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STRATEGIC OUTLOOK

SEVENTH FRAMEWORK
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1 Strategic Outlook

The Strategic Outlook builds on TRANSFORuM's previous deliverables and looks into the future of the European transport system and attempts to derive conclusions for EU transport policies. Distinct from the roadmaps, this document takes a look at the period between 2030 and 2050[1], with a clear long-term perspective and focuses primarily on the uncertainties and unknowns that this time period presents for the delivery of the White Paper goals and beyond. These uncertainties facilitate the 'vision-character' of this document – it focuses on where Europe could be in 2050, and how we could achieve this.

The Strategic Outlook pays particular attention to the main trends – both cross-cutting and theme-specific – that will influence future developments, which have been identified throughout the TRANSFORuM project, and reflects on these over the longer term.

2 Cross-cutting trends

A number of cross-cutting trends (i.e. relevant in some way to all thematic groups of TRANSFORuM) were identified in Deliverable 3.1: "Summary on main policies, funding mechanisms, actors and trends"[2]. It is not possible to consider the impact of each of these trends over the long-term exhaustively, so focus is given to the three trends expected to be particularly relevant in the context of the White Paper for this duration.

These are Europe's ageing population; trends associated with climate change (long term impacts and actions to address or build resilience to these); and GDP (in general terms as well as related to production and consumption). In the following, we explore the outlook for each of these trends and offer insight into how Europe can best plan or account for likely changes in the interim.

2.1 Ageing population in Europe

The total EU population is projected to be stable between 2010 and 2050. However, the share of people over 65 will increase by 70% and the share of people over 80 will increase by 146%. This will entail fewer people of a productive age needing to support an increasing number of elderly people and has implications for transportation too.

Active mobility (e.g. walking and cycling) may be less plausible for the older population and more compact urban development may be required. Access to services, including high-speed rail (HSR), should account for an older clientele, with attention paid to enabling those with decreased mobility to retain or gain access. And whilst uptake of MIMP will increase, access to new technologies as they emerge, should not forget this tranche of society. Consumption patterns shifting towards services may have diverse impacts on the freight sector. A reduction in the need for long distance freight transport could be coupled with increased urban freight movements . Longer term planning to account for such demographic trends would ensure that financing is directed towards the most appropriate developments. Engaging aging populations, across Europe and locally, in the planning and development of transport and mobility systems, will facilitate more effective solutions that take into account needs and wants of this growing group. This should include representatives that will reach this age bracket over the next 35 years.

2.2 Energy and climate-related trends

According to recent 5th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) the transport sector accounted for 27% of final energy use and 6.7 Gt CO_2 direct emissions globally in 2010, with baseline CO_2 emissions projected to approximately double by 2050; and more than triple by 2100 (IPCC, 2014). Transport emissions could rise even faster than other sectors' and reach 12 Gt CO_2 eqivalents annually by 2050. However, reductions in total transport CO_2 emissions of 15-40% are possible (Ibid.).

Aggressive and sustained mitigation policies are required. The decarbonisation of the energy sector is of increasing significance to the transport sector and these areas should work together more to find

1 Because the multi-modal information, management and payment (MIMP) goal is concerned with the period until 2020, the Strategic Outlook considers the period 2030-35 as opposed to 2050 for this goal.

2 Available at: www.transforum-project.eu/resources/library.html

solutions that are mutually beneficial. A major contributor to these reductions will be policies, which deliver much less reliance on oil, coal and gas in these two sectors by 2050 and significant investment in all types of renewables will be required in both energy and transport.

Recently industrialised and emerging economies will experience even greater emissions increases than Europe. Therefore, it is important that Europe plays a role in knowledge exchange, sharing experiences and good practices in lower carbon transport to facilitate reductions elsewhere. Additionally, impacts on the transport sector are highly unpredictable and it is difficult to envisage how the 2050 system will be affected by a changing climate. However, allocating more resources to improve resilience and accounting for risk in planning processes are certainly necessary in the interim. Awareness raising and long-term support is important, as is advanced information and control systems, contingency planning, staff training, and proper maintenance strategies. Current investment patterns in new infrastructure may need reconsidering, accounting for the increasing costs for repair and maintenance of the existing networks.

2.3 GDP-related trends

Economic stability is inherently short-term and prospecting the economy 35 years into the future is difficult and perhaps ultimately unhelpful. Nonetheless, a macro-perspective which considers trends related to growth is important.

Global GDP is predicted to rise from $72 (€58) trillion (2010) to $380 (€305) trillion by 2050 (Bassanini and Reviglio, 2011). Europe (the EU-28) will account for just 9% by 2050, down from 28% in 2010 (Ibid.). The implications of this decline may be far-reaching, but are difficult to predict. Europe could recentralise around particular sectors, or reindustrialise around new technologies and innovation – it is impossible to know for sure. Longer term investment in infrastructure, renewable energy and technological innovation are all-important in shifting the European economy onto a more low carbon trajectory and public-private partnerships (PPP) will play an increasingly important role in funding and supporting such comprehensive projects now and in the future.

3 Reflecting on long-term urban mobility in Europe

We know that more people will live in cities by 2050 and urban form and infrastructure will need to take account of this change. There are numerous specific issues that could be examined in the long-term context of Europe's urban mobility. Here three key trends are considered: alternative fuel investment, young people and urban deliveries as they will be important over the long-term.

The type of fuel and the technologies they will be powering in the longer term are difficult to predict. The IPCC suggests that until at least 2050 liquid petroleum fuels will continue to dominate the sector. However, breakthrough developments, most likely including the electrification of road vehicles, can help to drive emission reductions to 2050 and beyond (IPCC, 2014). The EU should continue to foster innovation around both technologies and fuels and strive to bring energy and transport sectors together to help push the boundaries, bring costs down and solutions to market.

As the current younger generations age, it is unclear whether we will continue to see the changing mobility behaviours that are demonstrating endure. Perhaps the current non-drivers will learn to drive in later life. Rapid changes in information and communication technologies (ICT) may continue to drastically change the current systems – driverless cars may be commonplace by 2050, perhaps urban development will have removed cars from our cities. As this section of the population will become one of the smallest, the influence that their behaviour has on overall urban mobility trends may decrease. As with the older populations, young people can play an important role in guiding the policy direction of Europe's cities and the EU should help to engage young people in the dialogue of the future of our cities.

Urban logistics and last mile need to get more attention in the medium- and long-term future. Understanding the current and future links between the White Paper and Sustainable Urban Mobility Planning (SUMP) is one such area where action now can help steer a clear path towards sustainable urban freight in the future. The many successful pilot projects that Europe's cities have showcased in recent years should be ramped up. There is vast potential for non-motorised and clean

energy technologies to play a significant role in reducing the environmental impact of the freight sector whilst ensuring the prosperity of the economy. New business models, consolidated delivery and a focus on service over products will be developed before 2050. Efficiency, interoperability and flexibility will be increasingly important considerations that can be promoted across Europe.

4 Reflecting on long-term long-distance freight in Europe

According to a comprehensive reference scenario (EC, 2013), total freight transport activity is expected to increase by 57% between 2010 and 2050 (1.1% p.a.). Road freight will grow by 55%, rail by 79% and inland waterway (IWW) by 41% (EC, 2013). Assuming a continuing share of 56% for tonne kilometres (tkm) above 300 km this means that, according to the White Paper goal, 760 billion tkm need to be shifted from the roads by 2050. This would imply that the growth in road freight would be limited to 12%; still a growth, but far from the projected 55%. To achieve the White Paper goal of switching 50% of road freight to rail and waterborne modes by 2050, a 180% increase in rail and waterborne modes would actually be required.

There are several key trends and unknowns that influence the possibility to reach this White Paper goal. Some of these concern the competitiveness of road freight. Due to the higher energy intensity of road freight it is more sensitive to increased energy prices. The reference scenario used places oil prices to around $140 (€118) per barrel in 2050, but this projection faces considerable uncertainty (as has been witnessed since the middle of 2014). Following recent price spikes, the oil price has been in decline, reaching a quasi-historical low of under $50 (€43) per barrel at the time of writing (NASDAQ, 2015). The availability and cost of unconventional oil in 2050 will constitute a key factor, as will the availability and price of viable alternatives. The ageing population will also mean there will (ceteris paribus) be less money in public budgets to allocate to infrastructure investments. A key challenge will then be to reallocate funding from road to investments in rail and waterborne.

Wages are an important component of road freight costs. There is a clear trend in road freight towards an increasing share of drivers from Member States with comparatively low wages (indicatively €6,000 – Poland vs. €26,000 – Germany). The pace at which wages across the EU converge is important for the competitiveness of rail and waterborne freight. Moreover, a rapid increase in wages in countries like China may imply a relocation of some earlier outsourced production back to Europe (The Economist, 2013). A transfer of "cheap labour production" to regions like Africa is also possible.

As mentioned with relation to urban freight, changed consumption and investment patterns are obviously important for the development of freight demand and the possibility to reach the White Paper goal. E-commerce may impose challenges relating to the bundling of goods in order to achieve efficient rail or waterborne transport. If 'the sharing economy' is strengthened, it may decrease the need for larger consumer goods like cars. It would then also decrease the need for parking and road space, which in turn would decrease the need for transport of steel, concrete and asphalt.

There are substantial uncertainties regarding total demand and the breakdown of the demand for freight transport in 2050. To manage some of these unknowns, cooperation between and within sectors should be increased, cost-efficient upgrading of infrastructure, addressing key bottlenecks in the current system and plans for a more holistic network should be prioritised in the short-term.

5 Reflecting on long-term HSR in Europe

In order to deliver a long-term shift of medium distance journeys to rail, it is important not only to densify and optimise existing HSR (and conventional rail) infrastructure by increasing capacities on congested railway hubs, but also to improve accessibility and intermodality at HSR stations, and increase the competitiveness of the sector by providing better on-board experiences. Focusing on these measures in the medium-term could lead to a broader horizon in 2050, which has identified high-demand corridors and enabled the prioritisation of where additional projects should be developed.

The financing of HSR projects will remain an important consideration. Lifecycle costs need more consideration in existing and new infrastructure financing. Member States should acknowledge and provide for the specific long-term requirements that private sector partners will have when funding infrastructure. In addition, PPP frameworks need to account for long-term risk to be minimised and profit (or return on investment) maximised.

Another area that needs more consideration in the long-term than it currently receives is the changing fuel sources that will come into play, both within the rail sector and across other modes. As the road sector moves towards electrification, HSR should be doing the same, considering not just the electrification of those remaining lines not yet connected, but also working alongside utilities to push for the development of greener electricity sources, striving to make HSR more sustainable.

HSR needs a strong and clear definition that reflects the reality of diversity and complexity of the numerous different (national) operational models across Europe. Instead of harmonising models, perhaps there is a need to understand each model and orientate long-term HSR visions towards considering the pros and cons of each and facilitating their co-existence. Indeed, long-term management of the HSR network needs to be multi-level, cross-border and supranational and linked to other modes in order for it to operate smoothly and to maximise the benefits it can offer across the continent. Promoting knowledge-gathering and sharing platforms would facilitate the development of an efficient European HSR network in a common framework. This would help to improve acceptability among all stakeholders.

6 Reflecting on long-term MIMP in Europe

Because the White Paper goal for MIMP considers the timeframe until 2020, our Strategic Outlook cannot plausibly look much further beyond 2030 and in this respect it is a unique case.

In the long-term we expect the three different systems (information, management and ticketing/payment) to grow together. At the moment they remain three distinct systems. In some cases more functions may be offered by one platform, but these very often deal with a single transport mode and/or a specific operator. Whilst numerous solutions exist across Europe, they are very often regionally specific or city-based. The biggest stumbling blocks are still interoperability between (and often within) modes, between different operators and across borders. However, developments such as social platforms, mobile computing, open data initiatives and a sharing culture, to name but a few, offer a promise of positive change and will continue to pressure established operators to offer accessible services. As establishing MIMP systems in Europe should help improve accessibility to public transport and support a shift from individual motorised transport, minimal information and quality standards must be ensured. Otherwise, the impact they can have on delivering this change could be very low.

Ultimately, the system should make it irrelevant to the traveller who the operator is, who carries out billing and payment and who provides the data. For the traveller it is relevant that everything is accessible (for example, removing language barriers), ideally provided through a single platform, reliable and trustworthy. Moreover, transaction costs must be kept to a minimum to ensure continuous usage. What and who is behind this, how all these systems are integrated should be of no direct concern to the traveller.

Whether it is one integrated system, or a number of different systems linked together through interfaces should, in the end, make no difference to the travellers. This, of course, raises a number of issues regarding, privacy, data security, sharing of confidential information which are not only of a technical nature but also concern the interests of travellers, operators and service providers alike.

7 Policy recommendations

Whilst specific recommendations have been offered throughout this condensed Strategic Outlook, relevant to specific trends and to each of the White Paper goals, there are a number of common recommendations, which would facilitate the long-term visions for European transport to be realised. Some of the recommendations below relate specifically to the Euro-

pean Commission, others to the Member States or the general population – some of them relate to a societal need for change and it is unclear who the drivers of such change should be, but perhaps this is where the Commission again could facilitate the dialogue to deliver against it in the long-term. The role of Europe in facilitating the wide exchange of good practices has been flagged by the OECD (OECD, 2012). In exporting around the world its model for environmentally sustainable infrastructure systems and smart energy policies, as well as the finance and know-how to produce them, Europe can help to move the rest of the globe towards a healthier, cleaner and more prosperous long term future.

- The EU should provide long-term perspective and goals, financial support and concrete, but flexible legislation as well as a framework to support and encourage long-term investment;
- All political levels should address the mismatch between short-term political cycles and long-term goals/issues, as well as about how short-term distinct projects fit with the longer term future;
- All actors need to mainstream and 'be aggressive' with low carbon to work towards a different reflection of current reality;
- Much more money needs to be allocated to building resilience and coping mechanisms;
- Much more attention on ageing is required in all policy-making areas;
- The inherent inequalities in mobility need to be addressed;
- The EU should promote sharing and exchange.

8 Conclusion

Whilst this Strategic Outlook offers a glimpse into some of the issues that will likely continue or rise to prominence in the long-term in Europe, it is clear that there is great uncertainty about how developments in the coming decades will affect our future. But it is clear that we can start to plan and help to shape this future. Some of the issues outlined in the TRANSFORuM roadmaps will endure. Locally-specific context for example will not go away and it is important not to advocate for one-size-fits-all approaches, but **adopt a more sensitive and flexible approach** to tackling the common issues that exist in specific, context-relevant ways. Things will continue to be different in different places; wants, needs, aspirations, trade-offs and priorities will range from city to city and across Member States and uncertainty makes any large-scale outlook complicated.

There are areas that the Commission can have a direct influence over – **promoting more diverse modal shares, facilitating knowledge exchange and planning for long-term investment** are but a few. Other elements, like the global system, economy, population trends, and changes to them, are out of their control and remit. Nonetheless, awareness and preparedness for likely changes can be deliberated and planned for. **Flexibility and reflection, learning by doing and broad engagement with diverse stakeholders** are elements of the policy making process that have been discussed time and again throughout the TRANSFORuM process and they should be taken forward, in the short-, medium- and long-term work that the Commission undertakes.

Vision and leadership are fundamentally important to realise the future we need as well as the future we want, so perhaps thinking now about the trends and measures that will have the largest impacts, as well as those that will be the most uncertain would be a good place to start.

The best recipe for resilience to unknown future trends is to **foster diversity**. Diversity is a rich store of adaptation capabilities. The opposite are monocultures and we must avoid monocultures of transport systems as well. In other words: we need to not put all of our eggs into one basket. More than 50% of modal share given over to cars is a systemic risk, as is investing solely in road freight, or new HSR lines. We have the tools to avoid such risk, we just need to implement them.

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ACRONYMS AND ABBREVIATIONS

GDP	Gross Domestic Product
HSR	High-speed rail
ICT	Information and communication technologies
IPCC	Intergovernmental Panel on Climate Change
IWW	Inland waterway
MIMP	Multimodal transport information, management and payment
PPP	Public-private partnership
SUMP	Sustainable Urban Mobility Planning

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