STRATEGIC KNOWLEDGE AGENDA FOR ‘SUSTAINABLE MOBILITY 2040’

An impression of knowledge questions to achieve sustainable mobility in 2040
Transumo (TRANsition to SUstainable MObility) is a knowledge programme seeking to make a contribution towards a transition to sustainable mobility. Transumo has shown that targeted practice-based research can serve to find new solutions for the challenges confronting us on the road towards a sustainable mobility system. A lot has happened, many new insights have been gained and major steps forward have been made.

However, realising such a transition is a long-haul process. Transumo ran for only five years. So it is not surprising that, despite leading to many interesting insights, the Transumo projects left some knowledge questions unanswered and raised others. The knowledge agenda can help to tackle these challenges.

In the course of the programme, a Transumo vision on sustainable mobility was developed (see e.g. the brochure Transumo Vision on ‘sustainable mobility 2040’) and transition paths were described. A certain idea was thus developed of what is necessary to achieve sustainable mobility. The Transumo projects have already yielded many insights and experiences facilitating the first steps in the transition. But – clearly – there is still a substantial knowledge gap between what we know now and what we currently expect we need to know to achieve sustainable mobility. That knowledge gap is translated into knowledge questions.

This memo first of all describes knowledge questions at the somewhat higher abstraction levels, and then proceeds to define the more specific knowledge questions at theme and project level; the texts in the boxes highlight some ‘hot potato’ issues surrounding sustainable mobility. These issues, in turn, give rise to further knowledge questions.

The knowledge questions formulated below touch on various fields:
- terminology, methodology;
- defining ‘sustainable mobility’;
- theme-specific, substantive knowledge questions;
- knowledge questions about implementations and transitions.

Just as the Transumo Vision on ‘sustainable mobility 2040’ only sets out one possible vision on sustainable mobility, this ‘knowledge agenda’ only gives an impression of the questions being raised in our efforts to achieve a sustainable mobility system.

The agenda is intended to inspire and kick-start further knowledge development. The knowledge agenda is by no means complete – nor could it ever be. The agenda was drawn up on the basis of our knowledge and ambitions (and a vision) of today. But our knowledge level will change, and so will our ambitions and vision(s). It follows that a knowledge agenda cannot be a static document, but must continue developing over time while being constantly enriched with new insights from others.
02.00 – TERMINOLOGY AND METHODOLOGY

02.01 – TERMINOLOGY

Transumo stands for ‘transition to sustainable mobility’; apart from ‘to’, each of these terms is open to multiple interpretation. That need not always be a problem, but it can be a source of confusion, uncertainty and vagueness. While some parties and actors feel comfortable in a world of shifting meanings, the experience within Transumo is that many others prefer to work with fixed points of reference – for instance, to set ‘targets’ for their own organization or company. A (more) uniform terminology, a shared nomenclature, may promote a better understanding of the developments that are necessary to bring about a transition to sustainable mobility. It can thus promote a smoother introduction of potential solution routes and approaches.

Peeling down the title of the programme, we can formulate the following knowledge questions:

> How can key terms from the transition theory be defined more accurately, operationalized and applied to mobility?

Transition science is still undergoing rapid development; subtle shifts in meaning occur over time, different experts apply different meanings, and relative outsiders give their own interpretations to terms. This can lead to confusion and miscommunication. Examples of terms that perhaps need more detailed definition and demarcation (in relation to sustainable mobility) include the three-way axis of ‘project’, ‘programme’ and ‘society’ as well as such concepts as ‘experimenting’, ‘upscaling’ and ‘broadening’.

> How can the key term ‘sustainability’ be more closely defined and operationalized in relation to mobility and transport?

• Is the tripartite concept of ‘people, planet, profit/prosperity’ (the 3Ps) sufficiently useful or do we (also) need other criteria or another approach to describe sustainability such as ‘Utilitas’ (useful and effective), ‘Firmitas’ (enduring and robust) and ‘Venustas’ (attractive and assimilable)?

• How is the interaction between the 3Ps, how do they influence each other, up to what level, if any, are they interchangeable: for instance, is economic growth always necessary to maintain our current prosperity level, is a high prosperity level necessary for our well-being? Is more mobility (kilometres travelled) and more freight transport a prerequisite for maintaining prosperity and well-being?

• Can the longer-term sustainability perspective and the transitions and measures that this requires be reconciled with the challenges of ‘here’ and ‘now’ (food crisis, financial crisis, economic crisis, tensions in the Middle East, global distribution of prosperity)? Does this tension have consequences for the sustainability mobility actions and ambitions of public and private parties?

• How can ‘profit/prosperity’ sustainability be defined and operationalized? Does the (western) prosperity-driven model offer sufficient prospects for the future? Does it adequately address the problems surrounding the (global) distribution of wealth? Does the relentless pursuit of ever-greater efficiency and productivity guarantee prosperity growth? What role does ‘accessibility’ actually play in our national and international competitiveness?

• How can ‘people’ sustainability be (quantitatively) defined and operationalized? How can well-being – including an element of prosperity, opportunities for personal development, social inclusion (vs. exclusion), access and freedom of choice in mobility – be captured in figures?

• How can ‘planet’ sustainability be more closely defined and operationalized? In the framework of Transumo, current insights (e.g. Kyoto) were translated to the mobility and transport sector. But that analysis, too, is not yet complete and requires further elaboration, for instance in such fields as the (effects of) the depletion of natural resources, end-of-life aspects of transport systems and/or life cycle analyses, the higher-order effects of the application of electric transport such as the

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1 – see “Innoveren als Driehoek”, Advisory Think Tank for the Social Mobility Innovation Agenda, The Hague, October 2009
effects of nuclear-, wind-, solar- and hydro-based electricity generation, quantification of spatial use, disruption and the effects of fragmentation/barriers.

> How can we better define and operationalize key terms from mobility and freight transport?
• The meaning of such terms as ‘accessibility’, ‘reliability’, ‘logistics’, and even ‘mobility’ is still evolving; different actors can attach different meanings to the terms. This is why it is important to define the challenges or problems and determine the effects of possible solutions with sufficient precision. It would therefore perhaps be useful to move towards broadly-accepted definitions (nomenclature), as introduced in scientific fields such as biochemistry.

02.02 – METHODOLOGICAL KNOWLEDGE QUESTIONS

Reports written largely by transition scientists about Transumo and the mobility domain regularly refer to the ‘mobility system’, the ‘car system’ and other (social) systems. Specific characteristics are attributed to these systems, such as autopoiesis (‘self-production’). This approach is in itself a useful counterweight to the idea that mobility is (only) a derived activity. Both approaches, however, demand clear definitions and a clear description of the systems and/or activities, including the systems input and output:
• How can we define and demarcate the system more sharply and then describe its interactions (and their dynamics) with other social (sub-)systems?
• How can we arrive at a method for properly describing and quantifying the dynamics of interactions/rebound effects, interaction between mobility/transport decision-making versus decision-making on other issues, abstraction levels (choice of residential/work location, company policy etc.) and timescales?
• How can we achieve a reliable objective method and a set of measurement instruments to determine the effects (e.g. of system changes on prosperity/planet/people sustainability aspects), and to what degree must indirect/higher-order and rebound effects (behaviour effects that partly cancel out initial sustainability benefits of system changes) be taken into account?
• To what extent are traditional economic – utility theory-based – and econometric models sufficient in the light of necessary fundamental changes in society? What is the potential role of new or rediscovered insights such as the economic prospect theory, insights from systems dynamics and from the complexity theory?
• To what extent do paradigms such as ‘market forces’, the aspiration for ‘transparency’, and even fundamental values such as individual freedom be upheld in a globalising world in which alternative value systems are asserting themselves? What effects do other value patterns have on our demand for mobility and on our behaviour-influencing philosophy?
• To what extent can desired or envisaged transitions be truly managed? What can we learn from the fundamental changes in the past which could only be identified as ‘transitions’ with hindsight?
What developments that can be characterized as ‘transitions’ were deliberately initiated, targeted, managed processes – and what can we learn from this for the mobility sector?
• How can the methodological approach – which aspires to gaining fundamental and practically useful insights – be further reinforced? Can this be done without losing too much on the two fronts of ‘rigour’ and ‘relevance’? Is knowledge development in practice at odds with fundamental knowledge development?

3 – see e.g. J. van Eijndhoven et al. (2009) ‘Verbonden mensen en verstrengelde activiteiten’, Drift, Rotterdam
7 – See e.g. presentation of M. Wegener “Cities and the Energy Transition. Can we model fundamental change?” for the PLATOS Congress 2009
03.00 – General Questions Regarding Sustainable Mobility

'Sustainability' and 'sustainable mobility' are difficult terms and Transumo already decided in an early stage of the programme to give a broad interpretation to the concept of sustainability. In this interpretation, 'sustainability' is not exclusively linked to 'ecology', 'human environment' or 'nature' but is defined as the balance between the 3Ps of People, Planet and Profit. The Transumo projects all focus on one or more aspects of sustainability in the broad sense, but they also invariably ignore certain aspects. Above, we already described that more work remains to be done to define and operationalize the sustainability concept. But there are also substantive knowledge questions that need to be answered:

- One question that has not yet been answered in Transumo is whether 'sustainable mobility' is a realistic aim; in other words, is it conceivably possible to create a mobility and transport system that both meets the high user demands (people), spares the environment, non-renewable energy sources and raw materials (planet), and also maintains the current prosperity level; many projects assume that the 3P objectives can be achieved simultaneously, but others contend that choices must be made and priorities set. Neither of these assumptions has been substantiated with sufficient evidence so far.

- Is the current level of passenger mobility and transport not 'too much' of a good thing; in other words: are we living in a world of 'hypermobility'? What criterion/criteria could serve as an indicator to establish whether hypermobility exists or not? And if it does, is hypermobility an independent phenomenon or is it related to e.g. 'hyperconsumption'?

- A similar question can be asked about freight logistics: is there, perhaps, 'too much' transport? This not only concerns the total volume of end products (which in some respects can be characterized as 'hyperconsumption'), but above all the waste in the production chain and the enormous transport distances of raw materials, basic products, semi-finished goods, components and also waste flows. What influence do concepts such as 'cradle to cradle' and discussions about e.g. the desirability of biofuel production and 'efficiency' in food production measured by energy content have on the size and direction of global trade flows (and e.g. the position of mainports);

- Must the mobility sector keep pace with other sectors for all 3P sustainability aspects or are there areas where mobility developments should 'lag' or 'lead' other sectors? To what extent can sustainability aspects be traded off with other sectors, such as the continuing use of fossil fuels in order to reduce transport costs so that proportionately much larger sustainability gains can be achieved elsewhere in the economy? One example is the question whether it makes sense to travel extra transportation kilometres in order to collect and recycle old paper.

- Transumo focuses mainly on land-based continental transport; but how must we deal with sea and air transport, which are major CO₂ polluters and fossil fuel users but also large contributors to our prosperity and well-being ('people')?

- Have health aspects of the current mobility pattern (internally, the effects on e.g. obesity and externally, the effects of noise and emissions) been sufficiently taken on board in the sustainability debate?

- In Transumo the 'planet' aspect of sustainability is usually viewed from the perspective of the effects of mobility and transport on e.g. the environment and the climate; vice versa, the (changing) climate has an impact on the mobility and transport system and, hence, ultimately also on mobility and transport. Though some exploratory studies have been made, it is useful to gain further insight into the consequences of climate change on (global) trade and freight flows, modality selection and transport behaviour, so that actions can be undertaken to reinforce positive effects and mitigate negative ones ('adaptation').

8 – see e.g. J. Adams (1999), The Social Implications of Hypermobility, in: ENV/EPOC/PPC/T(99)3/final, OECD, Parijs
9 – Various Transumo projects have looked at aspects of this issue: ‘chain synchronisation’ which involves retail distribution, ‘efficient container optimisation’ which involves waste flows and repositioning empty containers and ‘European networks’ with a case about sustainable logistical handling of waste paper.
10 – see e.g. G. Noordwier and A. Dusseldorp (2008) ‘De gezondheidsaspecten van de MER; Illustratie van een aanpak; deliverable D24 van het project Transumo A 15 project Van Maasvlakte naar Achterland’, Rotterdam
11 – M.J. Koetse, P. Rietveld (2009) ‘Adaptation to Climate Change in the Transport Sector’, VU University, Department of Spatial Economics, Amsterdam
Economic contraction – a ‘silver bullet’ for sustainable mobility?

The recent economic crisis shows that a lower level of economic activity automatically leads to substantial reductions in energy usage, emissions and other negative impacts on the environment. Various studies show that ‘well-being’ is not necessarily related to a high prosperity level. The recession is compelling fast and radical cost-cutting measures, both in the private and (later) public sector. But does such a crisis also genuinely lead to greater efficiency and productivity? Is it still possible in times of economic contraction to take sufficient initiatives that lead to truly sustainable mobility? Is it safe to assume that the population size is set to flatten or even decrease? Can we count on ‘organic’ developments leading to a reduction in mobility and transport? Or are we ‘counting our chickens before they hatch’, and are these organic developments not sufficient in themselves?

04.00 – THEME-SPECIFIC, SUBSTANTIVE KNOWLEDGE QUESTIONS

Transumo is a theme-based programme, within which a number of projects have been defined for each theme. In the course of the programme knowledge was developed and applied at theme and project level. In addition, specific follow-up questions were defined in the project completion reports and other publications. Below, several broader - more generic - knowledge questions have been formulated for the various themes.

04.01 – RELATIONSHIP BETWEEN SPATIAL PLANNING AND MOBILITY

- How can the relationship between spatial planning/organization and transport policy be further integrated? For instance, how can our mainports fulfil their mobility task in a manner compatible with sustainable spatial developments (with e.g. unbundling of transport flows and behavioural change instruments)?
- Can the sustainable mobility/transport task be viewed in correlation with other issues (water quality, water quantity, natural environment)?
- How are transport issues related to large-scale changes in regional functions, such as agriculture (relocation of greenhouse horticultural sites) and industry?
- Assuming that part of the sustainable mobility challenge can be tackled through careful planning of spatial functions, the next question is: what administrative structures and public-private arrangements can help to achieve the plans? To what extent can lessons be learned from experiences abroad, such as the German ‘Verkehrsverbunde’ (integrated transport systems), the Japanese joint rail and real estate operators and the French ‘versement transport’ (transport tax)?
- How can we make accurate forecasts of mobility behaviour and location behaviour in relation to combined infrastructure and spatial planning issues? Possible options are enhancing transport models with sufficient spatial detail to address issues relating to e.g. rail infrastructure and compact spatial development around railway stations, making models of mobility behaviour in public transport chains and aligning infrastructure investments with location behaviour.
- How can the evaluation method of Social Cost-Benefit Analysis (SCBA) for assessing projects in the Netherlands be further enhanced? Examples can be found in the field of spatial variations in parking costs, the relationship between changes in accessibility and changes in real estate values, the evaluation of density and spatial quality and traveller ratings for comfort in Public Transport.

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13 – The FES programme proposal entitled ‘Sustainable Dynamics in the Delta’ that was still under development in the autumn of 2009 addresses these questions; the European KIC-Climate proposal also looks at the relationship between land use/spatial planning, mobility and the water issue in relation to climate issues.
Aligning spatial planning and mobility – a ‘silver bullet’ for sustainable mobility?

For decades spatial planning and mobility development have been seen as closely related issues. Some visions for a sustainable future see the answer in largely autarkic, self-sufficient communities that have no need for busy external traffic. Others – particularly those dating from the 1970s and 1980s – sought to minimize commuting by achieving good work-life balances within urban areas. Later the concept of ‘dormitory towns’ gained currency to denote commuter towns with exclusive links to specific work locations.

The vastly enlarged scope of people’s lives and social networks, frequent job hopping and the fact that work is becoming less important as a mobility motive would seem to undermine the need for a close fit between spatial planning and infrastructure/transport system development. Nevertheless, several concepts have been developed in Transumo which actually attempt to restore that relationship, while certain vision formulation processes (Transumo, MIA Mobility) see such a close fit as one of the possible solutions. The key question remains, to what extent can a close fit contribute towards the achievement of sustainable mobility and how effective and cost-efficient is that approach?

04.02 – MOBILITY MANAGEMENT, SUPPLY CHAIN MANAGEMENT, DEMAND CONTROL

- How can we develop and realize advanced forms of sustainable mobility management? This concerns public-private set-ups dedicated to optimising the transport system on the basis of multiple objectives (smooth traffic flow, reduced emissions, safety, reliability, cost-effectiveness).
- How can we achieve an optimal integration of production and logistical processes? Can physical production and physical transport be organizationally decoupled from the management and control functions? Can this prevent superfluous flows (e.g. avoidable goods flows and city centre traffic), can the comparative advantages of the chain components be fully utilized (physical production where cheap labour is available, assembly close to sales markets, logistical process management based on expert knowledge as well as effective use of modalities and transport methods)?
- What concepts can link forms of individual seduction (‘self-steering’) to group direction (social objectives)? This is relevant to all issues where a balance must be found between top down control (based on the common interest) and individual services where the mobility user and transporter act out of self-interest. How can reward schemes be deployed more broadly in the mobility domain, e.g. to promote the introduction of electric vehicles? How can the application of reward schemes (e.g. for congestion avoidance) be extended from part of the transport chain to the entire transport chain (e.g. from train to the entire public transport chain)?
- How can we build in ‘incentives’ that seduce people into adopting sustainable behaviour - not to punish ‘bad behaviour’ but to create an intrinsic interest in sustainable mobility and sustainable freight transport?
- If we start tinkering with mobility and transport choices, we will change activity choices, destination choices, departure time choices and modality choices. And this, in turn, will necessitate all sorts of adjustments inside and outside the mobility system (workplaces at home or in shared business premises, the deployment of extra public transport, different working times etc.), thus causing 3P sustainability effects which are still largely unknown.

14 - The ‘Logistics and Supply Chains: Innovation Programme’ focuses on e.g. this knowledge question in the ‘hub management role’ and in the ‘Cross Chain Control Center’ concept; see: Van Laarhoven Committee (2008) ‘Logistics and Supply Chains: Innovation Programme’.
The price instrument as incentive – a ‘silver bullet’ for sustainable mobility?

Novel mobility payment methods, Pay-As-You-Drive insurance, congestion avoidance: these are all instruments that use positive or negative incentives to seduce or prompt actors to make sustainable mobility choices.

The initial results of the incentives are positive, but the longer-term effects are still relatively unknown. A transition to sustainable mobility takes decades to complete – can a price instrument remain effective over such a long-drawn-out period of time? How do cost-shifting mechanisms evolve (within consumer behaviour, between population groups, between the private and public sector, internationally)? How important will the ‘money’ factor remain? Will timely alternatives for the price instrument become available if required?

04.03 – MOBILITY AND TRANSPORT SERVICES (SUPPLY)

- How can we achieve an inter/transmodal, integrated service (information, bookings and payments) so that mobility users and transporters experience the overall transport network as a single joined-up system and, as a consequence, start using sustainable modalities in a more routine manner?
- Can we develop ‘green corridors’ in the near and distant future in order to create sustainable (physical and virtual) connections between the Eurodelta and the rest of Europe (and the world)? Is the Netherlands able and willing to take the lead in this process by developing a high-quality export product (concept, knowledge and management/decision support systems)? How desirable and feasible are ‘green corridors’?
- Continuing the above train of thought: how can we achieve more extensive integration between mobility and transport services and services of other sectors involving visits (healthcare, hospitality, leisure, entertainment) or the production and delivery of goods (e.g. homeshopping)?
- What organizational forms, business models, administrative frameworks, financial/fiscal instruments and what laws/regulations must be developed to overcome forces resisting integrated optimisation across sub-systems and sectors (think e.g. of links in the ‘supply chain’, the complex administrative relationships between various governmental layers and fields, cooperation between concession-granting regions as well as cooperation between road managers, between public and private parties and between modalities)?
- How can we introduce self-regulating mechanisms to ensure that momentary mobility needs can be rapidly and adequately fulfilled without inducing extra transport demand? This self-regulation should take place both at strategic and operational level and should apply to both passenger and freight transport.

04.04 – TRANSPORT SYSTEMS AND TECHNOLOGIES

- Considerable efforts are going into intelligent vehicle design. In order to avoid undesirable side and rebound effects, ongoing knowledge development remains necessary to understand how the addition of automated driver support and information functions influences driver behaviour.
- What technical and infrastructure facilities are necessary to connect mobility systems together and thus create the right conditions for a joined-up sustainable system? How do we resolve the spatial assimilation problems?
- What information systems are necessary to offer integrated services (e.g. travel time forecasts, including timely route and modality alternatives); how precise must they be, what types of information are useful? Who is responsible for the management and quality of the supplied information and services, are the systems perceived to be reliable and how/to what extent do decision-makers make use of the information? What are the consequences of information exchange, e.g. in terms of security in international chains?

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15 – For instance, building on the experiences of the Transumo ‘PROTECT’ project and the European ‘INTEGRITY’ spin-off project.
• Highly efficient combustion engines (diesel), fuel cell drive technologies, alternative fuels and battery-powered electrical drive systems, as well as all sorts of intermediate forms (hybrid technologies), are being developed more or less alongside each other. Is the parallel development and implementation of technologies useful or inefficient? In other words, does it make sense to choose (and, if so, who must choose), or is sustainability best served by letting ‘market forces’ determine the outcome?

• The transition to electric mobility touches on many fields. It not only concerns mobility, climate and space, but also demands structural changes in the fields of infrastructure (electricity supply and grid structure/capacity), urban planning (recharging stations, new (mobility) services, urban restructuring) and the social organization of mobility. Pilots involving exploratory and evaluation studies must be carried out to achieve learning effects and identify opportunities for upscaling. These pilots should link up with relevant Bsik/FES programmes (e.g. Space for Climate), the Transport Ministry’s sustainable car programme entitled ‘The car of the future is going to drive’ and the Sustainable Mobility Platform of Energy Transition.

• What role can or will be played by electrified forms of ‘slow’ transport, such as electric scooters and bicycles? To what extent will these compete with the bicycle and public transport; to what extent do they offer an alternative for the car and what are the (net) sustainability consequences?

• How can electric cars (combined with transitions in the energy system and spatial planning) be quickly and efficiently effectuated?

**Electric transport – a ‘silver bullet’ for sustainable mobility?**
Electrically-propelled vehicles (full electric vehicles or hybrid vehicles in electric drive mode) cause no local emissions pollution and produce very little noise. The application of electric drive systems in passenger cars, vans, mopeds and motorcycles can significantly enhance the quality of life, notably in urban areas.

But what are the effects on road safety? How do we resolve the persistent shortage of space for individual vehicles (in relation to e.g. parking and congestion)? What about ‘well-to-wheel’ energy efficiency and the use of scarce resources for batteries and engine components? How do we deal with vehicles and components at the end of the life cycle?

It looks unlikely that technology alone can fully resolve all these challenges in the near future; electric transport can represent a big step towards ‘sustainable mobility’, but cannot solve all problems and alternative (non-technological) approaches and solutions will remain important. Further research must indicate where a good balance can be found.

**ICT – another ‘silver bullet’ for sustainable mobility?**
ICT looks well-placed to make major contributions towards mobility sustainability. First of all, it can reduce the demand for mobility (via home-working/local shared office facilities and all sorts of tele/home/internet shopping and entertainment, telehomecare). Moreover, ICT can also promote the more efficient handling of transport demand (freight exchange, combined transport concepts in logistics), support intermodal transport, assist the more efficient handling of traffic flows and even encourage fuel-efficient driving.

But technology alone is not enough: the technologies must also be accepted and applied. In addition, technologies are by no means always used for their intended purpose. Unexpected behavioural reactions can even lead to the opposite effect of what was originally intended: the advent of telephony led to more rather than less mobility. The virtualisation of marketplaces (marktplaats.nl) caused a substantial increase in personal car transport. If a car is no longer ‘tied up’ at a workplace but parked outside the house because the owner is working from home, it may actually be used more often.

So what is the net effect? How can non-sustainable second order/rebound effects be avoided, without cancelling out all the benefits?
04.05 – SUPPORTING INFRASTRUCTURES, PHYSICAL NETWORKS AND HUBS

• Gaining fundamental insight into how an intelligent traffic system operates / organizes itself. What factors ultimately determine the quality, reliability and thus the predictability? How can we adjust our macroscopic and microscopic theories and models to describe and predict the behaviour of such a traffic system?
• Gaining fundamental insight into how (with what type of measures) and to what extent an intelligent traffic system can be managed; how both individual interests (travel time, comfort, reliability) can be reconciled with general interests (safety, sustainability, reliability) and the role that ‘vehicle to vehicle’ (V2V) and ‘vehicle to infrastructure’ (V2I) technology can play in this respect.
• Gaining fundamental insight into how you can move in a creative and sustainable manner from the current situation to the new situation; because it will take time to effectuate the transition to an intelligent and cooperative traffic system – if, indeed, this can ever be entirely achieved. Possible measures include routing, tolling, forecast information, dynamic closing and opening of connecting roads. A further step could be the introduction of dynamically managed private sector infrastructure networks.
• To facilitate all these themes: how can we transform this knowledge into theories, tools and technologies for monitoring and managing such an intelligent traffic system? New V2V, V2I and GPS tracking technologies open doors to more detailed and reliable data. At the same time, more (and more heterogeneous) traffic information necessitates more advanced and efficient algorithms to distil useful information from all these data.
• How can we make underlying infrastructures smarter and integrate them together? This not only concerns the ‘transport infrastructure’ and the integration within that infrastructure, but also the integration between different sectors, e.g. integration with the information infrastructure and the energy supply infrastructure 16.
• How can we achieve sustainable mainports – i.e. mainports that contribute towards a flourishing economy, an attractive and healthy living environment, and a pleasant social climate?
• Intermodality and combined transport services demand the realisation of terminals and transfer stations and nodes; how can such facilities be fitted into the environment? How can the negative effect of local nuisance (noise, emissions) be weighed up against the ‘higher’ interest of sustainability?

04.06 – GOVERNANCE, POLICY, MANAGEMENT

• ‘Sustainable Mobility’ cannot be a static end situation; the supply of and demand for (sustainable) mobility are in constant motion. How can we continuously ensure there is sufficient space and absorption capacity to renew the system, while always maintaining the balance between the 3 Ps?
• What are the most efficient and effective policy instruments and control concepts for encouraging mobility users to make sustainable transport choices? What, for instance, is the correct mix of measures to achieve sustainable urban distribution, where logistical and technical solutions can be married with government solutions? How can we pick and choose measures to ensure that solutions are mutually reinforcing?
• How can we incorporate mobility and transport into the quality of a region and get local entrepreneurs to take responsibility for the quality (sustainability) of traffic and transport flows to and from their area (location accessibility)?
• How do we coordinate mobility policy at local, regional, national, European (and, sometimes, global) level, notwithstanding the competition for authority between similar administrative layers and entities?
• How do we achieve a consensus of aims in different areas of policy? How can we make ‘sustainable mobility’ a lasting issue in other public policy areas that have a major impact on mobility choices,

16 – See also the DIEMIGO project of Transumo.
such as healthcare and education? How can we address such issues in the private sector, bearing in mind that logistics is often not perceived to be a ‘boardroom issue’?

- How is consensual politics developing in the Netherlands? To what extent has consensual politics been undermined by crises which demand fast decision-making, by social and political polarisation, by ‘Europe’ and by globalisation? What consequences will possible changes in governance paradigms have for the way we view infrastructure development (planning, assimilation, funding), public transport operation, road management and hub management (including seaports and airports)?
- What does social entrepreneurship mean in the public domain in terms of changes in the activities of public authorities, companies and citizens? What consequences will this have for public-private partnerships?

05.00 – IMPLEMENTATIONS AND TRANSITIONS

During the development and implementation of the Transumo programme, the field of transition science advanced in leaps and bounds. Transumo latched onto these developments in various ways. Transition, here, is not an end in itself, but a means to achieve a sustainable mobility system. The insights that have meanwhile arisen and the experiences with the programme give rise to a number of new knowledge questions that are related to transitions or partial developments and implementations.

- “Transitions are structural changes towards sustainability in many areas of social practice,” but simultaneously consist of a series of smaller developments which can mesh together and thus lead to a transition. Can we identify any developments – initiated within or outside Transumo – that could be seen as the first steps in a transition process?
- Are the current ‘environmental conditions’ such that the time is ripe for making the first factual steps in a transition to sustainable mobility? For instance, is there sufficient ‘sense of urgency’, are there sufficient technological conceptual solution routes, is the economic climate conducive (or will it be conducive) to sustainable development?
- Can an effective link be established between a ‘transition to sustainable mobility’ and other transition paths, such as the ‘energy transition’ and necessary transitions in e.g. agriculture, fisheries, construction and water management?
- At the instigation of the ‘Committee of Wise Men’, Transumo sought to focus more than preceding programmes on transition and implementation processes (such as transition experiments) rather than on concept and technology development; nevertheless the question remains how the conditions can be made sufficiently conducive to enabling actual implementation (translating knowledge into concrete instruments, applications and concepts in practice); what is the importance of a driving force and inspiring personality? What is the importance of pilot or example implementations? What is the importance of tools in making effects visible?
- In concepts requiring large-scale investments, it is often difficult to move from the test phase/pilot implementation towards the large-scale adoption phase. Persuading the first ‘real’ users to adopt the application can be hard as the technologies are often relatively new, expensive (not yet mass-produced) and not yet wholly reliable. What financial or other type of incentive structures can be developed and deployed to overcome this ‘first adopter problem’? How can new applications be upscaled and implemented?

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17 – See the project experiences in the final report of the Transumo project ‘Integraal Collectief Personenvervoer’ (2009, still to be published)
19 – See e.g. the Transumo project proposal ‘People Movers op Weg’ and the results of the demonstrators from the DIPLOMA project;
20 – See e.g. the tools developed in such projects as “Transumo A15: Van Maasvlakte naar achterland; duurzaam vervoer als uitdaging” (a ‘ScenarioGIS’) and “Waarde vastgoed en bereikbaarheid” (the National Accessibility Map);
• How can new insights – e.g. insights gained in pilots involving the practical integration of spatial and transport planning – be translated into lasting changes in structure, culture and working methods of individuals and organizations?

06.00 – DYNAMICS OF THE KNOWLEDGE AGENDA FOR SUSTAINABLE MOBILITY

The Transumo programme is due to end at the close of 2009. Five years of research have yielded a rich crop of new knowledge, concepts, insights and experiences. All this was achieved in practice-oriented projects involving intensive tripartite cooperation between knowledge institutions, businesses and government agencies. Transumo has thus given an impulse towards the establishment of a joined-up tripartite knowledge infrastructure for sustainable mobility by creating an environment in which organizations come together and bringing about a ‘living knowledge network’.

An essential part of a living network involves sharing, and ensuring the continuous availability of, the results, knowledge and experiences that form part of the knowledge infrastructure and the transition to sustainable mobility (for instance, all the results of research carried out in the Transumo context can be found at www.transumofootprint.nl). What is important in this connection is to connect, share and enrich the acquired knowledge wherever possible, so as to provide fruitful leads for the targeted ongoing development of more new knowledge (i.e. use the lessons learned in one project for the benefit of subsequent projects and future knowledge workers) as well as the permanent enrichment and updating of knowledge questions and the knowledge agenda for sustainable mobility. The central idea is that knowledge should no longer act as an impediment to finding solutions to mobility problems.

This knowledge agenda is designed to offer inspiration to stimulate and initiate further knowledge development based on the knowledge already acquired. Over time, the agenda must enrich itself with new progressive insights gained from the research and innovative approaches of (other) parties from the knowledge infrastructure for sustainable mobility and in the overlapping areas with important other domains. Key steps in this process have already been made with the newly-formed knowledge networks and, for instance, initiatives such as the Sustainable Accessibility Randstad programme, the creation of the leading logistics institute Dinalog and the commencement of talks with the government about the multi-disciplinary approach to practice-oriented research. Feeding and maintaining these knowledge networks is a prerequisite for guaranteeing, both now and in the future, the dynamics required to achieve the transition to a sustainable mobility system.
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Transumo is a platform of more than 300 businesses, government agencies and knowledge institutions jointly engaged in the development of knowledge in the field of sustainable mobility. Transumo aspires towards a transition from the Netherlands’ existing inefficient mobility system to a sustainable system that helps to reinforce national economic competitiveness, while also catering to man and the environment. Transumo’s activities started in 2005 and will run until the end of 2009. At present, more than 35 projects are being carried out within Transumo. More information about Transumo, this project and this brochure can be downloaded at: www.transumofootprint.nl