Sustainable Accessibility of the Randstad

2007 programme brochure

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Contents

1 Introduction

The Minister of Transport, Public Works and Water Management (V&W) has taken the initiative in concert with the Ministers of Housing, Spatial Planning and the Environment (VROM) and Economic Affairs (EZ) for the long-term research programme on Sustainable Accessibility of the Randstad (2008-2040).

The programme will be implemented by the best academic research groups in the Netherlands. The research should be innovative, achieving high scientific standards, multidisciplinary and maintaining an international orientation, and relevant in the context of the strategic knowledge questions being asked by the Ministries of V&W, VROM, EZ, other public parties, and possibly also private parties. The research should meet the NWO standards for scientific quality and level of utilisation and is associated with the NWO Sustainable Earth theme.

Key points

This document offers an impression of the focus and delineation of the contents of the research programme on Sustainable Accessibility of the Randstad. Research proposals will be selected and prioritised in the framework of the assessment procedure. The contents of this document are intended to stimulate and challenge scientists in the Netherlands to develop innovative knowledge and insights that are important to policy aimed at sustainable accessibility of the Randstad in the long term. In this context, researchers are asked to offer their vision for sustainable accessibility of the Randstad in future and to indicate how their research proposal fits into that vision. This will help the implementation of the programme to make a significant contribution to the knowledge base for sustainable accessibility of the Randstad in the longer term. In addition, the programme contributes to the education and training of young researchers in this field. (Because PhD students and post-doctoral researchers will be involved, there are opportunities to do internships in the government, and government officials can give guest lectures.) The programme is also aimed at strengthening the knowledge infrastructure for (and in) the Randstad. The research must meet the highest standards of scientific quality.

Political and societal context

The choice of the theme of sustainable access to the Randstad as a topic of scientific research arises in part from the intensity of the challenges facing policy-makers from the public and private sectors. Relevant policy processes include the Urgent Programme Randstad, the Randstad 2040 Strategic Agenda and the Adapting Spatial Planning to Climate Change programme (ARK).

The government has determined three main tasks for the Urgent Randstad Programme and the Randstad 2040 Strategic Agenda:

- Accessibility and economic dynamics;
- Climate-proof safe delta;
- Quality of life and a good climate for residence, business and leisure.

The government did not arrive at its formulation of the Randstad policy overnight. This statement notwithstanding, the perspectives revealed in the Randstad Urgent programme and the Initial Memorandum give rise to numerous knowledge questions that will have to be tackled and considered in the coming years. That applies primarily to the consequence of the changing climate, the new water tasks and the proposed energy transition for the accessibility of the Randstad, within the limiting conditions of ecological sustainability, economic vitality and social cohesion. The Knowledge Chamber of the Ministry of Transport, Public Works and Water Management underlines the relevance of the research themes in this programme.
The launch of an ambitious, long-term research programme as it is outlined here is highly compatible with the governmental priority to strengthen the Randstad's knowledge economy, as well as providing a more solid support structure for the long-term policy for the Randstad.

Focus of the programme

The research programme on Sustainable Accessibility of the Randstad (*Duurzame Bereikbaarheid van de Randstad* – DBR) looks to the future. The time horizon is around thirty years. The programme focuses on the internal and external accessibility of the Randstad, including the mainports and cities, for passenger, freight and information traffic. The programme challenges researchers to outline their vision of the accessibility problems and possible solutions to these problems around 2040 in inter-university research proposals. The research proposals should show how the results of the proposed research can contribute to tackling the above-mentioned accessibility problems. Qualitative criteria for defining sustainable accessibility of the Randstad in the future are:

- Limiting home-to-work commute times, particularly between the main cities, between home and work;
- Increasing the reliability of travel times;
- Soundness of infrastructural networks that can cope with unexpected events (*e.g.* accidents and weather conditions);
- Increasing the economic vitality of the Randstad;
- Strengthening the international competitive position of the Randstad;
- Sustainability of the transport and infrastructure system, partly in view of climate change and energy transition.

Relevant perspectives in this context include: connecting different scale levels, the synergy between urban and infrastructural networks and the interconnectivity of infrastructure networks. Which gaps in our knowledge appear if we reason from the future perspective being outlined? And how can these gaps be filled? How exactly is the accessibility of the Randstad defined and quantified from a network perspective? To what extent and in what way are the internal and external accessibility of the Randstad affected by climate change, the new water level and the energy transition? How can a 'no regrets' policy be followed in the short term, given the many uncertainties that surround the future? These are the key questions in the Sustainable Accessibility for the Randstad research programme.

This brochure describes six sub-programmes that together constitute the research programme as a whole. Participating inter-university consortiums from 3 or 4 university research groups will be asked to submit proposals. The descriptions in this brochure are not binding, but offer an indication. Each consortium is free to make their own choices within each sub-programme: leave out themes that are referred to in this brochure and add themes that are not referred to here, as long as the addition or omission leads to research that is clearly relevant to the sustainable accessibility of the Randstad in the longer term. The submissions are assessed on the basis of: societal relevance, scientific aims and quality, organisation, and financial aspects. Assessment criteria include:

- The originality of the proposals;
- The way in which the sub-programme is anchored in national and international alliances;
- The concrete approach to knowledge valorisation and dissemination in cooperation with the Ministries of Transport, Public Works and Water Management (V&W), Housing, Spatial Planning and the Environment (VROM) and Economic Affairs (EZ), provinces, municipalities, civil society organisations and/or the business community and the tangible perspectives for incorporating the new knowledge into research and education programmes (MSc, PhD, post-initial programmes).

Research themes

Due to the high density of the activities and the facilities they require, the Randstad has favourable opportunities for high productivity, accompanied by major comparative advantages. On the other hand, this very density also raises many problems in terms of high external costs, such as congestion in the transport sector and serious risks that the quality of the living and working environment will be compromised.

In this respect, it goes without saying that the Randstad does not exist suspended in a static situation; it is constantly exposed to a plethora of influences. In the longer term, this means trends on a massive scale, in such fields as climate change, energy transition, globalisation, demographics (from an international perspective) and technology. These mega-trends set the stage for the theme of sustainable accessibility of the Randstad to be addressed. These mega-trends as such are not part of the programme, but the influence that such pervasive trends will have on issues of sustainable accessibility, is.

The issues relating to sustainable accessibility of the Randstad in the long term can be grouped into six inter-related themes (see also Figure 1):
1. Climate change and energy transition: consequences for the Randstad infrastructure;
2. External accessibility of the Randstad, particularly the mainports;
3. Internal accessibility of the Randstad, particularly the cities;
4. Synergy between urban networks and infrastructural networks;

5. Ecological quality and infrastructural networks;
6. Governance in transport and infrastructure.

More particularly, the programme focuses on the internal and external accessibility of the Randstad to both goods and people, as well as specific information traffic. Where sustainability comes under pressure, the emphasis is on adaptation policy, and on supporting and strengthening the mitigation policy where possible. The sustainable accessibility (including external safety) of the Randstad concerns the Randstad as a whole, but also the mainports (Amsterdam Airport Schiphol, the Port of Rotterdam), the Randstad wings, and the major metropolises in the Randstad.

The Randstad is not located in Euclidean space, but in a highly specific environment that presents all sorts of obstacles on the one hand and vast opportunities on the other. Although one aim of scientific research is always the potential to generalise its findings, the research will constantly need to take into account the specific spatial features within the Randstad and beyond, and the numerous path dependencies.

Knowledge development

As a research theme, the issue of sustainable accessibility within the Randstad and to that area is not inspired solely by policy problems and challenges for public and private parties, but is – and that is not an entirely separate matter – a fertile theme for innovative scientific research. By maintaining an orientation on the Randstad as a coherent entity of cities, networks, physical structures and actors making decisions within that conglomerate whole, researchers are challenged to address fundamental research questions on the basis of their vision for the future, within their disciplines. In that context, the closely-knit nature of the region encourages multidisciplinary cooperation.

2 Aim

The research programme leads to interesting scientific questions in various fields. For example, it concerns such questions as finding the conditions in which second-best policy on combating negative external effects produces results that are as close as possible to the very best options.

Other important questions reside in assessing the perception of the quality of spatial planning and of the services provided by the transport infrastructure in the eyes of the relevant actors: inhabitants of the Randstad, but also companies that are based there or considering relocating to that area. Research on the economic importance of a smoothly running Randstad infrastructure also challenges researchers to analyse economic enhancement of cities within networks, taking into account the connections between the various cities in the Randstad.

The following strategic principles are important in developing knowledge in the theme of Sustainable Accessibility of the Randstad:

- The programme must contribute to strengthening the knowledge infrastructure for traffic and transport within the Netherlands, as part of Europe;
- The programme must generate innovative knowledge regarding sustainable accessibility of the Randstad, from which private and public parties can profit;
- The knowledge infrastructure will be bolstered in part by strengthening and anchoring university research in the long term and by improving cohesion between university and non-university research;
- Fundamental, strategic research should produce results that meet a high standard of science;
- The programme must intensify the cohesion and cooperation between the social sciences and the broad spectrum of science and technology research in the field of traffic and transport;
- The research results from the programme will be open to the public, since the research is pre-competitive. The results will have a trickle-down effect in education;
- The education component in the programme will be provided in part by the fact that young scientists (primarily PhD students) gain knowledge and training by conducting research. It is also important for the research to be integrated into master’s and PhD degree programmes.

2.1 The six DBR themes

The following section outlines the themes that will provide a basis for PhD and post-doctoral projects. Professors and senior university lecturers from the participating university research groups will manage and coordinate the implementation of the research programme. The working premise is six inter-related themes, which will be integrated into a total research programme. Assurances for the cohesion and cross-pollination between the projects, which have also been incorporated in various sub-programmes, will require a great deal of attention and effort in the programme implementation.

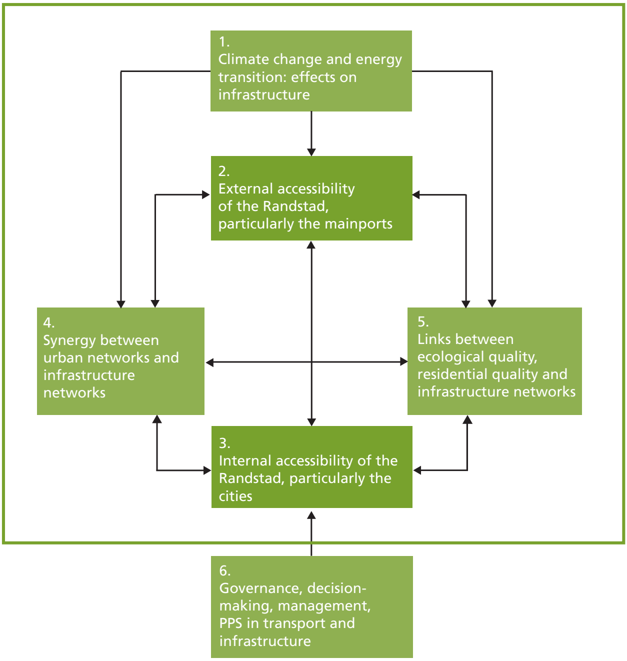

Figure 1. Six Themes on Sustainable Accessibility of the Randstad.
(The most important connections between the themes are marked with arrows. To some extent, all six themes are connected and all the boxes should be linked by arrows.)

The following sub-sections outline themes that could be covered within the scope of the programme. The researchers are challenged to work on the basis of their vision for the accessibility of the Randstad in the future, within these broadly formulated outlines, to formulate research proposals that demonstrate a high standard of science and that make a significant contribution to innovative knowledge that is useful for policy aimed at sustainable accessibility of the Randstad in the long term, with a time horizon in excess of thirty years.

2.1.1 Climate change and energy transition: possible consequences for the Randstad infrastructure

In recent years, a great deal of research has been done in the Netherlands on the theme of climate change and possible adaptation issues in relation to the lack of space. There is a growing awareness that the Randstad is among the most problematic locations, because of the convergence of the risks of the rising sea level and the greater water discharge from the rivers, in combination with continuing soil subsidence. The quality of the water is also an issue. This demands spatial strategies, *e.g.* for multi-purpose land use, such as combining water storage and other functions that create value, in order to overcome the spatial issues. Recent exploratory studies such as "*Nederland Later*" (The Netherlands Later) make it clear that many research questions are relevant here. Most of these will primarily be addressed in other research programmes, such as ARK and the Adapting Spatial Planning to Climate Change programme. In the programme on Sustainable Accessibility of the Randstad, the scope of the research is defined as follows: the exclusive focus is the connections between climate change and transport & infrastructure, in which indirect effects may also become relevant when climate considerations lead to other spatial planning decisions that have consequences for accessibility.

Climate change has various potential consequences for the accessibility of the Randstad. For example, the capacity and successful operation of roads and railways clearly depend on the prevailing weather regimes. This is a matter of complex connections that have thus far been the topic of very limited research in scientific terms. This concerns interactions between the effects that unfavourable weather conditions have on the transport demand (behaviour: e.g. choice of departure time, choice of speed), the chance of accidents and the resulting travel times. It is precisely in networks that are vulnerable to congestion, such as in the Randstad, that these types of weather-dependent interactions are relevant. The issue of developing robust networks, *i.e.* networks that continue to perform well if specific links or junctions are affected by major malfunctions, flooding, disasters or reports of terrorism, gains additional importance in the light of changes in the climate and the associated risks of flooding and weather variations. The behavioural component is also important here: citizens and companies can change their mobility behaviour in light of the changes in weather and climate. Additional important questions concern the extent to which infrastructures and accessibility are jeopardised by the changing climate and the new water task, and how this threat can be reduced (adaptation policy). To what extent can the Randstad learn from experiences gained elsewhere? The operation of the port of Rotterdam (water fluctuations on the Rhine) and Amsterdam Airport Schiphol (weather sensitivity of airport operations) are also relevant here.

Adapting the transport infrastructure to the changing climate conditions will presumably lead to additional investments; it is important for scientific research to produce results that can be used to generate cost-benefit analyses in order to avoid investing too much or too little. Public support for these types of adaptation also needs consideration. It is also important to be aware that there could be synergic opportunities (*e.g.* some strategic links in road and rail infrastructure could be elevated, making this part of the infrastructure less vulnerable, while simultaneously creating water countermeasures). This would give transport infrastructure not only a connective, but also a protective function in relation to the values of the economy and cultural history in the Randstad.

In addition, an energy transition will be needed in the medium term in order to counteract the shortage of fossil fuels and limit CO_2 emissions. The mixture of policy instruments used here will be accompanied by both technological innovation and behavioural change, even if only in terms of the behaviour with respect to purchasing vehicles. Of course the chances for successful adoption of innovations will increase if consumer preferences are taken into account during development. However, attention will also be focused on the potential for change in choosing a mode of transport, precisely in the Randstad where the conditions for public transport are relatively favourable. There is a pressing need for in-depth analysis of the behaviour of supply and demand parties on the transport market (passenger transport and freight transport) in the context of new opportunities and restrictions. Telecommuting is an example: in many respects, the technological conditions for telecommuting have been met. Telecommuting does in fact take place, but not in the way that had initially been anticipated: there are still few employees who work from home all day. More generally, research on potentially counterproductive (rebound) effects from policies aimed at energy conservation is crucial to prevent policy failure.

A related theme concerns the adoption and diffusion of innovations. Technology research as such will not take place in this programme, but the analysis of the consequences that possible technological developments may have for providers and users of infrastructure in the Randstad is naturally important. A recurring dilemma is the fact that the implementation of some technologies (such as some 'clean' fuels) often requires that a certain critical mass of users adopts those technologies before they also become attractive for others (e.g. because sufficient numbers of filling stations need to be equipped to supply the appropriate fuel). Such external network issues can cripple the diffusion of sustainable technologies, but it is exceptionally difficult to control and direct these types of processes, particularly if there is uncertainty about or between technologies. That is why it is essential to conduct research on factors that influence the acceptance and adoption of new technologies. Features both of the technology and of potential users are important here. Such insights are needed to develop 'no-regrets' policy.

2.1.2 External accessibility of the Randstad, particularly the mainports

The external accessibility of the Randstad is determined to a large extent by the location of the Randstad as a logical transfer and transhipment point between Europe and other continents, and between Great Britain and the European continent. The position in the delta of the Rhine, Maas and Schelde rivers and the proximity to the Rhine-Ruhr region and the Flemish Diamond has a major influence on the traffic of passengers and freight to and from the Randstad. The Randstad has three mainports: Amsterdam Airport Schiphol, the port of Rotterdam and the ICT hub in Amsterdam at Watergraafsmeer. Moreover, like Groningen, Europoort acts as an energy junction, and the Randstad is home to several vegetable and flower auctions that could be considered (global) greenports. In relation to research and policy regarding the mainports, globalisation is the most important of the abovementioned mega-trends. Besides the macro-economic trends, the strategies of the various actors in the chains are also important for the mainports. A world-wide perspective on the chains would be preferable here.

The external accessibility of the mainports is intercontinental (by air and via the oceans of the world) and continental (by land via road, rail, inland shipping and pipelines, and by continental air routes).

The intercontinental external accessibility seems primarily to be a matter of logistical choices. In general, the use of certain flight paths and shipping routes do not require many investments in infrastructure outside the mainport itself. The logistical networks in supply chain management could in principle be changed relatively quickly and drastically. In some respects, this makes the Randstad vulnerable. Competition from other major seaports and airports is fierce. Consider the spectacular investments planned for the Dubai airport, or the growing significance of the port of Antwerp. There is also a growing trend to take the ecological footprint of logistical chains into account, and the mainports are an important link in such chains. This presents both threats and opportunities. In all this, it is important for the climate to establish business activities in the Randstad remains attractive and that it is considered important both now and in the future to go through Schiphol or Rotterdam respectively.

In order to understand the long-term development, it is important from a scientific perspective to analyse the behaviour of the most important actors. Amsterdam Airport Schiphol can serve as an example here. Important parties that have a relationship with Schiphol, besides the airport itself, are the other (complementary and competing) airports; in this context, the airports that are important to the Randstad are not only Schiphol, Lelystad and Zestienhoven, but also airports in other parts of the Netherlands (such as Eindhoven) and to some extent in the neighbouring countries. Then there are the travellers and the companies they work for, or the companies whose services they use. The selection behaviour of travellers and shippers is a determining factor for Schiphol's growth opportunities, but these opportunities also depend to a great extent on the strategies of the airlines (and in Schiphol's case particularly the main carrier, Air France-KLM, and the Skyteam associated with that carrier), and whether or not they use hub-and-spoke strategies. Government authorities at various levels are also important due to such themes as regulation/deregulation, land-side access (for example by the HSL rail line), pricing and policy on spatial development, noise pollution and emissions. In particular for the policy on pricing, each of the themes discussed here could potentially make a contribution to sustainable accessibility in the Randstad. The function of the airports as transit and transhipment points between intercontinental and continental destinations and feeder lines deserves further attention, as does the direct association with residential and industrial areas. A chain approach is essential in order to gain an accurate impression of the relevant relationships. The theme of cohesion between the mainports in the Randstad also deserves more serious scientific attention.[1]

The rapid developments in the field of aviation after deregulation in the EU have made the topic of the industrial organisation in the aviation sector a fertile research theme. For the Randstad, important issues include how the developments in the airline community have an impact on the airports and what influence travellers and airfreight shippers and their diverse preferences have on this factor. Other important research themes include analysing the consequences of possible developments in relation to the liberalisation of flights to other continents, or the consequences that raising the price of aviation (by means of eco-tax on flights) will have for the external accessibility of the Randstad. Analysing experiences in other multiple-airport systems in Europe and elsewhere can offer relevant additional insights for how Schiphol performs in relation to other existing or future airports in the Randstad and its surroundings.

Besides the example of Schiphol, a comparable analysis can be conducted on the position that the port of Rotterdam occupies in intercontinental and continental networks, taking into account the supply chain management of the chain directors, the government policy at various levels, and the behaviour – including decisions on location – of important clients. Similar to Schiphol, it will be necessary to look at the limiting conditions with respect to health and the environment. The focal points in international freight traffic are shifting. Research could be done on whether this shift will continue in the coming decades. If increasing numbers of containers come in from Southeast Asia, will the port of Rotterdam be carried along on the wave of that region's booming economic growth? What about container

1 see KiM study, Synergie tussen de mainports

traffic from Europe to Southeast Asia? What about development in other parts of the world? And what will be the strategies of the parties identified in the development of global supply chains and networks? What are the prospects if the networks become more client-driven (demand networks)? What options are created by advanced navigation systems and systems that use dynamic slots?

The abovementioned mainports serve an important transit and transhipment function. The constant aim is to carry out a great deal of activities in and around these mainports that provide added value at that location. It is important to look beyond just the mainport itself. Via Air France-KLM, Amsterdam Airport Schiphol already has a special relationship with Charles de Gaulle Airport in Paris. Lelystad and Zestienhoven could take over parts of Schiphol's portfolio of activities. The relationship between Schiphol and other airports in the region, like Eindhoven or Zaventem, is also important. Anyone studying the port of Rotterdam would be well advised to take its relationship with Antwerp into consideration, as well as the role of the port of Amsterdam and of other regional seaports and airports.

The external accessibility of the Randstad is determined in part by its connections with the European network of high-speed trains. The Randstad is on the edge of that network, linking to it towards the south (TGV) and the east (ICE). The interconnectivity between the European HST network and the European airports will presumably be an increasingly important factor. The extent to which this will be accompanied by a modal shift from continental air traffic to HST traffic requires further research.

The external accessibility of the Randstad is not just intercontinental; it also has a continental dimension: the connections between the Randstad and the rest of Europe. With regard to the freight traffic, the multimodal hinterland connections from Rotterdam and Amsterdam are of primary importance: motorways (which sometimes have separate haulage truck lanes), the railway network (including the Betuwe Line), inland waterways, coastal shipping and pipelines. The high market share of inland shipping is characteristic of freight traffic in the Netherlands. Crucial factors include the location, nature and capacity of the terminals in the network of hinterland connections.

Little is known about how the ICT hub at Watergraafsmeer functions as a mainport. Research could be done on how Watergraafsmeer functions as an ICT hub for business users, the connectivity and the associated tasks, as well as potential consequences for the location behaviour and mobility behaviour of business users.

A familiar example of a smoothly operating combination of freight traffic and logistics is the flower auction complex in Aalsmeer, which gives the Randstad a global position in flower cultivation, flower trading and flower transport. Several greenports are also increasingly developing into centres in a complex of vegetable cultivation, international trade and international transport of fruits and vegetables. Research could look at the future prospects for these and similar arrangements and combinations that have ties to the Randstad. This could include arrangements in which the logistical chains of a range of commercial parties are coordinated and directed in mutual cooperation using modern ICT technology.

With respect to the external accessibility of the Randstad, besides the quality of the infrastructure and the transport services it provides, the barrier effect of national borders is also relevant. To this day, institutional differences still act as a serious inhibitor on international passenger and freight traffic. It would be possible to investigate the extent of the barrier effect presented by borders within the EU and beyond, the changes that seem to be occurring and the consequences they will have for the Randstad as an international switch point.

The development of passenger and freight traffic to and from the Randstad will be determined at least in part by the economic development of the Randstad, adjacent and competing regions, the next stages in the globalisation of international freight traffic and international division of labour, the international migration to and from the Randstad and the associated demographic development of the Randstad. These interrelations, both now and in the future, should be researched further and explained using statistical analysis.

2.1.3 Internal accessibility of the Randstad, particularly the cities

The main task is to conduct a coherent analysis of the accessibility of the Randstad. In many cases, that means an analysis of networks, in which the relationship between networks is studied on various scales. The internal accessibility of the Randstad is linked to a significant extent to the task of limiting and controlling the travel time from point of origin to destination. On the one hand, this is about reducing the door-to-door travel time; on the other, it is about increasing the reliability of the connections and reducing uncertainties about travel times. This could involve a single modality, but it is often about a combination of modalities, linked by transit points (stations, *etc.*) and transhipment points (terminals). The researchers should bear in mind potential technological innovations in vehicles, transport systems, ICT applications, energy carriers and/or propulsion mechanisms.

An integrated transport system should make it possible for travellers to make easy transfers at select locations offering a rich and varied level of services that are attractive to the user. Freight traffic is a similar situation: in this case, national and international freight traffic and urban distribution need to be linked. The concept behind the Stedenbaan (synergy between junctions and railway) could be developed consistently within the Randstad and beyond. Further research is required on ways that this could be achieved. One important area for attention concerns the behavioural response of the various parties. If that response were sufficiently understood, it would be possible to work on optimising the scope of networks, lines and junctions. If the value of the junctions increases, it will elicit interest from project developers, including NS Poort. Municipal direction is necessary for the destinations and the functional programme of the junctions. Agreements on value capturing seem to be essential, so contributions can be made to covering the costs of lines and networks. The infrastructure network is controlled by the national government, the Randstad authorities and Prorail. Numerous coordination problems arise here that require research and resolution. In this context, research could also be done on Deltanet. What terms would have to be met in order to introduce a train system in the Randstad that runs so efficiently and frequently that travellers no longer need to consult a timetable – or is that just a pipe dream?

The internal accessibility can be considered at the level of the Randstad as a whole, but also at the level of the individual urban agglomerations with the South Wing and the North Wing. Particular attention should go to the interaction between internal and external accessibility: the relationship that the Randstad has with the rest of the Netherlands and the European Union. The key question in each area is how the road network (car) and the rail network (train) can be combined with high-quality forms of urban and regional public transport, and what lessons can be learned in this respect from the policy in comparable metropolitan regions in Europe and other parts of the world. Average total travel times should be taken into account here, as well as various other angles. For example, it is essential to take into account uncertainties about travel times. Unravelling travel times to various elements of the transport chain (walking, waiting, transfer time, looking for a parking place, *etc.*) while taking into account how travellers appreciate these elements is also essential. This type of approach is indispensable in finding the right balance between improvements in access networks and connecting networks.

The interaction between ICT and transport infrastructure is highly significant: using real-time information linked to specific parts of the infrastructure, it will be possible for an intelligent Randstad infrastructure to emerge, which the traveller can use to support decisions on mobility, mode of transport and route. It is necessary in this context to keep a constant focus on the user's perspective: the demand side. The primary focus here will be on the importance that the user places on the quality dimensions of accessibility and individual differences in this area. Developments in ICT are bringing individual optimisation of the travel time or route within our grasp. However, that selfsame individual optimisation may also create accessibility problems. How fully informed travellers will determine the traffic pattern in a network after an incident or after unusual congestion is a scientifically important question. Even the distribution of balance could come out completely different as a result of stochastic aspects. Subjective aspects also play a role here, primarily in the precise way in which travellers handle information and in the perceived travel times. ICT can play an important role in reliability, predictability and perception of the travel time, primarily by providing adequate travel information. Up-to-date and sufficient travel information has the potential to improve the operation of the mobility system by offering the traveller favourable travel routes and expected travel times at any time, specifically tailored to the user's preferences, thus facilitating decision-making. As a side effect, this could generate new commercial activities and services. However, (private) mobility management for the work-home commuter and business traveller has been an underdeveloped field to date. A personal approach, with assistance in the form of information tailored to the individual mobility user, may be able to change this. This research focuses on the terms in which ICT can lead to a successful incentive in minimising accessibility problems. Acceptance and utilisation go hand in hand here, by using a personal approach with adequate interfaces, ambient intelligent agents, web services on trips, etc. In logistics as well, additional ICT applications could make a significant contribution to improving the sustainable accessibility of the Randstad.

Besides these approaches, which are more focused on physical networks and ICT, other policy dimensions will naturally also need attention, such as pricing mobility. Although a great deal of attention has already been paid to that issue in the Netherlands and the rest of the world, it is remarkable to note that the range of uncertainties remains extensive. It is particularly important to gain a better understanding of the secondary effects, such as the long-terms applications in terms of locations for businesses and households, as well as how the revenues are spent (investments in roads, in public transport, in tax cuts?). This may also be able to reduce the uncertainties in the estimates for such aspects as long-term price elasticity.

Another theme concerns the role that logistical networks play in the accessibility of the Randstad. There are clear bottlenecks, particularly in urban distribution, both for the accessibility of urban destinations and for the influence that deliveries have on urban liveability. Among other things, there is a need for a thorough analysis of the forces that help determine such aspects as frequency of delivery and location patterns in the retail sector. For example, there is the question of whether a better supply of information could lead to a decrease in the number of freight movements. In addition, innovative physical solutions should be explored.

The institutional dimension is also very important here (see also theme 6). To a certain extent, this is about the roles in the public sector. The theme of the possible policy competition between national, regional and local government authorities, each working to affect pricing from its own angle (e.g. via levies, congestion taxes and parking fees), evokes the question of which set of rules offers a perspective for the best possible final result for accessibility across the board. This explicitly concerns how to use a combination of instruments, and not just price policy as such. These questions are scientifically challenging; it can be expected that the answers will enhance the development of effective policy. Another institutional approach in the public sector concerns coordination of the various systems (national motorways, secondary roads, railway lines, urban and regional transport: bus, light rail, metro). Comparable research and policy questions arise here.

Another focal area is the opportunities offered by private financing or co-financing of infrastructure, forms of private capacity policy and the mobility policies set by employers (including public transport year passes and company lease cars).

As indicated above, internal and external accessibility of the Randstad are linked in various ways. In this context, infrastructure policy sometimes also evokes dilemmas. If the connections between locations are improved significantly and the travel time is reduced, increasing numbers of households that have one or more jobs in the Randstad could decide to live outside the Randstad; ownership and use of a second home elsewhere in the Netherlands or elsewhere in Europe (or even within the Randstad) could also increase. This would significantly increase the ecological footprint of the people working in the Randstad. On the other hand, the ownership and use of a second home could increase flexibility in the housing market, particularly if the legal distinctions between owner-occupied residence and second home were eliminated in many situations. This creates room for interesting research and policy questions.

Commuter traffic primarily affects the accessibility of residential and business locations within the Randstad (particularly in the urban regions, the North Wing or the South Wing). It is conceivable, if the current trends continue, that a growing percentage of the movements between home and work could take place between the Randstad and the regions outside the Randstad. To an increasing extent, the external accessibility of the Randstad is also in jeopardy as a result. The Law of BREVER (Constant Travel Time and Trips), although more capricious a factor than the title of ‘Law’ might suggest, plays havoc with the best-laid plans of the infrastructure and spatial engineers: the faster the connections between home and work, the greater the chance that the home and work locations will be moved to a greater distance; the distance increases while the travel time remains constant. These well-known mechanisms require further research in the light of future accessibility to and within the Randstad.

2.1.4 Synergy between urban networks and infrastructural networks

Accessibility is defined broadly in this programme: it encompasses not only the quality of the infrastructure networks, but also the spatial distribution of activities. This signifies that the accessibility situation in the Randstad needs to be assessed appropriately: although there may be many bottlenecks in the networks, the high density means that there are many potential interactions within shorter distances. Transport systems and spatial development in the Randstad are in a constant flux of co-evolution, in which developments in one system are both the determinant and the result of developments in the other system. The demand for travel arises from the phenomenon that people want to do various activities (living, working, shopping, recreation) at different locations, or because businesses derive various input from various locations and then sell their products in different locations altogether. At the same time, the location behaviour of households and companies is determined to a large extent by transport costs, linked to accessibility and reliability. Due to the network structure of traffic and transport, it is primarily relevant near important junctions, such as major stations and airports. At the same time, these locations often have major accessibility problems. The co-evolution discussed above means that developments are often self-fulfilling. For example, an easily accessible airport attracts extra activity, which in turn generates extra traffic, which may then lead to a larger network for the airlines involved, giving even better access to the airport. This interaction between transport, networks and junctions, as well as spatial planning, makes it very important to understand how mainports develop, but also to find ways to guide them in a direction acceptable to society. However, a great deal of the knowledge in this field is fragmented and anecdotal, which creates the risks of unwise decision-making in and around junctions, often based on difficult-to-verify but appealing arguments involving economic growth, prosperity and employment. This field of research attempts to arrive at a better identification of the relationships between spatial planning, infrastructure and network developments, and their implications. This can be achieved through empirical and modelling research, and can concern various modalities and types of junctions (including mainports). This research is also important in the context of the methodology issue of where the Randstad's boundaries lie.

The spatial impact that the infrastructure policy has on various scales can be analysed. This primarily involves location decisions. These decisions are very important for long-term studies, such as the programme at hand. In addition, they are also scientifically provocative: much more information is available on the short-term aspects of infrastructure users (such as the choice of a mode of transport) than the long-term aspects. Moreover, the attention for behavioural factors (in businesses and individuals) can be placed in the context of imperfectly functioning markets, such as the housing marketing and the job market, and how they are related to mobility. This is clearly an issue of institutional problems in non-transport markets that exacerbate the transport problems. Research on the consequences that these institutional problems have for mobility brings us a step closer to solving transport problems. In this context, the interaction between the infrastructure policy, the utilisation of infrastructure capacity and the spatial layout deserves further research. More generally, attention should be focused on behavioural responses from individuals, households and companies, for example as the foundation of the Law of BREVER. The relationship between choice of modality, mobility and building density (urban form) requires attention. Considering these research questions in a more particular context leads to such questions as: how to achieve high-quality urban and regional transport, taking into account the location behaviour of businesses and households; how to strengthen the synergy between road traffic and public transport; and how a clever combination of measures in infrastructure and spatial design can increase the percentage of cycle and pedestrian traffic (in part in relation to public housing).

In choosing a location, businesses and household balance various aspects of spatial quality against each other, and accessibility is one of those factors. Infrastructure and the associated choice of location are important not only to the transport issue, but also to productivity and thus to the performance of the Randstad economy and to strengthening the agglomeration advantages in that area. However, little systematic research has been done on the contribution of the quality of accessibility to the attractiveness and productivity of metropolitan regions. As a result, there is a lack of knowledge on the actual economic importance of investing in accessibility.

A related theme is that of the indirect effects of transport policy, which cost-benefit analyses currently do not address. The OEI guidelines (Overview of Effects Infrastructure) for social cost-benefit analysis do refer to these effects (which, it should be noted, could be both positive and negative), which involve imperfections in the relevant markets but are not yet taken into account in practice. Precisely because the markets in the Netherlands that are dealing with major imperfections (housing market, job market) are closely related to the transport market, it would seem obvious to focus more attention on this issue. Developing knowledge in this field is not only scientifically challenging, but also extremely important to strengthening policy support instruments in the longer term. One possible research tool here would be a spatial balance model (general or partial).

2.1.5 Relationship to ecological quality, residential quality and infrastructural networks

This theme is about the influence of transport infrastructure on the qualities of the landscape and ecology in the Randstad. Besides the accessibility advantages that infrastructure generally offers, there are also potential disadvantages in the area of spatial quality. Transport infrastructure is often in conflict with landscape qualities, ecological qualities and the qualities of an area for use as a residential neighbourhood or open-air recreation area. Cutting through the landscape can reduce the visual quality, cause noise pollution and generate emissions of greenhouse gases, fine dust and other harmful substances, as well as vibrations and traffic hazards. Developing or redeveloping traffic infrastructure requires an integral approach to developing the area as a whole, considering transport connections and residential qualities in context. This applies both to line infrastructure and to point infrastructure, such as airports. The perceptions and behaviour of drivers, cyclists, pedestrians, residents and holiday-makers are very important here.

In practice, this tension between transport infrastructure and residential and ecological qualities often greatly influences the decision-making process (see section 2.1.6) and deserves further research in part for that reason. For example: How can green and blue elements (nature and water) be valued, and how is it possible to do full justice to these values in a social cost-benefit analysis? The two primary dimensions here are noise pollution and visual obstacles. With respect to noise pollution, the analyses of the negative effects generally concentrate on home values. To date, there has seldom been an integral evaluation of noise pollution from different sources (including traffic noise); instead, the analyses are generally limited to a single source (such as aircraft noise). There are opportunities here for more overall analyses of noise pollution, in which the assessment of decibels produced by the different modes of transport (aircraft, train and road) can also be discussed. Very little research has been done to date on assessing visual obstacles. Research on these quality aspects is important; as incomes increase, the quality aspect can be expected to play an increasingly important role in valuing households and companies, which in turn influences the social cost-benefit analysis. Finally, the question can be asked whether new research and optimisation techniques can be put into play in order to gain a better understanding of the future sustainability of access to the Randstad.

2.1.6 Governance, decision-making, management and public-private partnerships in transport and infrastructure

Increasing the long-term sustainability of Randstad accessibility requires efforts from public and private actors in a broad range of fields. It is possible that different management and steering techniques will be needed than what has been customary to date. Economic, governmental and behavioural approaches will have to be combined in order to arrive at valid insights and policy recommendations. Gaming and simulation techniques could be used in this context, as well as methods for practical ways to deal with uncertainties or options for reducing those uncertainties. The following list describes a number of governance dimensions.

1. Some policy instruments will take the classical form of orders and injunctions (do’s and don’ts). Issues of enforcement, sanctions and inspections play an important role here. This could include criteria applied to vehicles (cars, trains, ships, aeroplanes, etc.), such as emission and noise standards. Orders and injunctions could also be linked to infrastructure use (road traffic laws, speed limits, etc.). This will often involve preserving public values, such as safety, public housing, sustainability and energy-saving measures. The regulations can be formulated at an EU and/or national level.

2. A second category of policy instruments concerns *financial instruments*, which are generally associated with proposed incentives. The incentives could be subsidies, fiscal incentives or public investments. This category comprises fuel consumption taxes, differentiated parking fees (which could also be accomplished by market parties) and the application of road pricing differentiated on the basis of time and place. Ideally, prices will be structured in such a way that all the external effects are internalised. The use of public investments can bring the realisation of new infrastructure closer. Criteria can be set (see the previous item) for infrastructure realisation, upgrading or maintenance that guarantee public values.

3. A third category of policy instruments is available in the realm of *organisation and vertical coordination* (EU, national, provincial, regional, local). It could also concern *horizontal coordination* (co-production of policy between policy sectors, as well as public-private partnerships). In this case, the distribution (and determination) of risks is an important task. Finally, it could concern *internal organisation and entrepreneurship* in order to arrive at a decisive approach, take initiative, bring parties together, avoid impasses and maintain an effective and efficient form of project management, which anticipates procedure for appellate review and deviations from national and European rules.
   Aspects of these coordination tasks include promoting synergy between the motorcar system and public transport; promoting a mutual adaptation in property development and public transport infrastructure development (relationship between the Ministries of Transport, Public Works (V&W) and Water Management and Housing, Spatial Planning and the Environment (VROM)); coordinating urban and regional policy (such as urban and regional public transport); and promoting integral regional development, in which harmony has been achieved between redevelopment in town and country planning, urban renewal, nature management, water management and infrastructure development (the Ministries of Transport, Public Works (V&W) and Water Management and Housing, Spatial Planning and the Environment (VROM), Economic Affairs (EZ) and Agriculture, Nature and Food Quality (LNV)). An adequate policy on competition is also important in this context. New forms of tender (D&C; BFOM arrangements for 20-30 years) may become relevant here.

Sometimes it is about coordinating policy sectors that are not always closely related by nature, such as the mainport policy and the application of logistical concepts (V&W-EZ), the coordination of transport infrastructure and ICT infrastructure (V&W-EZ), or the coordination of mobility policy and such issues as opening hours for shops and schools, working hours, holiday scheduling and working from home (V&W-EZ).

4. Then there is the set of policy instruments aimed at *information and communication*. This could be about promoting car pooling, notifying individuals about traffic congestion and about emissions and air quality, or by exercising persuasion.

5. Finally, there is the old, familiar instrument of *public works* implemented by the government itself: building and adapting the capacity of the infrastructure and maintaining the infrastructure. Spatial planning can be put into this category. The question is whether the government authorities will also be providing infrastructure, property and services itself in future, or if it is possible and advisable to set criteria for the production of goods and services by private parties in the context of quality, competition and public values, so that the government could concentrate more on its (presumed) core tasks.

The intention to put a price on mobility, differentiated by time and location, may lead to a mobility market on different scales, the effects of which we do not yet fully understand. This is true of both passenger and freight traffic. It also applies to road, rail and flight traffic. From a governance perspective, pricing measures can lead to a greater private role in infrastructure: specific road sections/connections or larger networks, which could create different impressions of the question of whether the property should be privatised entirely, or whether it should be about specific tasks such as maintenance and management. The hoped-for advantages – such as increased efficiency, decisive management and constructive, easier access to financing – will have to be offset against the dreaded disadvantages – generally connected to the formation of market power. How private road management can make a maximum contribution to achieving sustainable mobility and accessibility is also unknown; it is clear that a great deal will depend on the question of whether calls for tenders will be issued and if so, how much, how competing providers will be distributed over the network, and whether and how private providers will be regulated. Of course this cannot be seen separately from privatisation of public transport, which some experience with calls for tenders has already been gained, and where the introduction of the public transport smartcard facilitates more innovative price policy and rate differentiation. This creates a potential playing field for independent providers in which the question is how they can be employed to best effect in order to achieve a more sustainable traffic and transport system. The fact that greater market influence does not always have the desired effects is illustrated by the disappointing results of deregulation in the taxi transport sector. One challenge is the fact that the effects of market influence not only achieve economic efficiency benefits, but that the design also supports the process of achieving sustainability targets.

This field of research aims to create a better understanding of the operation and regulation of network markets. This involves the prices, the capacities, the user demand, and the associated prosperity, as it can be expected in various institutional arrangements and models of market regulation. In this context, experiences in other countries can sometimes be significant as best practices. To what extent would it be recommended to split ownership of the infrastructure, the vehicles and the services? How can problems that occur in interface management (e.g. lack of safety) be resolved? What price policy can be used by both public and private parties in networks, and what effects will that policy have? How can market parties (and particularly the consumers of mobility services) be informed in such a way that they thoroughly understand the systems and make a well-considered and responsible choice? Which combination of policy measures has a good chance of success? And how can the acceptance of measures that might seem unpopular at first glance be improved so that effectiveness and acceptance can be combined? What institutional arguments can be developed for the design, construction, maintenance and management of different types of infrastructure and the implementation of public transport services? What experiences have other countries had with these arrangements? How can public values be safeguarded in the various arrangements?

2.2 Coordination with completed and ongoing research

The programme on Sustainable Accessibility in the Randstad is not unfolding in splendid isolation. The research programme builds first and foremost on a number of ongoing BSIK projects: Transumo, Next Generation Infrastructures and (to a lesser extent) Innovative Use of Space. The programme also builds on the recently completed NWO-Connekt programme on Traffic and Transport.
In the Netherlands, a number of intrinsic relationships between the executors of the Randstad research programme and third parties would be obvious. Examples include:

- The Royal Netherlands Meteorological Institute (KNMI) for state-of-the-art information on climate change;
- The Adaptation programme on Space and Climate (ARK), which will start soon;
- The innovation programme on Logistics and Supply Chains, which is being prepared by the Van Laarhoven committee in cooperation with SenterNovem;
- Deltares, primarily to strengthen the relationship between water management and social sciences.
- The planned Knowledge and Innovation Centre in the EU Framework Programme regarding the energy transition, which is being set up in the Delft University of Technology.

The research programme referred to here will be implemented by research groups to be selected, in cooperation with MIT, KIM, CPB, SCP, MNP, RPB, NICIS and the Royal Netherlands Meteorological Institute (KNMI), among others, and in consultation with the Ministries of Transport, Public Works and Water Management (V&W), Housing, Spatial Planning and the Environment (VROM) and Economic Affairs (EZ), as well as eligible civil society organisations, umbrella organisations and market parties. The research programme to be undertaken should also be firmly and tangibly embedded in the international arena.

The university research groups involved generally participate in national research schools (such as NETHUR, TRAIL, the Tinbergen Institute, ERIM, Beta and SENSE). The knowledge networks will be used to the fullest, in order to arrive at mutual coordination of the research. That also applies for utilising international research networks, such as AESOP, NECTAR, STELLA, IAAP, ENHR, ERSA and CESUN, and numerous bilateral international partnerships, as well as alliances in the framework of European programmes (Interreg, Steps, ESPON, etc.). The ties to several completed or nearly completed NWO programmes are also important: NWO-Connekt Traffic and Transport, Gamon, Amadeus and the research and data from the Knowledge Institute for Mobility Policy (KiM).

Agreements can be made with public and/or private actors per sub-programme and sometimes per project regarding co-financing, cooperation, knowledge valorisation and knowledge transfer.

The research programme is not solely theoretical in orientation, but is also problem-driven, guided by the dilemmas and research questions that are generated by the Randstad documents of V&W, VROM and EZ. Relevant alternatives used in other countries or expressed by relevant sectors of society (market parties, consultants, local and regional governments, civil society organisations) and/or scientific logic can also give reasons to undertake research projects.

2.3 Budget of the DBR programme

The programme will be implemented using contributions from the Ministries of V&W, VROM, and EZ. Contributions will also come from NWO and the universities. The contribution from the abovementioned ministries and NWO totals approximately ten million euros. Approximately four million euros is available for the first round. The contribution from the scientific institutes consists of a supplement to the NWO contribution up to the level of the actual costs of the researchers. Training and supervision capacity should also be provided.

The programme will be implemented in three rounds, which will overlap in part. The timing and the general distribution of the available research funding across the three rounds is as follows:
Round 1: 2008: approximately 50%, Round 2: 2009: approximately 33%,
Round 3: 2011: approximately 17%
The programme will last for 6 years. The research activities will actually start in mid-2008.

In stage 1 and stage 2, the financing will go primarily to PhD students and post-doctoral researchers. Stage 3 is intended for research extending beyond the project parameters and for conveying knowledge. Obviously this work will be done by senior researchers. The priorities for that stage will be determined in the mid-term review (end of 2010, beginning of 2011).

The research questions in this overarching document are broader than what can be realised with the limited resources available. In stage 1, the researchers will be challenged to submit proposals that would, in their assessment, be the most scientifically innovative and simultaneously make the most relevant possible contribution to the knowledge needed for sustainable accessibility to the Randstad. The preliminary questions for stage 2 can offer an indication of the topics that should preferably be addressed in stage 2 of this programme.

3 Guidelines for applicants

3.1 Who can apply

A subsidy application can be submitted on behalf of a consortium by a professor or senior university lecturer working at a Dutch university. A consortium consists of 3 or 4 cooperating university research groups in the Netherlands; the research leaders must have a persuasive track record. University groups can participate in more than one consortium. In order to promote inter-university cooperation, the explicit aim is for a sub-programme to be implemented by researchers who are affiliated with different universities. The multidisciplinary cooperation within and between sub-programmes is also an important aspect of the DBR programme. In addition, the intention is for the consortium to indicate which authoritative foreign researchers will/could cooperate and what form such cooperation could take.
Applicants are expected to be prepared to bear scientific, organisational and financial responsibility for the research, if the subsidy is granted. Among other things, this means drawing up progress reports, cooperating in the mid-term and final reviews, and working actively to convey (interim) research results to possible users in workshops, conferences, trade journals, book contributions, etc. An important aspect, from the start of this programme, will be the transfer of the knowledge that has been developed (as well as any relevant knowledge already present) to the users, such as the ministries involved, the regional and local governments and other stakeholders.

3.2 What can be applied for

The DBR programme is multi-disciplinary and interdisciplinary in nature and comprises six intrinsic themes, which will form the foundation for research programmes with PhD projects and post-doctoral projects. Research programmes can pertain to (parts of) one of the themes, or combinations of two or more. Professors and senior university lecturers from the participating university research groups will manage and coordinate the implementation of those research programmes. The research will be conducted by a consortium of 3 and 4 university research groups in the

Netherlands; in very rare exceptions, it will be done by one or more public research institutes, such as TNO. Subsidies can be requested for research programmes consisting of a combination of one or two post-doctoral projects and several PhD projects and associated materials, up to a total scope of a maximum of 1 million euros per application. It is expected that the indirect government funding for research (the first flow of funding) will be used to ensure proper supervision for the researchers appointed to work on the programmes that receive subsidies, as well as a provision for the usual overhead for conducting research. As is customary for NWO programmes, the contribution from the institutes involved will come in the form of supervision, provision of basic facilities and overhead.

The only costs that can be subsidised are costs that can be attributed directly to the implementation of the research programme and the scientific research being conducted in that context. It is possible to apply for a subsidy to cover the costs of both personnel and materials for the research. The duration of the subsidy and/or the appointment of researchers depends on the category in which the researcher falls. The scope of the requested subsidy, the duration of the appointment and the level of the researcher(s) should be proportionate to the research to be conducted. It is not possible to exceed the budget of a subsidy that has been granted. In all cases, research appointments are at a university or another research institute, not with the NWO. If the researcher is not appointed to a position at the university but at a research institute, the university rates set by the VSNU will be used. NWO will not agree to commercial rates. In case of doubt, please contact the secretariat prior to submitting a request for subsidy.

The participating university groups are expected to ensure that the research has a trickle-down effect in study programmes, such as MSc programmes, PhD programmes, post-initial education and in-company training. The costs of these activities do not fall within the scope of the research budget and will have to be covered by the educational earnings from tuition, etc.

Subsidy for personnel costs

The subsidy for personnel costs can be used to pay the costs of project implementation staff. The amounts are in accordance with the contracted agreements that NWO has with the universities. These are lump sums in which salary costs are indexed and the retainer risk has been redeemed. Subsidy for personnel costs is based on the following categories:

PhD student (AIO)

- A PhD student is appointed for a period of four years to conduct doctoral research. The current amount is € 177,495 for a full-time appointment for four years;
- A bench fee of € 5,000 for a 4-year period is provided for conference attendance and dissertation costs.

Post-doctoral researcher

- A post-doc is a researcher who has recently completed his/her PhD (< 2 years ago), who is at the start of an academic/scientific career;
- The duration of the appointment for a post-doc is a maximum of three years. The amount available is € 174,911 for a full-time appointment for three years. It is also possible to choose a 0.75 FTE appointment for a period of four years;
- A bench fee of € 5,000 for a 3-year period is provided for conference attendance and poster presentation;
- The appointment of a post-doctoral researcher should be motivated in terms of the complexity and difficulty of the research.

Subsidy for material costs

This subsidy can be used to pay the costs of the research. This could include:

- The purchase of special equipment and non-durable items required for the research, with the exception of computers;
- Conducting interviews and surveys;
- Purchasing data files;
- Travel which is necessary in the framework of the research.

Not all costs will be eligible for compensation:

- The costs of computer use at university computing centres and the costs of laboratory time are not eligible for subsidy;
- Housing, overhead and depreciation costs are not eligible for subsidy;
- The costs of equipment, non-durable items, or administrative or technical assistance, which should be part of the usual facilities at a university or research institute, are similarly not eligible for compensation, unless the supported research requires the use of facilities that clearly exceeds normal use;
- The teaching costs for PhD research assistants in training (OIO) are specifically the responsibility of the institute at which the research is being done.

Other costs that are not covered include:

- Costs incurred to acquire an audit certificate;
- Costs incurred to mediate on behalf of and/or acquire and carry out contract research, including the indirect costs that can be attributed to such;
- Reservations for future costs and/or maintaining reserves.

3.3 When can applications be submitted

Subsidy applications for scientific research programmes in the framework of the DBR programme can be submitted in two successive rounds during the course of the programme. The first round will start in the autumn of 2007. In principle, a second round will follow at the end of 2008/beginning of 2009. The exact terms of the second round, such as intensifying the focus on one or two specific DBR themes, will be determined at a later date. Further announcements in this regard will be made in due course. A third round will also take place in 2011, intending specifically for short-term research extending beyond the parameters of one specific programme (i.e. not for PhD students) and for conveying knowledge. This third round is only open to applicants whose subsidy applications were granted in the first or second round. The exact terms of the third round will be determined in due course. It should be emphatically noted here that the transfer of the newly developed knowledge and insight to the users throughout the duration of the entire programme is an important aspect of the DBR programme. The Programme Committee will pay particular attention to this aspect, as well as drawing up a communication plan.

In order to gauge the interest and structure a sufficient assessment procedure, Letters of Interest should be submitted before the first round, but no later than 15 January 2008 before 12 noon. *Submitting a Letter of Interest is compulsory!* Applicants who do not submit a Letter of Interest will also be excluded from submitting a full application later. In this context, see also section 3.6 and the timeline in the appendix. Applications cannot be corrected or supplemented after the deadline.

3.4 Drawing up an application

Subsidy applications must be submitted according to the instructions in this brochure; the proposed format should be written in English. Letter of Interest forms for subsidy applications and the accompanying instructions can be downloaded from the NWO website as per 17 December 2007: http://www.nwo.nl/DBR. Electronic submissions should use the Iris system, which can be accessed via the NWO website (www.iris.nwo.nl)

3.5 Specific conditions

In order to be eligible for admission to the procedure, each application has to meet a number of formal requirements, as described below. The NWO Subsidy Approval Regulations also apply.
Applications are first assessed on the basis of the following formula.
Only applications that meet these criteria will be processed and enter the selection procedure. An application will not be processed if one or more of the following applies:

- The application form is inaccurate, incomplete or not filled out according to the instructions;
- The application was not submitted by an established researcher on behalf of a consortium of universities;
- The application was not submitted via the Iris system.
- The application was not submitted on time.

Finally, please note that the submission of a Letter of Interest is required. Applicants who do not submit a Letter of Interest will also be excluded from submitting a fully developed application at a later stage.

Expected research results

The application should lead to one or more excellent scientific publications attributed to the person or persons proposing the research. Besides scientific publications, articles in professional journals, contributions to popular science and documents containing policy recommendations are explicitly also counted toward the results of the research. It is important that the results should also benefit the co-financing government ministries (V&W, VROM and EZ), local and regional governments and other possible users, for example by means of study days, workshops or conferences. From the time that the research starts, active exchange will take place

with potential knowledge users and policy-makers in national, regional and local government. The scientific project leader will institute a users' group to facilitate that goal, in consultation with the programme committee. Exchange programmes and guest lectures taught by prominent representatives from the practice of policy should also have a place in the programme. It should be noted that this form of knowledge dissemination requires the active involvement from both the policy and the science sectors. The assessment of the proposals will take into account how the knowledge transfer to potential users is structured in the application. If the application is accepted, the programme committee will ensure that the activities announced for knowledge transfer actually take place. The dissemination of knowledge is not simply about knowledge generated during the course of the research. The researchers participating in the DBR programme may also be asked for advice on the basis of knowledge they already possess.
The education component in the programme will be provided in various ways, in part by the fact that young scientists (primarily PhD students) gain knowledge and training by conducting research. However, it is also important for the research to be integrated into master's and PhD degree programmes.

3.6 Submitting an application

Applications can only be submitted using the Iris electronic application system. To use the Iris system, you must request an access code on the NWO website: http://www.iris.nwo.nl. More information on Iris is available from the NWO website. If you have questions of a technical nature, please contact the Iris service desk. The service desk can be reached Monday through Friday from 11 a.m. to 5 p.m. on telephone number: 0900–6964747. This number can only be called from within the Netherlands.

4 Assessment procedure

4.1 Procedure

The valid applications (see section 3.6) are assessed in an 'open competition', in which scientific quality and relevance to the programme issues are used to make a selection of proposals that could be subsidised. The general procedure for proposal submission and assessment is as follows.

In this brochure, the Programme Committee is publishing a call for tenders, accompanied by requirements that proposals must meet. In order to explore the market and set up a sufficient assessment procedure in time, potential applicants are required to submit a Letter of Interest (see also the timeline in section 6). A Letter of Interest contains information on how the problem is formulated, an indication of the DBR theme(s) pertinent to the application, the intended composition of the consortium and the international affiliations/alliances.

On the basis of the following criteria, the complete applications will be assessed by an ad-hoc Assessment Committee consisting of a range of international members, so all applications should be in English. The Assessment Committee will draw up a preliminary assessment with questions that will be sent to the applicant. The Assessment Committee will invite the applicant for an interview (which will be recorded on tape) in which he/she can respond to the preliminary assessment (rebuttal) and answer questions. After that, the Assessment Committee will assess whether the application can be subsidised and offer an indication as to whether the applications that could be subsidised deserve high, average or low priority. It may also recommend that parts of the application, such as a sub-project, should be excluded from the subsidy. If larger numbers of applications are submitted, multiple Assessment Committees will be instituted. However, if unforeseen circumstances cause the situation to change, or if there is an extreme number of applications and/or insufficient cooperation, then the procedure will be changed accordingly. The applicants will be notified of any changes immediately. In part and on the basis of the assessments drawn up by the Assessment Committee(s), the Programme Committee will rank the applications in order of priority and present them to the Supervisory Board. The Programme Committee, the members of which are not involved in the contents of the applications, may be supplemented with ad-hoc members for this purpose. The Supervisory Board, consisting of representatives from the financing institutions, supervises the implementation of the DBR research programme and makes the formal decision to grant the subsidies.

4.2 Criteria

The applications will be considered on the basis of the following assessment criteria to judge their scientific objectives and absolute quality, relevance to society and organisational aspects. All four of the sets of criteria will be taken into consideration. This means that an excellent track record does not constitute sufficient grounds on its own to achieve a good assessment.

Relevance to society

- Connection of the research to strategic policy questions, as described in Chapter 2, and the quality criteria described in the 'outlines';
- The extent to which the research brings a solution to societal issues (particularly the sustainable accessibility of the Randstad) closer to tangible reality;
- The connection between fundamental and applied research, and the applicability of the intended results;
- How the research results will be disseminated to the (potential) users in the government ministries (V&W, VROM, EZ), local and regional governments, civil society organisations and/or the business community;
- Concrete prospects for incorporating the new knowledge into education and study programmes (MSc, PhD, post-initial).

Scientific objective

- The proposal must fit within the framework of the research as described in the programme text;
- The proposal should connect to knowledge in this field in other countries, and to make use of that knowledge (international connection and anchoring);
- The relations the research has to existing programmes in this area (such as Transumo and NGI) and whether or not there is synergy;

- Interuniversity cooperation is required;
- The research should contribute to strengthening the knowledge infrastructure;
- There should be multidisciplinary cooperation within and between sub-projects;
- The integrative nature of the application; there should be good cross-connections between the sub-projects.

Scientific quality

- The scientific relevance of the research in theoretical, methodical and descriptive respects;
- The originality of the problem as formulated, contribution to the creation of new theories or research method;
- Methodological and technical structure, appropriateness of the methods and techniques, availability of any data, clarity and motivation;
- Completeness, coherence and consistency; clear development of the problem, including in relation to the theoretical framework; clear delineation of the proposed research;
- Workability and feasibility of the sub-projects, including work and publication plan.

Organisation and finance

- The consortium should consist of 3 or 4 research groups from two or more universities, and the leading researchers should have a convincing track record;
- balanced combination of junior and senior researchers;
- management of the research programme;
- organisation of national and international cooperation.

The applications that receive a positive assessment with then be compared on the basis of a) the assessment criteria for the application and b) and the urgency of the issue. The Programme Committee can also base its prioritisation on how the applications are distributed across the DBR themes.

4.3 Committee members

The DBR research programme has a Programme Committee, one or more ad-hoc Assessment Committees and a Supervisory Board.
The co-financing ministries of V&W, VROM and EZ are represented on the Programme Committee, which also includes a number of scientists recommended by NWO. If necessary, the Programme Committee can be supplemented by several ad-hoc members during an assessment round.
The Programme Committee is responsible for ensuring the coordination and coherence of the programme, assessing the progress and setting the budget. The Programme Committee is also responsible for prioritising the proposals based on programmatic and quality criteria. The prioritisation takes place on the basis of the results of one or more ad-hoc Assessment Committees. The Programme Committee is also tasked with promoting the transfer of knowledge to the users, which is an important aspect of the DBR programme. To facilitate this, the Programme Committee will temporarily be supplemented by both researchers and users during the implementation stage of the research.
An ad-hoc Assessment Committee assesses whether an application could be subsidised, conducts interviews with the applicants, and offers a general indication of the priority. It may also recommend that parts of the application, such as a sub-project, should be excluded from the subsidy.
If applications are received in greater numbers, several Assessment Committees will be instituted. An Assessment Committee is composed of independent Dutch and international experts in the field in question; it reports to the Programme Committee. The (technical) chairman of the Assessment Committee also reports to the Programme Committee.

A Supervisory Board, consisting primarily of representatives from the financing institutions, supervises the implementation of the DBR research programme and uses the Programme Committee's recommendation to take the formal decision to grant the subsidies.

The members of the Programme Committee and the Supervisory Board are appointed by the co-financing institutes and NWO. The committee members are listed below.

Supervisory Board

- W.J. Kuijken, Secretary-General of the Ministry of Transport, Public Works and Water Management (chairman);
- J. van der Vlist, Secretary-General of the Ministry of Housing, Spatial Planning and the Environment;
- C.P. Buijnk, Secretary-General of the Ministry of Economic Affairs;
- P. Nijkamp, chairman Governing Board NWO.
- H. Hazewinkel, chairman Board of Management VolkerWessels;
- J.W. Oosterwijk, chairman Executive Board Erasmus University Rotterdam;
- M. Norder, alderman The Hague;
- Secretariat: V&W and NWO Social Sciences.

Programme Committee

- H. Leeflang, Ministry of Transport, Public Works and Water Management (chairman)

Government representatives
- A.J. van der Burg, Ministry of Housing, Spatial Planning and the Environment;
- A.L. ’t Hoen, Netherlands Knowledge Institute for Transport Policy Analyses (KiM);
- N. van Paridon, City region of Amsterdam;
- E.C. Schmieman, Ministry of Economic Affairs;
- E. Reiding, Ministry of Transport, Public Works and Water Management.

Science and university representatives

- A.N. Bleijenberg, TNO;
- M.A. Hajer, University of Amsterdam;
- M.A.J. Kuijpers-Linde, Netherlands Environmental Assessment Agency (MNP);
- H.J. Meurs, Radboud University Nijmegen;
- H. Priemus, Delft University of Technology;
- E. van de Voorde, University of Antwerp.

Secretariat

- H.W. Waaijers, policy official at NWO Social Sciences, waaijers@nwo.nl, phone: +31 (0)70 344 09 13
- C.A. Rövekamp, secretary at NWO Social Sciences, rovekamp@nwo.nl, phone: +31 (0)70 344 09 47

5 Other information

5.1 Contact

The NWO website has the most recent information on the DBR research programme. If you have questions about the programme, please contact the secretariat.

6 Annexe

6.1 Timetable

The indicative timeline for the first round of subsidy applications is as follows:

13 December 2007	preliminary announcement of the DBR programme on the NWO website and in the NWO Social Sciences newsletter
mid-December	press release issued
17 December 2007	DBR brochure and form for Letters of Interest on the NWO website
15 January 2008	applicants submit Letters of Interest
4 March 2008	applicants submit fully developed applications
early April 2008	the Assessment Committee(s) send their preliminary assessments and questions to the applicants
2nd half of April 2008	the Assessment Committee(s) interview the applicants
mid-May 2008	assessment meeting of the Programme Committee
end of May/June 2008	final decision by the Supervisory Board regarding which subsidies will be granted

6.2 Abbreviations

A

AESOP	Association of European Schools of Planning
AIO	PhD student
ARK	Adapting Spatial Planning to Climate Change programme

B

BSIK	Decree on subsidies for investments in knowledge infrastructure

C

CESUN	Council of Engineering Systems Universities
CPB	Netherlands Bureau for Economic Policy Analysis

D

dB	Decibel
DBR	Sustainable Accessibility of the Netherlands programme

E

ENHR	European Network for Housing Research
ERIM	Erasmus Research Institute of Management
ESPON	European Spatial Planning Observation Network
ERSA	European Regional Science Association
EU	European Union
EZ	Ministry of Economic Affairs

G

GaMON	Social Scientific Research into Nature and the Environment

H

HSL	High Speed Line
HST	High Speed Train

I

IAAP	International Association of Applied Psychology
ICE	InterCityExpress

K

KiM	Netherlands Knowledge Institute for Transport Policy Analyses
KLM	Royal Dutch Airlines
KNMI	Royal Netherlands Meteorological Institute

L

LNV	Ministry of Agriculture, Nature Management and Food Quality

M

MIT	Long-term Programme on Infrastructure and Transport
MNP	Netherlands Environmental Assessment Agency
MSc	Master of Science

N

NECTAR	Network for Effective Collaboration Technologies through Advanced Research
NETHUR	Netherlands Graduate School of Urban and Regional Research
NGI	Next Generation Infrastructures
NICIS	Nicis Institute
NS	Netherlands Railway
NWO	Netherlands Organisation for Scientific Research

O

OEI	Overview of the Effects of Infrastructure

P

PhD	Doctor of Philosophy

R

RPB	Netherlands Institute for Spatial Research

S

SCP	Social and Cultural Planning Agency of the Netherlands
SENSE	Research School on Socio-Economic and Natural Sciences of the Environment
STELLA	Sustainable Transport in Europe and Links and Liaisons with America

T

TGV	Train à Grande Vitesse (high-speed train)
TRAIL	Research School on Transport, Infrastructure and Logistics

V

V&W	Ministry of Transport, Public Works and Water Management
VROM	Ministry of Housing, Spatial Planning and the Environment
VSNU	Association of Universities in the Netherlands