Planning in onherleidbare onzekerheid: een evolutionaire benadering.

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Inhoudsopgave

Samenvatting

Planning in onherleidbare onzekerheid: een evolutionaire benadering.

Het zijn spannende tijden voor vervoersplanologen. Maatschappelijke zorgen weerklinken in meer fundamentele kritieken. De laatste komen neer op het verwijt dat conventionele planningsmethoden onvoldoende rekening houden met de toenemende, onherleidbare onzekerheid van toekomstige ontwikkelingen. Het centrale doel van deze paper is verkennen of en hoe een evolutionaire benadering van planning kan helpen deze beperkingen te overwinnen. Het betoog draait rondom twee kernhypothesen. De eerste is dat vervoerssystemen zich op een evolutionaire wijze gedragen. De tweede, daaruit voortvloeiende hypothese is dat vervoersplanologen dienen meer te focussen op het versterken van de weerbaarheid en aanpasbaarheid van het systeem. Ontwikkelingen in Amsterdam in de tweede helft van de vorige eeuw dienen ter illustratie. In de conclusies worden meer algemene implicaties getrokken.

Summary

Coping with irreducible uncertainty in urban transportation planning: an evolutionary approach.

For urban transportation planners these are challenging times. Mounting practical concerns are mirrored by more fundamental critiques. The latter come together in the observation that conventional methods do not adequately account for the growing, irreducible uncertainty of future developments. The central aim of this paper is to explore if and how an evolutionary approach can help overcome this limit. Two core-hypotheses are formulated. The first is that the urban transportation system behaves in an evolutionary fashion. The second hypothesis is that because of this, urban transportation planning needs also to focus on enhancing the resilience and adaptability of the system. Changes in transport and land use policies in the post-war period in the Amsterdam region are analyzed in order to test the two core-hypotheses. In the conclusions more general implications are drawn.

1. Introduction

For urban transportation planners these are challenging times. Practical concerns are echoed by more fundamental critiques (see for instance Dimitriou, 1992; Gifford, 2003). Central to the latter is the contention that conventional, forecast based planning methods do not adequately account for the *irreducible uncertainty* of developments affecting transport and its relationship with the broader context. Uncertainty is, of course, inherent to any future oriented activity. There are, however, different forms of uncertainty. Following Van der Heijden (1996), a first form of uncertainty is *risk*, where there is enough historical precedent in terms of similar events to allow the estimation of probabilities for various outcomes (this is the core realm of forecasting); a second from are *structural uncertainties*, where the event, while still conceivable in terms of chains of cause and effect, is unique enough not to provide any indication of likelihood (think at the complex interplay of rising wealth, social emancipation, mass motorization and urban decentralization, as it unfolded in industrialized nations in the second half of the last century); a third form are *unknowables*, where the event cannot even be imagined (think at the 1973 oil crisis). While all three forms of uncertainty may apply in any context, the likelihood of uncertainties of type two and three increases as the time horizon gets longer and the system gets more complex, up to a point where prediction is no longer possible. As a discipline that also deals with the long term and with highly complex systems urban transportation planning should also be able to come to terms with fundamentally unpredictable events, that is, irreducible forms of uncertainty.

Yet, a convincing response is still lacking. In the words of Meyer and Miller (2001, p. 519): "No aspect … is as pervasive to the [transport planning] process, and yet as often ignored, as uncertainty". In response, Meyer and Miller stress the need to improve present land use and transportation models. More adequate forecasting models would need to explore the full range of system responses (short and long run) to a broad variety of policy combinations (transportation, land use and other), and do this at the level of individual responses (by means of disaggregated behavioural models). However, and crucially, they also recognize that "Even with 'ideal' … models, uncertainty will still exist with respect to the exact nature of future activity systems" (p. 340). Banister (2002, p. 141) strikes a similar note by remarking: "Some of the limitations of the TPM [Transport planning model] have been met by the ILUTM [Integrated land use transport models]. But the complexity of the land development process, travel decisions and the rapidly changing forms of industry, of population structure, of lifestyles, and of the use of time all contrive to make progress difficult, if not impossible”.

This paper attempts to take this more fundamental level of criticism to its consequences. In particular, its aim is to explore if and how an *evolutionary approach* to urban transportation planning can help overcome some of the limits mentioned above, and help develop planning methods that can usefully complement forecasting based ones. The inspiration is drawn from much more advanced conceptualizations in other disciplines, and most notably evolutionary economics and the application of complexity theory to the understanding of cities. Evolutionary and complexity approaches seem especially appropriate because they both recognize the high level of interdependency between the different components of the system and the limits to dealing with such interdependency by means of prediction, because of irreducible uncertainty. Building upon this line of reasoning, two core-hypotheses are formulated with respect to the object and the scope of urban transportation planning. The first hypothesis is that the urban transportation system indeed behaves in an evolutionary, complex fashion. The second, related hypothesis is that because of this, urban transportation policies need to also focus on enhancing the resilience and the adaptability of the system. Changes in transport and land use policies in the post-war period in Amsterdam are analyzed in order to test the two core-hypotheses. In the last part of the paper more general implications are drawn.

2. An evolutionary approach

Evolutionary thinking originated in the natural sciences but is increasingly being applied in the social sciences and most explicitly in economics (Nelson & Winter, 1982; Dosi & Nelson, 1994; van den Bergh & Fetchenhauer, 2001; Boschma et al., 2002). Intriguing parallels can be also found in works adopting theories and methods of the emerging science of complexity - and particularly the concept of self-organization - most notably including applications to the analysis of cities (Allen, 1997; Portugali, 1999; Batten, 2001; but see already Jacobs, 1961). Characteristically of all these streams of work, the assumption of (a single) equilibrium as ‘natural’ state of the system is questioned, and attention is rather directed to far-from-equilibrium processes of change. Characteristically, periods or relative system stability and incremental, quantitative change are alternated by periods of system instability and radical, qualitative change. It is especially because of the occurrence of the latter that prediction is difficult, if not impossible, and the rationality of social actors is fundamentally bounded.

A focus on evolutionary economics can help further develop the argument. While there are different interpretations within the field, some basic principles are aptly captured by the notion of microevolution introduced by Nelson & Winter (1982). According to Nelson & Winter, because of irreducible uncertainty, the existence of transaction costs and the difficulty of change in the short-term, firms tend to follow *organizational routines*, or proven ways of conducting business, rather than consider each time all possible alternative courses of action. On the other hand, the evaluation of current routines can lead firms to their adjustments and even substitution. The results of such *searching process* are, however, also uncertain. Furthermore, because past experiences influence both existing routines and the search for new ones, different firms will typically have different routines and try different alternatives, resulting in a variety of economic behavior. Eventually, the actual performance of a firm will constitute the major incentive to maintaining or changing a routine. Such performance is largely determined by the characteristics of the *selection environment*, that is, the interplay of demand and supply in the marketplace. The selection environment is not a static entity either, as it will also change as a result of the accumulation of firm-specific processes. In this sense, there is *co-evolution* between the market and individual firms.

The resulting economic reality is one characterized by continuous successions of disturbances and adaptations, which preclude the attainment of a stable equilibrium. Continuous change means that initially successful routines can become less efficient or effective, or even have unexpected consequences. There is no once-and-for-all optimal routine. Furthermore, the nature of the process underlies the incremental nature of change, and the difficulty of more than marginally altering an existing routine. The risk that firms be *locked-in* in a non-optimal routine is therefore always present. The implication is that beyond a certain threshold, marginal change will not suffice and coordinated change will be required. However, because it is uncertain which routine will be able to break the impasse, diversity of and competition among alternatives should be stimulated. It is precisely such redundancy of routines that makes the economic system resilient, that is, capable of continuous performance in the face of changing, uncertain circumstances.

The above conceptualization of economic reality can be also usefully applied to the object of this paper. Existing transport and land use policies can be seen as *organizational routines*. The broader, changing urban socio-demographic and economic context can be seen as the *selection environment* in which existing policies must continuously prove their worth and the *searching process* for better policies takes place. As also policies, in their turn, affect the selection environment, there is *co-evolution* between environment and policies. The analogy further suggests that there is no universally valid, optimal policy. Accordingly, the value of a solution can only be appreciated in a specific, continuously evolving situation. At the same time, recognition of the unpredictability of the outcome – particularly when the long term is concerned – should also result in recognition of the need to look for ways of improving the ability of the system to react and perform in the face of unforeseen (and unforeseeable) change. More specifically, an urban transport and land use system capable of performing in the face of unpredictable change would be, in the first place, one capable of continuing to function in the face of change, that is, it must be a *resilient* system. This seems particularly important for system components that cannot change rapidly, or easily (such as a transportation network morphology). Secondly, it would be a system capable of changing itself in response to change in the socio-economic environment, that is, it must also be an *adaptable* system. This would especially apply to system components that, given their nature, can change relatively swiftly (think at a road pricing scheme).

Building upon this line of reasoning, two core-hypotheses can be formulated with respect to the object and goals of urban transportation planning. The first hypothesis is that the urban transport system indeed behaves in an evolutionary, complex fashion. The second, related hypothesis is that because of this, urban transportation policies need to also focus on enhancing the resilience and the adaptability of the system. Changes in transport and land use policies in the Amsterdam region in the post-war period are discussed in the following sections to test the two core-hypotheses. The goal of this exercise is not so much that of providing an interpretation, let alone a conclusive one, of these events, but rather that of exploring to which degree they can be characterized as evolutionary and complex. For this purpose, the two core-hypotheses are further articulated in the following sub-hypotheses:

- The behavior of the urban transport system can be characterized as evolutionary and complex because:
  - The system alternates periods of incremental, quantitative change and periods of radical, qualitative change, or system transition phases
  - During transition phases both the scope for policies to influence the outcome and the unpredictability of such outcome are greatest
- Because of unpredictability, policies need to:
  - Increase the resilience of the system, that is, its ability to keep functioning in the face of unexpected change. This seems especially important for the shape of transportation networks, as this is relatively difficult/slow to change
  - Increase the adaptability of the system, that is, its ability to react to unexpected change. This seems especially important for land use regulations and mobility management measures, as these are relatively easy/fast to change

3. Testing the hypotheses

Behavior of the urban transport system in the Amsterdam case can be characterized as evolutionary and complex because:

- ***The system alternates periods of incremental, quantitative change and periods of radical, qualitative change, or system transition phases***

For reason of space the discussion will be limited here to the single major land use and transport policy transition of the period under examination: this is described in Box 1. Fig. 1 shows the transformation of the urban and network morphology during this period and is provided for reference. This limited account should not conceal the fact that there are also, and quite crucially interrelated transitions in the selection environment. These will be referred to only indirectly. Finally, the many periods of more incremental, quantitative change, will have to be left implicit.

The 1960s and 1970s are a major transition phase in land use policies in Amsterdam. These are years of extreme turbulence in all societal domains, also resulting in a radical change of land use policy course. This is particularly the case in the dominant attitude towards the historic city center, where a fundamental shift from transformation to conservation occurs. This shift will have a long-standing impact also on land use policy elsewhere in the city and region, and most notably on the emergence and consolidation of the notion of complementary centers in the urban periphery and the suburbs, where service growth rejected from the historic city center has been increasingly accommodated (compare patterns of centers in 1967 and 2001 in Fig. 1).

The land use policy debate in the 1960s and 1970s has been mirrored by intense transport policy debate in the same period. Also in this case the focus was the historic city center, here in the form of contestation of urban motorway and, particularly, railway plans. The resulting shift in transport policy (see Box 1) was perhaps even more pronounced than that in land use policy, with an effective halt to both urban motorway and urban railway expansion and a shift to an approach dominated by mobility management and marginal infrastructure interventions. Only during the 1990s, and at the condition of no-harm to the existing urban fabric will new urban infrastructure proposals be allowed to re-enter the political arena.

- ***During transition phases both the scope for policies to influence the outcome and the unpredictability of such outcome are greatest***

Proof for the first part of this hypothesis (scope) is the occurrence of qualitative (rather than quantitative) change consistent with policy goals. Evidence for the second part (unpredictability) is the concomitant occurrence of qualitative change that was not aimed at. Let us focus again on the main policy transition phase, the late 1960s and early 1970s. This was a unique period because instability in different domains connected (just think at the central role of the emerging youth culture in the contestation of urban renewal plans), resulting in radical policy change. In other periods policy seems rather a reaction to broader, stable (and thus difficult to reverse) trends, having at best the effect of marginally conditioning the outcome (as with the only relative concentration of successive waves of spatial decentralization trends). On the contrary, qualitative policy change in the 1970s resulted in qualitative actual change. The final outcome proved, however, unpredicted for a significant part. The conservative land use and transport policies in the city center not just helped preserve, as desired and expected, its residential (and up to then sharply declining) function. They were also, unexpectedly and unwillingly, a factor in its later gentrification and the development of a burgeoning tourist and leisure industry there. Furthermore, constraints on city center development indirectly helped shift the focus of economic activity in the region towards the emerging centers in the periphery and the suburbs, not an entirely unforeseen but certainly at the time not even a deliberate policy goal. As far as mobility is concerned, while the outcome of the policy turn in the 1970s within the city (less cars, more bikes, and a more livable public space) was by an large an explicit goal, the related development of a diffused, multi-centered urban region were the car dominates and adequate public transport is lagging behind was not.

While still exploratory and necessarily limited in scope, the analysis above does provide some evidence that the Amsterdam land use and transport system has changed in an evolutionary, complex fashion, in the period under examination, in the sense defined by the first set of hypotheses. Let us now move to the second set of hypotheses. These posit that because the systems behaved in an evolutionary, complex fashion, successful policies needed to:

- ***Increase the resilience of the system, that is, its ability to keep functioning in the face of unexpected change. This seems especially important for the shape of transportation networks, as this is relatively difficult/slow to change***

The fact that successful policies were policies that have proven effective in qualitatively different contexts (that is, both before and after transitions) is seen as evidence for this hypothesis. Particularly the shape of the infrastructure networks seems to have had this characteristic. The combination of motorway and railway radials and tangents shown in Fig. 1 has proved able to support a wide variety of developments across the whole period, most importantly including sharply shifting foci of economic and social activity, different transport technologies, and policy transitions as the one described in Box 1. More specifically, it has repeatedly provided alternative pathways of growth when barriers to the further development of the city center (like the contestations discussed in Box 1) have emerged. In order to better appreciate this, let us compare the development patterns of Amsterdam wit those of Utrecht (see Fig. 2), another Dutch city that is in this respect much more representative of network morphologies elsewhere in the Netherlands and other countries.

The fundamental difference between the Amsterdam and the Utrecht transportation network morphology is the absence of railway tangents in the latter, meaning that it cannot provide a firm anchor to a polycentric pattern (there are no locations with an accessibility comparable with that of the historic center) of development. There is no obvious ‘third way’ in Utrecht. As a result, development has been rather characterized by concentration in the only center and increasingly (because of the mounting negative externalities of such concentration) by diffused, car-dependent developments along the motorway tangents.

It is important to stress that this difference is not just due to deliberate choices, or the product of a different ability to anticipate the outcome. Rather than of coherent, long range planning, the present network morphology in Amsterdam is the product of a long chain of decisions and actions, often unconsciously or unwillingly contributing to the final result. These include (Poelstra 2003): land reservations for a – never realized - railway freight line around the city made at the beginning of the XX century; land reservations for local roads made in the 1932 Amsterdam ‘general expansion plan’, which have also not been implemented as envisaged; the opening – starting in the 1970s and profiting of those rights of way – of railway links to connect the airport of Schiphol to the rest of the country (a national government-led process); the realization since the 1970s of a motorway ring as part of the national motorway plan of 1966 – partly using the reservations for the freight line and partly those for the local roads; the realization in the 1990s of a light rail line following the route of the airport railway links (perhaps the first fully explicit attempt at developing a multi-modal, multi-centered network morphology). An intriguing policy question follows. Is it possible to identify in advance such resilient interventions, and – if so - how? I will get back on this later on.

- ***Increase the adaptability of the system, that is, its ability to react to unexpected change. This seems especially important for land use regulations and mobility management measures, as these are relatively easy/fast to change***

The fact that, in order to be effective, policies that were not resilient in the sense discussed in the previous section needed to be adapted, is seen as proof for this hypothesis. The most poignant example seems, once again, the radical change of course of transport and land use policies in the 1970s (see Box 1). Such adaptation has been an essential condition for the development of the new, quite successful policy mix that – at least as far as the historic city is concerned - has shown viable up to the present day (if this will also hold for the future is, of course, a different matter). Policy change proved, however, all but a natural process. A decade of intense conflict including violent riots and a 'policy-trauma' that is still felt in the city was needed to achieve it. In many ways, the existing plans and planning institutions appear to have been, at least initially, hampering rather than promoting adaptation. The policy question is thus if and how such policy transitions could be made easier, or how the adaptability of policies could be increased. In other words: how can policies be made more responsive to (unexpected) reactions from the society at large? But also: how can this be done without reducing too much the just as necessary stability of the policy context, that is, its resilience? Also these issues will be addressed in the next session.

4. Coping with irreducible uncertainty

The central contention of this paper is that an urban transport and land use system capable of supporting economic and socio-demographic change is also one capable of continuing to function in the face of change, that is, it must be a *resilient* system. Secondly, an urban transport and land use system capable of supporting economic and social change must be able of changing itself in response to change in the socio-economic environment, that is, it must be also an *adaptable* system. The Amsterdam case shows both the workings of resilience and adaptability, and specific ways (that is, ways that take account of path-dependency) of achieving them. The resilience of the system is best shown by a transport network morphology (the combination of radial and tangential links, both road and rail) that has provided a relatively stable base for the radical shift from a monocentric to a polycentric urban structure. The adaptability of the system is perhaps best shown by the (ultimately) successful re-shaping of the policy course, particularly in terms of land use and mobility management, in response to systemic crises. There is a link between the two. The resilience of the transport network morphology has been a condition for the adaptability of land use and mobility management policies, because it has allowed choosing at all times between substantially *different* policy courses. As we have seen from the comparison with Utrecht, this variety of options was more limited elsewhere.

However, the Amsterdam case also shows the limits of a purely ‘rational choice’ (in the sense of Simon, 1957) approach to achieving resilience and adaptability. The present network morphology is the result of a very long chain of decisions and actions, often unconsciously or unwillingly contributing to the final result. The land use and mobility management policy transition also emerged after a protracted period of conflicts and contradictions, and many effects were not anticipated. These limits to predictability are by no means specific of the Amsterdam context. In Britain for instance, the expectation that, following the development of new radial and tangential roads, growth would still take place in the city center was long undisputed, while no model had anticipated inner-city decline or massive decentralization (Banister, 2002).

What sort of urban transportation planning would this lead to? A reference to Christensen’s (1985; see also Gifford, 2003) classic characterization of uncertainty in planning can help make a first step. According to Christensen (Fig. 3a) planning problems and approaches can be characterized in terms of the uncertainty about goals and the means to achieve them (or ‘technology’). The term ‘technology’ is used here in the broad sense of ‘means to achieve goals’. In this respect a transportation system is a technology, but also a parking regime, or a marketing campaign. Furthermore, the term is inclusive of the economic, social and cultural institutions that identify the context in which a technology is developed and applied. Different sorts of uncertainty require different planning approaches. When goals are not agreed and the technology is unknown there is “chaos”. In Christensen’s interpretation these are untreatable planning issues, and uncertainty needs somehow to be reduced in order to proceed. When feasible, this should certainly be the preferred option. However, in many (even if by no means all) situations uncertainty seems *not* reducible. What to do then?

Abstracting from the characterization of the Amsterdam case Fig. 3b sketches a possible approach. The starting point is the observation that even when goals are not agreed a distinction can be made between goals that are independent of the future technological context (as “promoting the growth of the urban economy”) and goals that are not (as “promoting the growth of a specific economic sector in a specific location”). Analogously, even when the technology is unknown a distinction can be made between a technology that only has the potential to serve limited goals (as a transportation system connecting a limited number of places in a limited number of ways) and a technology that has the potential to serve more goals (as a transportation system connecting more places in more ways). When goals are both not agreed and dependent on a specific future technological context and technologies are both unknown and can only serve limited goals options should be kept open, thus preserving the *adaptability* of the system. On the contrary, not agreed goals that are independent of the technological context and unknown technologies that can serve many goals are, at least potentially, robust goals and technologies and should, with reference to Christensen’s characterization, be bargained over and/or experimented with. Because of the limits to predictability, only actual bargaining and experimentation – or ‘policy experiments’ - will tell how true this potential is. If it is, policies should be brought further towards implementation, as they are likely to improve the resilience of the system. If this does not prove to be the case, the need to keep options open will be reintroduced. It is through such a recursive, exploratory process, that the system can gain both resilience (by means of robust measures) and adaptability (by means of keeping options open).

There is, however, a caveat. The above suggests that in cases of irreducible uncertainty and insufficient robustness, options should be always left open. However, it is not difficult to think of situations where there might still be arguments for action (think a the development of an innovative transportation system with highly uncertain, but potentially highly rewarding impacts). In political (rather than technical) terms this can still be acceptable (or even desirable, as taking risks has been always considered a hallmark of leadership). However, the above suggests that even in this case as much allowance as possible should be made for learning, that is, implementation should be designed as much as possible as a ‘policy experiment’.

5. Conclusions

Economic and socio-demographic change shape urban transport and land uses, but the latter provide in their turn a still essential physical support to the former. In the face of rising complexity and persisting uncertainty about the future, planners should devote more energy to understanding the evolutionary, complex nature of change in urban land use and transport systems, and, accordingly, to finding ways of promoting their resilience and adaptability. This would complement other, forecasting based approaches, and allow transport providers to develop and transport users to choose between different ways of moving around, both in the shorter and, most importantly, the longer term. The latter appears all the more urgent in the face of real uncertainty about the future viability of the presently dominating transport solutions and a tendency not to recognize this by those taking decisions. In this respect, the classic definition of sustainability proposed in the Bruntlandt report (World Commission on Environment and Development, 1987) still provides a poignant evaluation criterion. How does a particular transport and land use policy affect the possibility of future generations of making their own mobility choices? An exploratory attitude seems essential, as the answer will be different in different contexts, and contexts will keep changing, unpredictably.

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Box 1: The late 1960s and early 1970s, a transport and land use policy transition dissected. Sources: le Clercq, 2002; Dienst Ruimtelijke Ordening Amsterdam, 2003; Dijkstra et al., 1999; Honig, 1996; Poelstra, 2003.

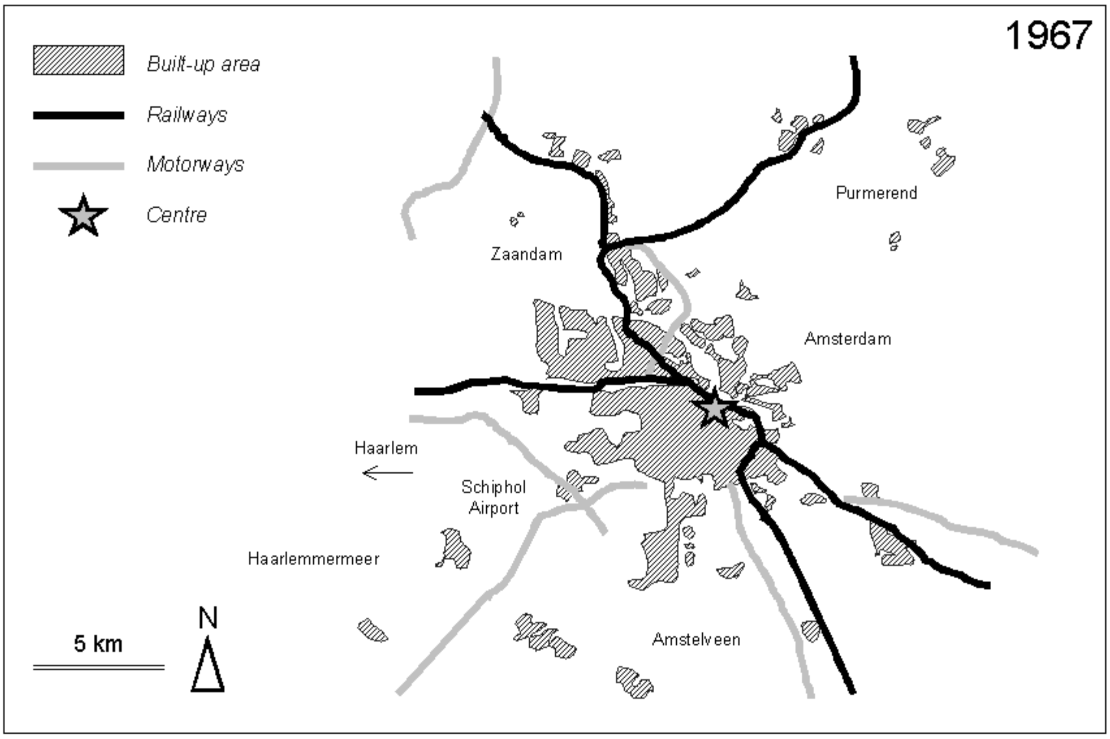
The 1960s are the theatre of an extensive production of far-reaching urban renewal and infrastructure plans for Amsterdam's historic city, following a first city centre report in 1955. The underlying philosophy seems straightforward: population growth is to be accommodated in new expansions on the urban periphery and in growth centres in the region, service growth is to be concentrated in an enlarged and restructured city centre, and a new underground urban railway network is to be developed to link the new concentrations of population, jobs and services. The new transportation system is seen as a tool to reinforce the position of the city centre in the region, and as a way to fight mounting congestion there (by both providing an alternative to the car and giving the car more space above ground). From 1963 to 1966 an urban railway office is installed to work out the plans. Conclusion of the study is to start with the construction of an east line - connecting the central railway station to urban renewal areas in the centre and the newly planned South-eastern urban expansion - and to follow later with a north-south line. However, and signalling expert disagreement, also an alternative, incremental plan is developed, envisioning a first phase with a north-south line only and expansion of the bus and tram network as a substitute – at least for the time being - for an extensive underground railway network. Other plans follow, including in 1967 one by the American professor D.A.Jokinen who proposes a system of radial urban motorways to connect a drastically restructured city centre. Particularly this plan has a shock effect on a public opinion increasingly concerned with the fate of the historic city. In 1968 however, conflicting plans and ongoing discussions notwithstanding, the city council decides 'in principle' to build the underground railway. The decade of urban renewal debates seems also to reach its resolution point with the publication in 1969 of rigorous plans envisaging the demolition of as much as 75.000 dwellings in the historic city.

While there is still enough consensus on the policy course within the city council, the railway and urban renewal proposals meet unexpected, strenuous resistance from the population. Leading the contestation is an unorthodox coalition of local inhabitants fearing displacement and emerging urban youth movements wanting to affirm their alternative visions of the city. The planning machinery seems, however, unstoppable. In 1970 an agreement is reached with the national state on financing the east line and in the same year the city council decides to start its construction as well as preparations for a north-south line. Shortly thereafter construction starts. The contestation, however, explodes and takes the streets, seamlessly merging with protest against urban renewal. In the following years, popular pressure keep mounting, up to the point that the city council has to come back on its decisions. The first change is on the land use side. In 1972 the council decides to build houses instead of a throughway on top of the inner-city section of the underground railway tunnel. Amendments on the transport side follow: in 1974 the council decides to complete the east line but to halt indefinitely further implementation of the rest of the plan. The decision does not immediately calm the spirits, and in 1975 there are violent riots against the underground railway.

The first stretch of the east line opens in 1977, but a year later the policy change of course is made official. On the land use side a local government report sanctions the shift by trading 'urban renewal' with 'building for the neighbourhood', that is, incremental, housing-led adaptation of the historic city, without displacement of the existing inhabitants. A 'traffic circulation plan' does the same on the transport side, by stressing the need to strike a balance between accessibility and liveability, and to do this by means of improvement of the existing tram system, development of a coarse primary road network, a restrictive parking policy in the city centre, and new bike routes.

The contrast between the vision of the city and its transport system before and after these turbulent years can be still appreciated at a glance in the Mr. Visser square, where the underground railway east line enters the medieval city centre. Looking towards the periphery of the city one sees a large traffic thoroughfare flanked by modern, tall office buildings. Looking towards the centre one sees a much smaller street with plenty of space for bicycles and pedestrians and a mix of preserved and new residential buildings, with mostly small-scale retail on the ground floor. In between the two the mouth of a never completed road tunnel has been converted in an indoor playground. In the Nieuwmarkt underground railway station underneath pictures of the 1975 riots still remind how this all came about.

Figure 1: Changes in the built-up area and the infrastructure in the Amsterdam urban region, 1967-2001. *Source*: adapted from Jansen, 2003.



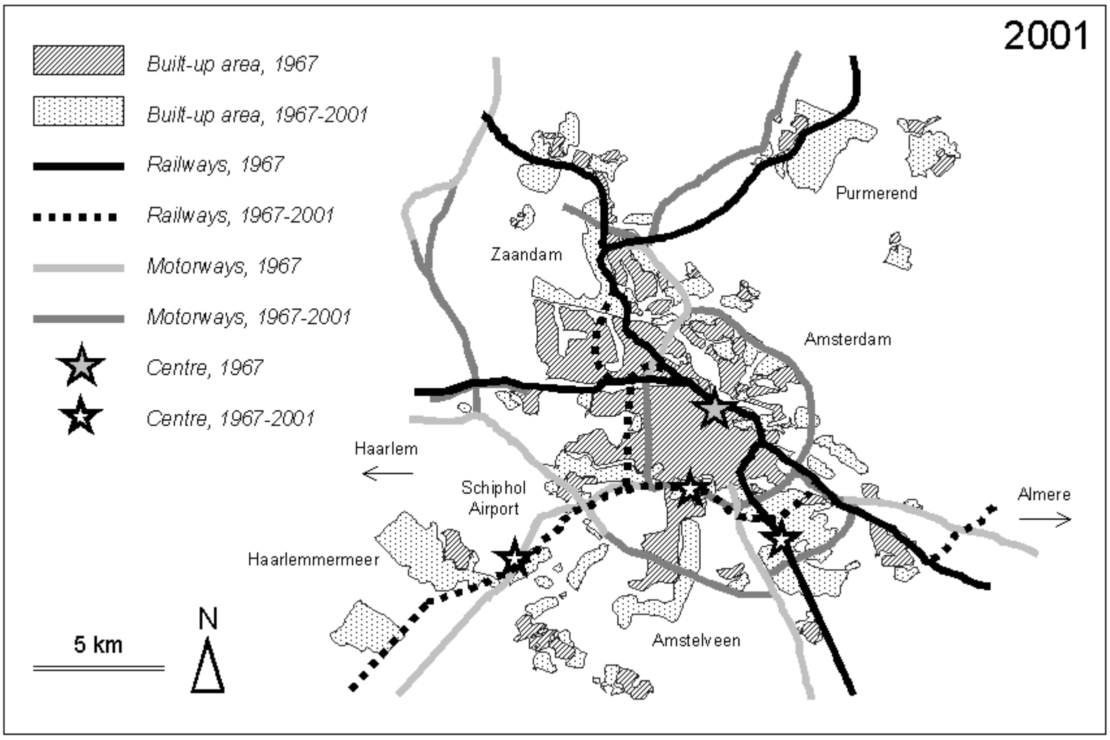
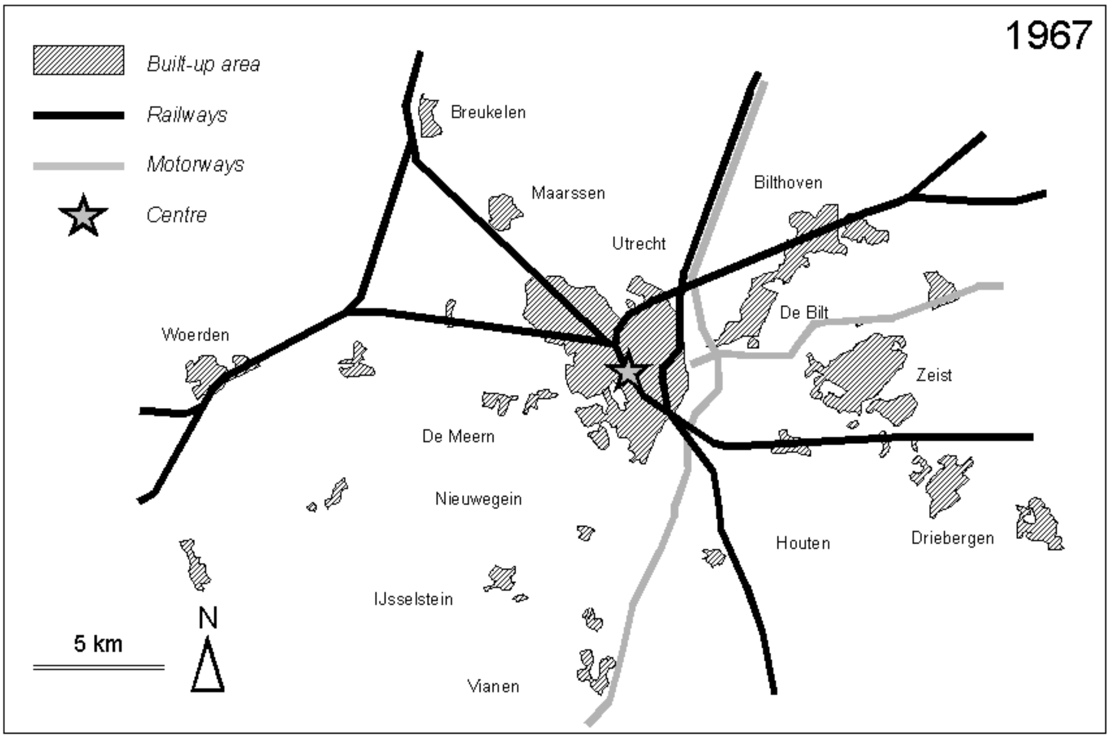


Figure 2: Changes in the built-up area and the infrastructure in the Utrecht urban region, 1967-2001. *Source*: adapted from Jansen, 2003.



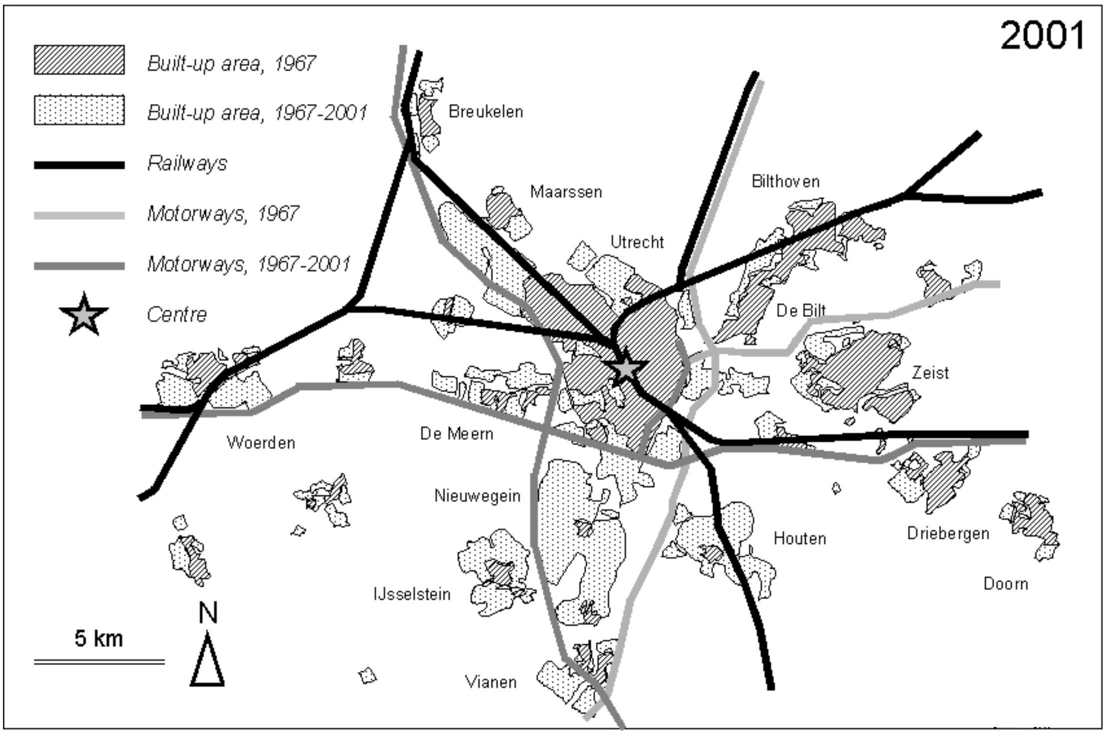


Figure 3a: Coping with uncertainty in planning (Christensen, 1985)

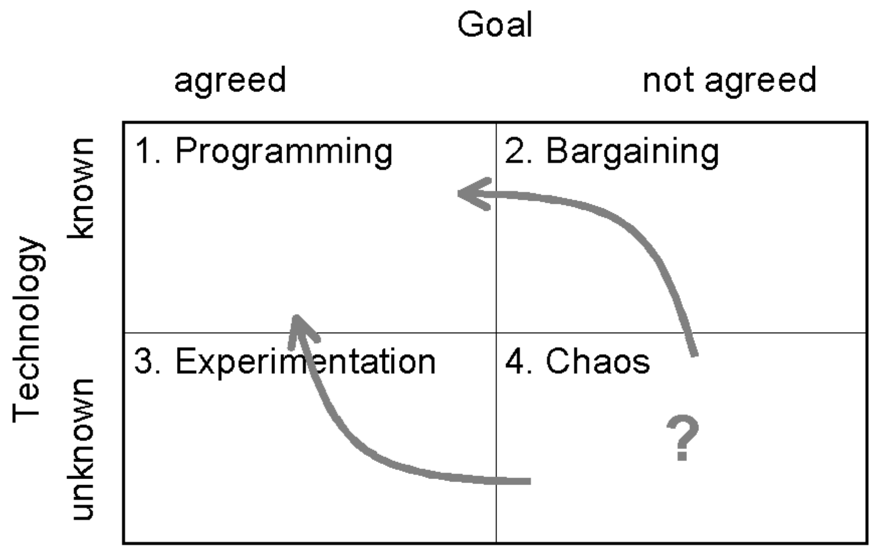


Figure 3b: Coping with *irreducible* uncertainty in planning (or 'chaos')