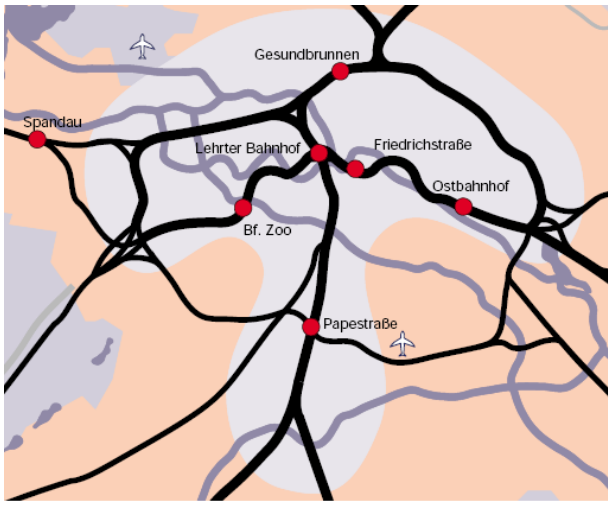
This consequential decision also has to be understood in the particular context of the early post-Wall years, when most people had hugely optimistic expectations for the future development of Berlin. At the time, the population of the reunified city-state was expected to grow from 3 to 5 million in a about a decade, sending traffic estimates soaring. Today, however, revised estimates expect the city's population to remain stable at around 3.3 million until at least 2020 (SenStadt Berlin, 2008).

3. Unbundling the Tiergarten Tunnel Giga-Project

The VZB project was one of re-unified Germany's most ambitious, most high-profile large transport infrastructure projects. It resulted in a joint planning procedure for several separate yet closely connected North-South tunnel projects, including: (1) a rail tunnel for long-distance and regional rail services run by the publicly owned German Rail company *Deutsche Bahn* (officially forged in 1994 out of the former East German Reichsbahn and the former West German Bundesbahn), (2) a road tunnel for the urban highway B 96, (3) a tunnel for a new (sub)urban-regional rail line, the S-Bahn 21, (to be run by *Deutsche Bahn*), and (4) preliminary tunnel and station platform segments for new subway lines, the U-Bahnen U5 and U3 (which would be run by the metropolitan transit agency BVG). The new tunnels were to cut through the heart of re-unified Germany, starting at the site which was to become Berlin's new Central Railway Station, leading southward underneath the Spree river, the Tiergarten park, the adjacent new Federal government quarter and new the entertainment and shopping complex at Potsdamer Platz before linking up with pre-existing road and rail infrastructures around the Landwehr canal and the Gleisdreieck grey fields south of the former Anhalter rail station. The planning, approval, and implementation of these multiple infrastructures were extremely complex and required the coordination of a multitude of stakeholders. Financing was equally complicated, involving various local and federal government sources, as well as major contributions from *Deutsche Bahn*.

Immediately after the fall of the wall, a heated debate began among transport experts and officials as to how best restructure Berlin's divided, truncated and neglected rail infrastructure to meet the city's future needs. Two alternative models were proposed, the so-called *Achsenkreuz* ('centreline-cross') and the *Ringkonzept* ('ring concept'). Proponents of the *Achsenkreuz* model wanted to build a new North-South tunnel in addition to the existing East-West axis, along which the important regional and long-distance stations *Zoo*, *Friedrichstrasse*, *Alexanderplatz* and *Ostbahnhof* were located (the latter being the 'East Station' which was called Hauptbahnhof, i.e. *Central* or *Main Station* until 1998). While the *Achsenkreuz* model still proposed some

improvements to Berlin's the outer rail ring, it was nevertheless already clearly centred on the idea that a new Central Crossing Station would be built at the intersection of the two axes. When the transport planning officials from the Berlin Senate in the West and from the Magistrate in the East met for their first joint meetings after the fall of the wall, they were surprised to find that independently of each other, both parties had come up with this same solution. It was hardly a perfect solution, however. Opponents immediately pointed out that this concept unnecessarily centralized rail transport activities at one central location, which was not at all suited to Berlin's expansive, poly-nucleated urban structure. They also maintained that concentrating the vast majority of all rail transport along just two key axes would keep the system inflexible and vulnerable, as any disruptions along either axis would lead to extensive delays. Moreover, from the beginning, critics worried about the technical difficulty, environmental impacts and high cost of building the new North-South link. So early on, local green and transit advocacy groups proposed an alternative, and, as they argued, much cheaper 'ring concept' which was centred around a renovation of the (interrupted) inner ring (at that point consisting mainly of former freight links) with a set of new changing stations at each end of the ring. This concept, too, had several inherent problems. Trains were only ever to travel on partial sections of the ring, meaning the concept actually required the construction of extensive new tracks at the many different entry and exit points along the ring. Furthermore, the complex concept of trains running both clock- or counter-clockwise around portions of this ring was deemed very confusing to users, who might have to change at different points along the ring depending on their destination and time of travel. Also, the four changing stations to the East, West, North and South would all have had to be thoroughly upgraded from their present state.



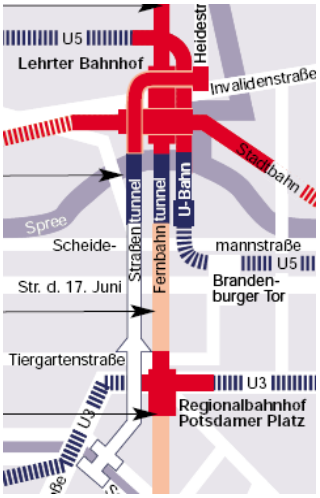


Figure 1 (left).
The "mushroom concept" for the restructuring of inter-city and regional rail. as originally adopted
Source: Deutsche Bahn Drehscheibe Berlin: Pilzkonzept (p.5).
Also available online at: www.bahn.de/imperia/md/content/pdf/holding/bauprojekte/3.pdf

Figure 2 (right).
The complex web of new road and rail tunnels which make up the Tiergarten tunnel 'giga-project'.
Image excerpted from: ibid.

3.1 Mushroom-Concept and Central Station as Pivotal Inputs to the VZB Project

So planners at the reunified German Railway authority came up with the compromise solution of the 'mushroom concept'. In its original incarnation (shown in figure 1), it was supposed to combine the best of both models by routing regional and long-distance trains not only along the new North-South tunnel and the existing inner East-West viaduct but also along an additional northern ring. And it is important to note that in this original mushroom concept, the new central crossing station was supposed to be but one of a whole set of new changing stations – no more than a *primus inter pares.*

In terms of transport inter-connectivity, the Friedrichstraße station would certainly have been the best location for a new central station because of its crucial nodal function within the inter-urban

rail network: at Friedrichstraße, the central East-West S-Bahn lines already intersected with the North-South S-Bahn lines as well as with additional tram and subway lines. But digging a new north-south long-distance rail tunnel to and from this already densely built-up location was judged to be very expensive, excessively disruptive and overall more difficult. So the planners at the German Railway authority *Deutsche Bahn* ultimately decided to locate its new central crossing station one stop to the west at or near the *Lehrter Bahnhof* S-Bahn stop, in the middle of a large urban grey field site with no pre-existing transit connections other than the east-west S-Bahn. They had to overcome strong resistance from the German Minister of Transport at the time, Günther Krause, who preferred the *Friedrichstrasse* location. In fact, most national politicians did not like the idea of locating this massive tunnel and station project immediately adjacent to the future site of the new Federal government quarter, and many were (rightfully) worried the tunnel mega-project would delay or otherwise negatively affect the federal government's ability to move from Bonn into their newly planned quarters along the Spree river. And urban planners and transit experts also did not like the location precisely because of the isolated nature of the site.

3.2 The Redevelopment of Potsdamer Platz

Another impetus for the VZB project came from the need to solve the problem of re-structuring and restoring access to the major urban redevelopment site at Potsdamer Platz. Once the commercial heart of the city and a major transport node, Potsdamer Platz was cut off for decades on one side by the Berlin wall, and further isolated by the surrounding obsolete rail sites around the old *Anhalter* and *Potsdamer* (Freight) Railway Stations.

But already in the 1980s, there had been a first set of planning initiatives on both sides of the wall aimed at reviving visions for the area. Then in early 1989, the Daimler Corporation had expressed an interest in selecting a site for the new headquarter building for their service-sector subsidiary *debis*, and subsequently entered negotiations with the Berlin Senate Department for Urban Development for a suitable location in Berlin. Fatefully, the Senate Department offered to sell them the then publicly owned sites around Potsdamer Platz. Then, to the great surprise of all, the Berlin wall was suddenly opened on November 9, 1989, and long cherished dreams of re-imagining Potsdamer Platz as the new centre of a reunified Berlin could be transformed into reality.

Logistically speaking, being able to combine and coordinate the new construction of the North-south road and rail tunnels, led by *Deutsche Bahn*, with the construction of the new commercial and entertainment district, lead by the three main private investors (debis, Sony/Tishman Speyer, ABB) and the State of Berlin, was an extremely fortunate affair. The five parties entered into a joint construction logistics company called *Potsdamer Platz GmbH*, or *baulog* for short. Throughout the construction in the 1990s and 2000s, the derelict Potsdamer Freight Terminal could be used as the logistical headquarter for this vast undertaking. Meanwhile, the planning approval procedures for the redevelopment of Potsdamer Platz were institutionally and legally separate from those for the rail and road tunnels reconnecting the site with the rest of the city.

3.3 The Joint Planning Approval Procedure

The unusually complex joint planning approval procedure (*gemeinsames Planfeststellungsverfahren*) for the multiple rail and road infrastructures in the central area was started in the fall of 1993, but not before the Berlin Senate opted to decouple the fate of the financially unsecured S21 rail line from the overall procedure so as not to endanger or delay approval of the larger package. On January 1st, 1994, the Federal Railway Authority EBA (*Eisenbahnbundesamt*) was instated as the new supervising and authorizing body for the German rail sector and immediately put in charge

of the approval process. *Deutsche Bahn* and the Berlin Senate were the joint applicants, with the Senate responsible for the subway and road projects. Opposition to the VZB project was mainly voiced by a coalition of environmental and civic groups and activists which formed an "*Anti-Tunnel GmbH*" (Anti-Tunnel GmbH, 1994). The main strategy of the coalition was to bring an environmental impact lawsuit against the entire project. The Berlin State Working Group for Environmental Protection BLN (*Berliner Landesarbeitsgemeinschaft Naturschutz*), an umbrella organization of more than a dozen local environmental groups, filed the suit on behalf of the plaintiffs, but it was rejected on November 28, 1995, about three months after the EBA had issued the official decree of approval (BLN, 1994; Planfeststellungsbeschluss VZB, 1995; Bundesverwaltungsgericht, 1995). The coalition still organized various public demonstrations and activities against the project, but began to fall apart as the projects continued.

3.4 Construction and Opening of the Road & Rail Tunnels

The coordination and engineering of the various construction projects was extremely complicated and involved many different tunnelling methods, including several variants of open ditch and shield construction. Moreover, an entire section of the Spree riverbed was diverted for several years. But engineers always knew that this would be a complicated and risky undertaking, because due to the low groundwater level, the Berlin subsoil is always imponderable. A major construction site accident occurred in 1997 at the southern end of the tunnel by the Landwehr canal. The tunnel segments had to be flooded to avoid even greater damage, and would only be pumped empty again after two full years. Overall, substantial financial and time losses resulted from various construction difficulties, delaying the opening of the tunnels by many years. Nevertheless, the construction of the tunnels was celebrated by their promoters as a major engineering feat. In the end, the opening of the road tunnel only preceded the opening of the new Central Station and the intercity rail tunnels by a few weeks. Yet, the timing was ultimately very favourable, because when the glamorous new station opened in May 2006, the entire world was looking to Germany and Berlin as the site of the 2006 Soccer World Cup.

4. Critical Issues

An in-depth presentation and analysis of all elements, factors and actors in this complex mega-project is beyond the scope of this paper. Instead, there is only room to highlight the most critical issues in this complex story:

4.1. Optimistic Forecasting & Long-Range Planning

As already noted above, the whole bundle of projects was approved under the mistaken assumption that a booming Berlin would undergo vast economic and population growth. Instead, Berlin greatly suffered from the collapse of its non-competitive productive industries in the former East and from the disappearance of national subsidies which had artificially propped up the local economy in the West. An often wasteful use of public resources and a major real estate banking scandal involving a state-owned bank and several local politicians further exacerbated Berlin's already precarious economic position. The local real estate market quickly became overbuilt as new service sector industries were much more hesitant and slower to re-locate to Berlin than expected. With hindsight, it is easy to scoff at the exaggerated expectations of the early 1990s. But as wrong as the related traffic predictions turned out to be, they were likely not based on wilful lying or purposeful deceit on the part of project promoters. Rather, they represent a classical, albeit very consequential case of wishful thinking. And in the end, *Deutsche Bahn* and many members of the Berlin Senate explicitly accepted the creation of excess

capacities as part of a 'future-looking' concept, meaning planners were never really challenged to back up their investment plans with accurate projections and solid, realistic calculations of future demand. Both project promoters and opponents were very much aware that the time right after the fall of the wall represented a unique 'window of opportunity' for the approval of these bold, large-scale plans, and that this giga-project likely would not have been approved at any other time.[3] And the time pressure was not an imagined but very real factor in this case, as the Tiergarten tunnel infrastructure works needed to be completed before the Federal Government quarter could be built atop. *Deutsche Bahn* then even changed the plans to include not two but four separate intercity rail tubes in the plans, although two tubes would have been sufficient for the medium- to long-term, even in a context of optimistic forecasts. *Deutsche Bahn* expects to better use the extra capacity once the direct Airport Express rail link from the Central Station to Berlin's new international airport BBI is built. Added somewhat more recently to the overall plans, this Airport Express is now yet another transport infrastructure mega-project forming part and parcel of the multi-billion Euro investment plan 'Transport Node Berlin'.

4.2 Limits of and Legal Obstacles to Public Intervention

Given the complexity of the procedures involved, it was extremely difficult for civil society actors to meaningfully intervene into the official decision-making process. During the joint-planning procedure, the coalition of Tiergarten tunnel opponents made up of the local environmental and civic groups was handed over fifty thick folders containing sometimes highly technical information. The coalition, which relied on volunteers for most of its work, was completely overwhelmed with trying to organize a meaningful and coherent commentary to these extensive documents in a short time frame of six weeks. Opponents also complained that the plans documents were only publicly displayed for review and commentary at a relatively out-of-the-way, comparatively inaccessible and very difficult to find location on the Gleisdreieck grey field (Rheinländer 2008). Most crucially, the German courts rejected the local environmental groups' challenge to the joint planning decree on the grounds that they were not legitimized to challenge a Federal environmental review procedure. Today, after improvements in public participation and environmental review processes due to new EU legislation, environmental groups have new avenues for intervention, both at the national and at the EU level. Both in Europe and North America, citizens have come to expect improved opportunities for the public deliberation and review of infrastructure projects as important democratic rights (Hudson et al. 2008). So the legal challenges to the Tiergarten tunnel might have turned out more successful today than in 1994. It is unlikely the project could have been halted altogether, however.

4.3 Over- and Underestimation of Risk, Cost Overruns

The tunnel opponents focused a good portion of their energy on trying to assert that the tunnel projects would cause severe and permanent environmental damages to the Tiergarten Park. For this, they enlisted the help of the KUBUS Office for Cooperation and Consulting in Environmental Questions at the Technical University Berlin, which in turn help identify various university researchers who were willing to provide their scientific expertise to prepare an alternative environmental report. As it turned out, there were major issues with insufficient groundwater management and monitoring that were remedied as a result of the independent researchers' assessments. Yet overall, the university researchers deemed the *ecological risks* and

[3] This was the overwhelming response from the expert interviews we carried out. To quote a typical response, coming from former senior railway official: *"If this project had not been initiated at this moment, it would not have been realized. … For one because of the economic circumstances. And such visions have to fall on fertile ground, and that is only possible in a certain time frame after reunification. Otherwise other criteria will be used and then I don't think it would be realized. "*

possible permanent environmental damages to the Tiergarten park to be less substantial than the activists had hoped, crushing their hopes of halting the projects on the basis of environmental arguments (Berliner Landesarbeitsgemeinschaft Naturschutz, 1994; Steinberg and Schophaus, 2003). However, given the unfavourable groundwater situation, the likelihood of major construction accidents occurring was always high, and this was not sufficiently acknowledged as a *financial risk*. Other factors, such as rising construction prices and additional environmental requirements further raised project costs. According to official federal parliament documents, the entire expansion of the Berlin rail node, which besides the Tiergarten tunnel and the new Central Station also included additional station renovations and track work in multiple other locations around Berlin, was listed in the German federal investment plan of 1993 as a project of 'pre-eminent need' which was to cost a total of 5113 million Euro (converted from D-Mark). An additional 636 million were eventually added for the planned new fast rail connection from Berlin Central Station to the new international airport BBI. By December 31, 2005, the overall cost estimate for entire rail node had been upped to 6338 million Euro, so already an overrun of 589 million. Of that, 2788 million Euros were allocated to the North-South connection. And by then, the Federal government had already agreed to pay an additional 185 million Euro for the Tiergartentunnel (Deutscher Bundestag, 2007; BMVBS, 2007). The Federal government will also pay 80 percent of the at least 370 million Euros which are now estimated for the full completion of the U5 to Alexanderplatz.

4.4 Crucial Path Dependencies & Points of No Return

Initial traffic volumes in the road tunnel were significantly lower than projected, but two years after its opening, it seems that motorists in Berlin have embraced the new option, and the tunnel is now relatively well used, even though its official designation as an urban road and its curvy design limits speeds to 50 km/h. Local activists' fears that the construction of the segment would reignite the age-old push for a North-South urban highway ('*Westtangente*') appear unfounded given the current (transport) political climate in Berlin.

At the same time, the implementation of the 'mushroom'-concept, together with the related opening of the new Central Station and the North-South intercity rail connection obviously had wide-ranging effects on the Berlin rail network and the hierarchy of rail stations. Once *Deutsche Bahn* had formally committed itself to the expensive new tunnels and the station, it became imperative for them to maximize the use of these infrastructures – both from a perspective of self-interest and one of public accountability. But with a stagnating urban population and economy, the only way *Deutsche Bahn* could make its mega-projects more successful was by routing as many long-distance and regional trains through the North-South tunnels and the new station as possible – obviously at the expense of other stations. So soon after the opening of the new station in 2006, the now privatized *Deutsche Bahn* abandoned the original mushroom concept in favour of an adapted version which concentrated long-distance rail travel along the new tunnel, even going as far as completely cutting the historically very busy and well-connected Zoo train station in West Berlin completely off from inter-city high-speed rail service. Even Berlin's Senator for Urban Development and Transport was caught off guard by this announcement, causing her to join the chorus of objections.

Travel times to many regional and inter-urban destinations have indeed been cut substantially since the opening of the station and tunnel. But many Berliners now have to travel much further and have to make more and more awkward transit connections before they can access their inter-urban train connection at the new station.

The new regional crossing stations at the Northern (*Gesundbrunnen*) and Southern (*Südkreuz*) mid-points of the S-Bahn ring only partially offset this problem. And indeed, *Deutsche Bahn*'s increasingly exaggerated emphasis on a new 'interurban crossing station' as opposed to the use of

historical interurban terminals seems rather misplaced in a metropolis where less than ten percent of interurban travellers are 'crossing' passengers. Historically, over ninety percent of interurban rail passengers have had Berlin as their final destination, meaning passengers will (and thus transport agencies should) care much more about local transit connections to the rest of the city than about grandiose East-West/North-South intercity interchanges (Cramer, 2008).

Moreover, the package-deal-type joint approval procedure and the subsequently executed investments created strong path dependencies and *de facto* 'points of no return' for three urban rail mega-projects with questionable rationality. Even though the S 21 North-South S-Bahn was not officially part of the original decree, considerable preliminary works for the S21 were nevertheless executed as part of it. For this, the original decree was modified multiple times at the behest of the Berlin Senate. The Berlin Senate eventually did start a separate approval process for the S21, but the pertaining decree was only issued in February 2005, i.e. at a time when most of the engineering and construction for the S21-related tunnels and platforms at the new station had already been completed. Yet at present, Berlin does not really have the money to complete the line. Creative alternative suggestions for a combined use of the already completed S21 tunnel stubs and the unused intercity rail tunnel segments exist, but since the interurban rail and the S-Bahn systems run on separate electrical systems, this solution would require the purchase of a special generation of dual system S-Bahn trains. Such rail lines operate with success in several European cities, but the concept still lacks political support in Berlin (Deutscher Bundestag, 1995; see especially point 1.2 bottom).

Meanwhile, the substantial preliminary subway station and tunnel works for the U3 subways at Potsdamer Platz were justified and executed as mere 'advance construction works' for lines listed in long-range planning documents. The U3 (which has since been renamed U10) runs mostly parallel to other existing S- and U-Bahn lines and will most likely never be built. And the further completion of the U5 to Alexanderplatz is one of the most controversial issues in Berlin transport politics right now. Construction difficulties, once again related to groundwater damage, repeatedly delayed the opening of the short segment from the Central Station to the Brandenburg Gate, even preventing the operation of the planned limited shuttle service during the 2006 World Cup. In 2001, then Senator of Housing and Construction Peter Strieder issued a construction halt for the project, saying only a limited one-exit station at Pariser Platz/Brandenburg Gate would still be completed. This, however, was contested by the Federal government which insinuated it might make the Berlin Senate pay back 136 million Euros of already used up federals funds should the subway not be completed as originally agreed in a previous 'capitol agreement'. The U5, nicknamed 'Chancellor Subway' (*Kanzler U-Bahn*) by the press and the general public because of its prestige-project character and its prominent location, has long been critiqued as a typical 'White Elephant' investment in which large sums of public funds are used for a high-profile project of limited cost-benefit value. Original estimates for the full line originally projected 200,000 riders a day, but have since been corrected downward to 150,000. Separate estimates from the German Institute for Economic Research came to only 40,000 riders. The Berlin transit authority BVG itself even admits that projections for the 2 km, three-stop shuttle version of the line from the Central Station to the Brandenburg Gate (with a stop at the Bundestag Parliament building) would only attract about 6,400 daily riders, which would not justify running it. Nevertheless, the BVG asserts that it will start operating this rump shuttle line after construction at the Brandenburg Gate is completed anyway, arguing that it will be impossible to communicate to the public why it would chose not to operate such a new, prominently located subway link once it is ready for use (Fülling, 2007).

5. 'Valuing' the VZB Tunnels - The Limits of Traditional Cost-Benefit Analysis for 'Giga'-Projects

The VZB story is only understandable in the larger context of Berlin's extensive restructuring efforts since the 1990s. Although believable numbers needed to be produced for formal approval, it seems that grandiose visions were ultimately more important than cost benefit analyses. And admittedly, traditional cost-benefit analyses are unable to capture all of the wide-ranging (both monetary and non-monetary) costs and benefits of the Tiergarten tunnel projects. Two more key issues deserve particular mention here: (1) the question of the 'prestige value' of the various road and rail tunnels and (2) the re- or de-valorisation of railway sites as a consequence of the new North-South tunnel.

5.1 Mega-Project Festivalization and the Role of Prestige

The case of the U5 best exemplifies what an important role prestige still really plays in the approval of supposedly 'functional' transport infrastructure projects. Again, Berlin is admittedly a superlative case, because of the highly elevated level of symbolism involved in re-building the new capital of re-unified Germany. The Berlin of the early 1990s was a time and place where Daniel Burnham's famous dictum "Make no little plans" acquired a whole new meaning. To put it a bit irreverently: reunified Berlin, or rather: the federal and state-level officials residing in it, suffered from a particularly acute case of 'ribbon-cutting' syndrome. And the leading city bureaucrats, architects and engineers charged with transforming the city's public face all became very public faces themselves. *Deutsche Bahn's* chief engineer for the Tiergarten tunnel and the Central Station, Hany Azer, was frequently featured in local and national media, voted 13th out of the top 50 Berliners of the year 2006, and even received Berlin's highest medal of honour for outstanding service to the (city-)state. The openings of the tunnels and the new train station were all celebrated with great fanfare, and heated debates over the pros and cons of the station - both as a piece of engineering and as an architectural accomplishment - raged in the national papers for weeks, even years, after that. It seems that festivalization, which has long been a preferred public-private partnership strategy for boosting urban economic development (Häussermann and Siebel, 1993), now also plays an increasingly important part in bolstering public excitement and approval for expensive, large-scale transport infrastructure projects. Transport authorities in Berlin gladly rented out unfinished tunnels or stations for movie shoots, celebrity parties or concerts, so that these prominent transport sites were turned into memorable events locations even before they officially open their doors to the general public. A perfect example is the cooperation between the Berlin transit authority BVG and director Christoph Hagel for 'the Magic Flute in the Subway', a new stage production of Mozart's classic piece in the completed but still unused '*Bundestag*' ('Federal Parliament') station of the U5 (Blech, 2008).

Figure 3. Fireworks at the opening celebration of the Hauptbahnhof (Central Station) in May 2006. Source:www.spiegel.de/img/0,1020,633576,00.jpg

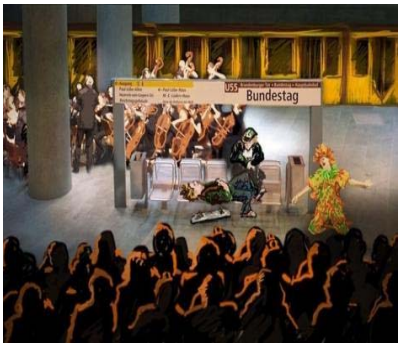


Figure 4. Staging of the 'Magic Flute' in the finished but still unused 'Bundestag' ('Parliament') station of the U5 Subway. Source :www.welt.de/berlin/article1408363/Hagel_plant_Zauberfloete_in_Geisterbahnhof.html

5.2 Transport Mega-Projects, Urban Development and the Changing Role of (Privatized) Railway Companies

The VZB tunnel case also brings into focus another crucial yet often under-appreciated effect of urban transport mega-projects, namely their overall impact on urban dynamics, and more specifically their potential to turn previously inaccessible and/or unattractive urban brown- or grey fields into prime real estate locations (Bruinsma et al., 2008). In the case of the Potsdamer Platz, located at the southern end of the tunnels, the construction of the road and rail tunnels and the related upgrading of the Potsdamer Platz station into a regional rail station node further boosted the already substantial attractiveness of this coveted newly developed area in the heart of the reunified city. The two most important companies on the site, Sony and Daimler(Chrysler) negotiated (and paid) for direct exit ramps from the road tunnel to their underground parking structures and loading docks, thus greatly improving their accessibility for motorists and delivery trucks.

The urban development impacts were expected to be more dramatic at the northern end of the tunnels. In fact, in many ways the Tiergarten tunnel story is as much as an urban development story as it is a transport infrastructure story. Early on, *Deutsche Bahn* executives pushed for a grand solution of a new North-South rail tunnel underneath the Tiergarten in conjunction with a new crossing station at its northern end. But they got even more ambitious as the planning process progressed, consciously rejecting alternative concepts for a more modest, functional station building in favour of star architect Meinhard von Gerkan's eye-catching, expensive glass palace in which transfer points between tracks are artificially lengthened in order to better lead visitors and passengers through the multiple levels of stores and restaurants. In doing this, *Deutsche Bahn*'s overall decision-making rationale was influenced by its new role as a privatized (yet still state-owned) rail company preparing itself for a further transition into a public shareholding company. The company is no longer a public authority delivering a public good (mobility/accessibility) but a profit-seeking transport service provider. At the same time, *Deutsche Bahn* was also already in the business of managing and/or selling off two potentially very valuable types of real estate, namely railway station buildings and the surrounding station areas. And both *Deutsche Bahn* and the Berlin Senate were of course well aware of the substantial long-term development opportunities involved in locating an attractive new Central Station at the site of the former Lehrter Station - a site surrounded by large and largely undeveloped parcels of land either owned by *Deutsche Bahn* or the city. So far, these hopes and opportunities have not materialized. For a variety of reasons, which would merit a more expansive discussion in another full-length paper, there has been little redevelopment of the sites surrounding the new station.

6. Concluding Insights: The 'Bundled' Nature of the Tiergarten Tunnel Mega-Project

So how should one judge the VZB mega-project and its performance to date? Even four years after the opening of the road and intercity rail tunnels, one can give but partial answers to this question. From an engineer's perspective, great obstacles were eventually overcome and the infrastructures successfully delivered. From a transport planner's or railway official's perspective, the new infrastructures represent a substantial capacity and (partially) efficiency improvement. From a visitor's and from a public pride perspective, the completed Tiergarten tunnel projects were an essential prerequisite for the opening of the new Central station, which is as much an architectural flagship destination as it is a transportation hub. From a German taxpayer's or an economist's perspective, the benefits might not quite seem to justify the (final) costs, however. From a transit-oriented development/urban renaissance perspective, the

Tiergarten tunnels created a theoretically welcome albeit practically still unrealized and in the near future probably also unrealizable opportunity for the successful revitalization of several large, centrally-located grey field sites (Peters, 2009). This list could easily be expanded to include additional perspectives. The bottom line is that the ultimate judgment strongly depends on one's point of view. One critical issue which definitely deserves closer public scrutiny in future undertakings at this immense scale, however, is the practice of bundling multiple large-scale infrastructure projects for joint-approval. In the case of the VZB project, substantial advance construction works were carried out even for those transport projects which had not yet been approved or financed in their entirety, thus creating seemingly irreversible political and financial path dependencies for projects whose merit has been and still is questioned by some experts. But there seems to be a clear consensus that the promoters of the Tiergarten tunnel project(s) successfully used the unique time-window right after reunification to get a set of bold interventions approved as a 'package deal' which would have otherwise received much closer scrutiny from a variety of sides.

And the interdependent nature of the various mega-projects bundled together in the VZB endeavor makes it very difficult to discuss the individual merits of each project. More importantly, the actual cost-benefit analyses were all predicated on the assumption that all elements of this 'giga-project' package would be implemented, which to-date has not been the case. Very soon after the fall of the Berlin wall, German Railways made a fateful decision to locate a large new flagship station at the future intersection of an already existing East-West rail axis, running above ground, and a new, yet to be constructed, North-South rail tunnel axis. Yet despite its geographical location in the very heart of Berlin, the chosen site of the new "Central Station" was in the middle of a large urban wasteland which was not connected to the rest of the city by subway or light rail at all, and which had comparatively poor accessibility for bus, automobile, and pedestrian and bicycle traffic. By supporting German Railways in this consequential decision, the respective local and national-level transport and urban development agencies created important path dependencies regarding the future development of this location and the related transport connections. The current result, however, is rather disappointing. The new Central Station sits atop a series of expensive new road and rail tunnels, but has to yet be connected to Berlin's dense and fine-grained transit system by subway or light rail. And even after three years of operation, the new Central Station continues to look like a 'Glass Palace in a Desert' (Maak, 2006) with all the surrounding sites still awaiting redevelopment.

Figure 5. Bird's eye view of the massive new Central Crossing Station just north of the new Federal Government Quarter and the Brandenburg Gate in the heart of reunified Berlin. This perspective also affords an impressive view of the huge grey fields still surrounding the station site to the North, South and West.
Source: Google Maps

Acknowledgements

The author would like to acknowledge the assistance of Matthias Kracht, Wiebke Preckwinkel, Sebastian Munafo, Markus Richter and Evelyn Westphal in accessing some of the case study materials used to write this paper. Further thanks are due to Markus Hesse, former head of the German OMEGA team, and especially to the many unnamed interviewed experts and professionals who shared their valuable time and insights on this project.

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