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Recommendations on Joint Actions across Thematic Areas

TRANSFORuM D6.2

The White Paper goals considered in TRANSFORuM

Urban transport

"Halve the use of 'conventionally-fuelled' cars in urban transport by 2030; phase them out in cities by 2050; achieve essentially CO_2-free city logistics in major urban centres by 2030."

Long-distance freight

"30% of road freight over 300km should shift to other modes such as rail or waterborne transport by 2030, and more than 50% by 2050, facilitated by efficient and green freight corridors. To meet this goal will also require appropriate infrastructure to be developed."

High-speed rail

"By 2050, complete a European high-speed rail network. Triple the length of the existing high-speed rail network by 2030 and maintain a dense railway network in all Member States. By 2050 the majority of medium-distance passenger transport should go by rail."

Multimodal information, management and payment

"By 2020, establish the framework for a European multimodal transport information, management and payment system."

GENERAL INFORMATION

The present document represents the "Recommendations on Joint Actions across Thematic Areas" in the context of the TRANSFORuM project. This document is one element of the formal Deliverable 6.2 "Consolidated roadmaps and recommendations to reach selected EC 2011 WP goals".

More information about the project can be found at www.transforum-project.eu.

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TABLE OF CONTENT

LIST OF FIGURES

LIST OF ABBREVIATIONS

CEF	Connecting Europe Facility
CLSC	City logistics service centre
ERTMS	European Railway Traffic Management System
ETCS	European Train Control System
GSM-R	Global System for Mobile Communications – Railway
HSR	High-speed rail
ICE	Intercity-Express (German high-speed train)
ICT	Information and communication technologies
MIMP	Multimodal transport information, management and payment
SUMP	Sustainable Urban Mobility Plan
TEN-T	Trans-European Transport Networks
TGV	Train à Grande Vitesse (French high-speed train)

1 Introduction

1.1 Information about the TRANSFORuM project

The TRANSFORuM project contributes – by engaging key stakeholders in carefully moderated forum activities and through other consultation measures – to the transformation of the European transport system towards more competitiveness and resource efficiency. TRANSFORuM has convened relevant actors and stakeholders at various stages throughout the project to discuss the related challenges, barriers, trends, opportunities and win-win potentials of reaching four key goals of the 2011 European White Paper on Transport (CEC, 2011):

- Clean Urban Transport and CO_2-free city logistics (goal 1)
- Shift of road freight to rail and waterborne transport (goal 3)
- Complete and maintain the European high-speed rail (HSR) network (goal 4)
- European multimodal information, management and payment (MIMP) system (goal 8)

TRANSFORuM's underlying assumption is that policymaking should be based on an in-depth understanding of all stakeholders' positions and that coordinated action among them is more effective than any individual attempts. The TRANSFORuM consultation process was therefore designed to elicit these views and to uncover synergies between individual policy measures and policy areas.

The concrete conversations with and among stakeholders were conducted in interviews, ad-hoc encounters, extracted from 130 responses to our online survey, through various social media channels and via the feedback function of our project website. Most importantly, TRANSFORuM organised 10 face-to-face workshops in 10 different European countries – see below.

The present document focuses on recommendations relating to topics that cut across TRANSFORuM's four thematic areas, while the four separate thematic roadmap documents address the four goals and policies towards achieving them individually in more detail. The four roadmaps and the present recommendations are also accompanied by a strategic outlook of the European transport system beyond 2030.[1]

The findings presented here are primarily based on the stakeholder debates at the following TRANSFORuM workshops:

[1] All mentioned documents are available at www.transforum-project.eu/resources/library.html

- A two-day workshop in Gdansk, Poland, in June 2013, which provided basic identification of key policies, actors, funding mechanisms and trends with regard to the four thematic areas, as well as an identification of barriers, challenges, and ways to overcome them;
- A series of four two-day workshops in October and November 2013 on good practice lessons and learning processes, each of them specifically considering one of the four thematic areas. The workshops included presentations about and guided visits to thematically-relevant sites in the respective cities in which they were held;
- A two-day workshop in Vienna, Austria, in January 2014 with a particular focus on cross-cutting issues between TRANSFORuM's four White Paper goals and a discussion of the preliminary roadmaps;
- Another series of four two-day workshops in May and June 2014 to discuss each draft roadmap 2.0, again including local presentations and guided site visits;
- TRANSFORuM's final conference in Brussels on 8 December 2014, where the final roadmaps were presented.

1.2 Purpose and structure of the document

The transport system is complex. This complexity does not only relate to technicalities within separate sub-elements of the transport system – e.g. which alternative propulsion technologies to choose in road transport or how to design effective intermodal freight hubs. In this document, we discuss the more politically challenging questions and the open issues that arise from the fact that all sub-elements of the transport system are closely interrelated. Developments and decisions in the transport system are likely to affect each other to varying degrees. These interrelations cover important cross-cutting issues and the impacts of policies beyond their primary purposes are often not fully addressed when debating transport policies.

With its work on four different thematic areas, TRANSFORuM offers are great opportunity to apply a comparative and integrative perspective on the four roadmaps. In this respect, the present document therefore wants to specifically highlight questions and findings of a more cross-cutting nature and take a look at overarching challenges. With its specific focus on cross-cutting issues this document is NOT a summary of the four roadmaps, but it draws on the roadmaps.

In particular, the present document has three purposes that are distinct but interlinked:

- Outlining commonalities between the four thematic roadmaps. Amongst other issues, it will be highlighted that mobility and transport policies should not only focus on infrastructure investments and more efficient operations, but must also strategically and systematically consider communication and cooperation measures;

- Highlighting and making explicit interrelations such as trade-offs and synergies between the individual roadmaps;
- Formulating concrete policy recommendations based on the cross-cutting perspective.

The structure of the document follows these three interrelated objectives. Chapter 2 shows relevant commonalities between the four themes and identifies joint conclusions. Chapter 3 takes a more detailed look at interrelations such as important trade-offs and synergies between policies in the four thematic areas. Chapter 4 focuses on policy recommendations, including considerations about the relevance and the potential of EU policies, as well as more general conclusions.

2 A comparative perspective on the four thematic roadmaps

In this chapter we develop a comparative perspective on the four roadmaps. We relate this to three specific action areas, which played a significant role in all four roadmaps. These areas (visualised as blue rings in Figure 1) are about:

- Improving communication, coordination and cooperation;
- Increasing efficiency and service quality on the basis of existing infrastructures;
- Extending infrastructures.

It is a particularly noteworthy finding of TRANSFORuM that the first area – coordination and communication – in itself offers huge potential for improvement that can be tapped at relative low costs. Even if communication and coordination alone are not sufficient to fulfil the ambitious White Paper goals, such activities are necessary in many cases to enable progress in the respective fields. Together with the two other areas, Figure 1 illustrates that increasing coordination, increasing efficiency and increasing capacities are important across all four of TRANSFORuM's thematic areas and demonstrates how the fields of action proposed in the respective roadmaps relate to these areas. In doing so, the diagram visually underlines the fact that, while content and concrete challenges may differ between the themes, the three areas mentioned above represent generic challenges that are relevant in all parts of transport policy.

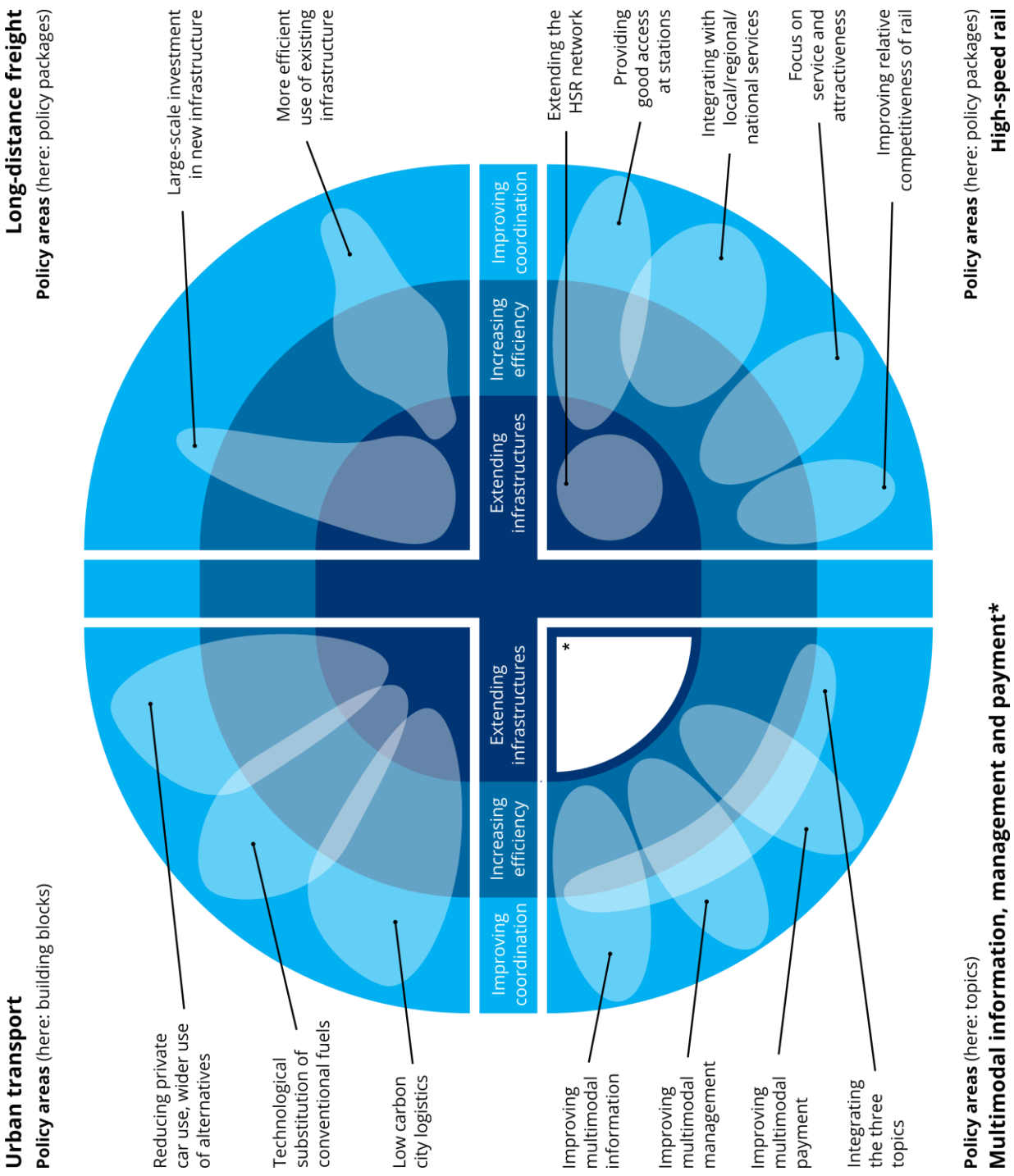

Figure 1: TRANSFORuM's four thematic areas and their respective policy areas towards the White Paper goals. Within each thematic area, the balance of the specific policy areas between the categories of 'improving coordination', 'increasing efficiency', and 'extending infrastructures' should only be taken as an approximate indication.

*: Due to the special character of the White Paper goal on creating a framework for MIMP systems (goal to be achieved by 2020, instead of the 2030/2050 timeframe of the other thematic fields), the roadmap for this thematic area does not consider policies that focus on the actual development of new infrastructures.

2.1 Improving coordination and communication among stakeholders

During the course of the TRANSFORuM project, stakeholders across all four thematic areas and in the joint meetings emphasised many times, and in quite different contexts that only by enabling joint actions on the basis of adequate coordination and communication activities, could the four goals become achievable. Important technical progress in specific fields can be expected from single actors or organisations who are striving for benefits such as economic success. But to reach the four White Paper goals, this is generally not enough. There is no "silver bullet" for achieving any of the four goals; all the four roadmaps highlight the need, but also the potential, for policy packages of various measures enabled by joint actions involving various actors.

Diverse forms of communication and coordination are needed that go far beyond people just talking and temporarily working together in projects or other context. It is about addressing the following points more strategically and systematically:

- Identifying potential for cooperation;
- Broad and early engagement of stakeholders to enable involvement and buy-in to and ownership of ideas;
- Raising awareness among all relevant stakeholders;
- Identifying common targets and related strategies which secure longer-term commitment from relevant stakeholders.

Only such structured communication and coordination allows more efficient approaches, measures and solutions. Whenever discussing transport policy options, open communication is needed for clarifying actors' needs and expectations, for assessing potential benefits and drawbacks of proposals, and for avoiding getting on a wrong track by stumbling across important details and alternative views that were overseen or knowingly ignored in previous stages of a policy process. In various technological fields, such open communication already takes place in the European Technology Platforms. Beyond technology, fora such as EPOMM (www.epomm.eu) and POLIS (www.polis.eu) discuss urban transport issues. Both even broader and more cross-cutting activities, as well as more specific and focused groupings would be helpful. Yet, it must be acknowledged that communication is not just a magic bullet that will solve all problems. In many cases, controversial issues will remain and not all stakeholders may be pleased by or receptive to the chosen policies. Still, the main message from the TRANSFORuM process remains valid: that there are often low-cost approaches and improvements available that will help to achieve the White Paper goals without expensive infrastructure investments – the 'low-hanging fruits'. This conclusion will be made more concrete by using examples from the four thematic roadmaps.

Urban mobility: Urban areas are characterised by dense mixtures of rather different actors, each with different mobility needs. These needs are met more or less successfully by a diverse range of providers including the users themselves. As well as providing essential services for cities, local transport also produces and concentrates a wide range of negative impacts. This makes urban mobility a complex governance issue. Some cities have already managed to develop, approve and implement strategies pointing towards more sustainable urban transport systems. In general, this is based on the involvement of different stakeholders, for example by using a sustainable urban mobility planning (SUMP) scheme. But there are about 800 cities in Europe and many of these have not yet achieved sustainable mobility. It is important to create political momentum for change in these cities and to foster an "enabling culture" to make the ambitious White Paper targets achievable. It is essential for local governments to create joint visions together with stakeholders to move forward. A similar situation occurs in urban freight, no real progress can be expected if individual measures are taken in isolation. Policy packages that combine incentives and regulations are essential. The implementation of city logistics service centres (CLSC), to alleviate urban freight issues, needs close cooperation between different stakeholders such as retailers, carriers and local authorities. More generally, building networks of cities is seen as a promising approach to help create the required political momentum. Cities that share similar visions and goals, or even challenges for urban transport, could benefit from joining forces under a common commitment to realise or address these. However, as stated above, communication and deliberative processes are no magic bullets and particularly in urban areas with their extremely complex setting, dissent and conflict will remain. But these can also be inspiring sources of creativity and urban development, making actors think about yet uncovered options and alternatives. In contrast to other areas, in the urban context citizens are more directly affected by the design of the transport system which is an integral part of the urban environment they live in. It is crucial for the success of urban transport policies to integrate citizens' views about urban transport but also about what makes a city liveable in general – to fully tap the potential that lies in the diversity of citizens' views and knowledge.

Long-distance freight: Here, it was pointed out several times and in relation to several fields of action that communication and coordination between responsible organisations is indispensable for coming close to achieving the White Paper targets in the envisioned timeframe. Public authorities play an important role in establishing and catalysing such processes. But actors in the private sector are the main players here, and they need to find and establish ways to work together. A measure that was often mentioned was the establishment of a 'one stop shop' for the customers of long-distance freight to enable them to help facilitate a switch away from road towards the alternatives. Such approaches can only be realised by intensive coordination and cooperation. The freight corridors appear to provide

a good basis for bringing stakeholders together, with the Rhine-Alpine corridor being given as a concrete example in the freight roadmap.

HSR: This field is not only about high-speed, and high-speed is not an isolated technology option. The trains need to be accessible and the 'last mile' is often crucial for the overall competitiveness of the system. A clear finding from the TRANSFORuM process is that the build-up of new physical infrastructure (i.e. new HSR lines) is only one specific piece of the wider landscape of measures to achieve a modal shift towards greater use of rail in passenger transport. With respect to the two policy packages focusing on good accessibility at stations (e.g. by local public transport, bike- and car-sharing etc.) and on improving the integration of HSR services with local/regional/national services, coordination between all actors is essential. When facing the increasingly competitive organisation of the rail sector, a multitude of companies, public bodies and institutions have become involved as part of the processes required to offer excellent HSR services. An open and transparent debate is needed and the interests of all parties (as well as costs) need to be balanced, keeping in mind that constructive collaboration will ultimately be to the benefit of the public transport sector as a whole.

MIMP: Improved coordination between actors is at the very centre of the roadmap because the respective White Paper goal 'only' refers to creating a "framework" for MIMP services (and not their full-scale implementation), but yet the timeframe (by 2020) is short and in the present situation, the co-existence of a multitude of initiatives from policy and from within the industry itself significantly complicates the process. There is no clear, consensual vision as to what the framework should look like and which primary purposes it should fulfil. A crucial element in the process is bringing relevant actors together, not only to align policies and strategies, but also to ensure a shared understanding. Moreover, the results of the stakeholder consultation carried out by TRANSFORuM suggest that it is particularly important to consider that there will most probably be no such thing as *the* MIMP system. Separate systems will co-exist and will require appropriate interfaces between them. For all of these sub-systems, visions, arguments, and appropriate framework conditions and standards need to be negotiated between all the interested stakeholders.

Across all thematic fields, learning-by-doing and **learning from good** (and bad) **practices** has come up as an important issue. Good practice learning perfectly illustrates the value of sharing and utilising knowledge and it can provide opportunities for trying out 'new things' and experimenting with policies without a need to design everything from scratch. Although context will always play an important role in the success or failure of an initiative, knowledge and experience exchange within and between contexts allows more effective working when trying to achieve specific goals, and it also allows the bundling of proven measures in order to achieve effective policy packages. Good practice learning

itself also benefits when stakeholder arrangements are transparent and collaborative, including stakeholders from multiple levels, actors and institutions.

Coordination, as well as the related planning infrastructure, depends on a sound data base. The workshops identified several current shortcomings. For example, in urban transport there is quite often a significant lack of data on urban freight flows and this hampers a proper planning in this field. For HSR, there is a discussion about the quality of cost-benefit analysis which is limited by a lack of data. In general, the internalisation of external costs – an important topic in all but the MIMP roadmap – needs an adequate data base. Furthermore, in all four roadmaps data is needed for tracking and communicating progress.

2.2 Increasing efficiency and service quality on the basis of existing infrastructures

It is widely acknowledged that transport is a derived demand. Users and customers demand a high quality, affordable and reliable service. It is not primarily the infrastructure that is at the heart of public and private interests. Extending infrastructure usually involves substantial costs. In some countries it is a major challenge to finance further expansions, especially in times of tight public budgets, which hardly even allow for a proper maintenance of the existing infrastructures. Following this argument, which was identified as important in several debates during the TRANSFORuM project, at least three of the roadmaps provide an explicit perspective on measures that help to improve efficiency and service quality without huge investments in infrastructures. It should also be mentioned that in the urban, freight and HSR roadmap, it is explicitly emphasised that strategies should not only focus on new technologies and infrastructures. In these three roadmaps approaches to improve the quality of service and reduce cost of transport options are seen as integral part of strategies towards reaching the White Paper goals.

Urban mobility: It was stated many times that, in addition to the electrification of cars, it is essential to improve the service quality of public transport, cycling and car-sharing schemes. The car-sharing schemes are mostly bottom-up initiatives, financed by private actors. Some incentives such as dedicated parking spaces can have an important impact and this may be possible at a low cost. Many car-sharing schemes already have electric vehicles in their fleet, and thus contribute to the diffusion of such vehicles and the necessary supporting charging infrastructures. An easier and more flexible access to public transport and an improved combination of public transport with car-sharing and taxis (last mile) does not require large infrastructure investments. For the electrification of urban freight, it is not the infrastructure which is the main bottleneck but rather the organisation of logistic services as well as in the lack of incentives for companies to invest in upgrading or changing their vehicles.

Long-distance freight: This roadmap identified several measures to improve efficiency and service quality. The example of one stop shops and the potential for corridors as an organisational and communicative basis have already been mentioned in section 2.1. Longer, heavier and faster trains, improved intermodal terminal operations, better management of capacities, implementation of the European Railway Traffic Management System (ERMTS), standards for longer trains and tackling the last mile problem are good examples of improving the capacity and quality of the rail sector. For waterborne transport, the infrastructural bottlenecks are mainly at the terminals and their hinterlands. The freight roadmap shows that there is some room to improve efficiency and service quality at these "hotspots". Better integration of rail and water and creating a level playing field are also cross-cutting examples. Cooperation and alliances between actors need to be promoted to achieve customer-friendly intermodal services and utilise economies of scale. There is also a need for a general information system for the availability of freight services so the customer can be informed about available alternatives.

HSR: Increased efficiency in HSR is related to the issues in the long-distance freight field, as they both utilise track infrastructures and often the very same tracks, particularly when considering the wider scope of the HSR White Paper goal on passenger rail services in general (see also section 3.4). Again, the policy package on better integration with local/national/regional services means that single HSR lines do not necessarily bring advantage to the rail system as a whole, and such advantage can only be achieved when new HSR services are properly integrated with the existing rail services. This would ensure that not only fast point-to-point connections are built but that passengers can effectively achieve better door-to-door travel times that make efficient use of the whole transport – and particularly rail – infrastructure.

MIMP: A significant challenge arises from the multitude of already existing (technical) standards, data protocols, data interfaces etc. To a certain extent, these are directly linked to the current non-existence of a MIMP framework. New functions and solutions are often developed in uncoordinated ways, having different visions and purposes in mind. A coherent MIMP framework should help to rearrange the respective activities and channel them in a more efficient way that would still allow for multiple purposes and multiple interests to be fulfilled – but this must be done without reinventing the wheel and creating more need for complex interfaces in those areas where a consensual understanding can be reached.

2.3 Extending infrastructures

Infrastructure extensions are still needed, but resources and public acceptance are limiting factors. High-quality transport services need high-quality infrastructures. However, the extent to which the achievement of the White Paper goals depends on – more or less costly – infrastructure investments differs considerably between the four roadmaps as well as between different European regions.

Urban mobility: The high density in urban areas usually makes it rather difficult to change the basic infrastructural settings, but in certain urban areas much can be achieved without large infrastructure investments. The main infrastructure investments that are unavoidable in this field are related to an infrastructure for alternatively-fuelled vehicles. These vehicles should not only be restricted to the car fleet but also include the introduction of alternative fuels in public transport (battery electric or hydrogen-fuel-cell buses, trolley buses) and urban freight. Other measures such as building new or extending existing metros or tramways are extremely helpful to achieve the respective White Paper goals, but they cannot be expected to be implemented on a broader scale across all the 800 European cities. And even where this kind of new infrastructure is built up, only a radical redesign of the urban landscape, street spaces etc. will allow the city to fully benefit from the new infrastructure and to actually reduce the use of conventionally-fuelled private cars. Infrastructure for non-motorised transport – for cycling and walking – would also facilitate the achievement of the White Paper goal and can be comparatively low cost to other types of infrastructural development, with potentially significant results.

Long-distance freight: It is possible in many areas to achieve significant progress by improving efficiency and service quality of the existing infrastructure. But the roadmap also illustrates that in several regions, infrastructure investments are unavoidable to achieve the targets. One example is the bottlenecks in rail infrastructures in the upper Rhine valley. This accounts for rail and also for the various connections between rail and water. For shifting 30% of road freight over 300km to water and rail, bottlenecks in the seaports and inland ports have to be removed. The capacities of intermodal terminal and hinterland connections need to be adapted to be able to carry the shifted freight loads. Container terminals in sea ports – especially in harbours with hub functions – need to have sufficient waterfront access for ships (15–16m depth). From the land side, sufficient rail infrastructure and terminal turnover capacity are needed. The relationship between rail freight and passenger rail needs to be taken into account when it comes to the use and extension of rail infrastructures (section 3.4). Infrastructure investments between the modes need to become a more level playing field, with each modes' needs considered together to ensure a balance between road, rail and waterborne – in order to achieve the White Paper goal.

HSR: The message for HSR is consistent with the urban mobility and long-distance freight themes: large infrastructure investments are only part of a wider picture. These investments are therefore only one element of the policy package that would also focus on less capital-intensive measures. However, the challenge set up by the White Paper is huge, and it will not be fully achievable by better coordination and more efficient use of existing infrastructure alone. In some cases the rail network is reaching its current capacity limits, e.g. around Lyon where freight operations conflict with HSR services coming from the dedicated HSR lines (see also section 3.4). New infrastructure is therefore necessary, but the HSR roadmap puts a clear focus on a "reasonable consideration" of funding issues. More specifically, the European perspective requires a much closer look at what new HSR lines are most relevant at a given moment in time. Here, higher priority should be given to closing gaps, upgrading international links in the European network (also beyond EU Member States), and removing current bottlenecks – instead of perpetuating inherited national planning perspectives. For example, the current gap between the French and German HSR networks significantly slows down international trains. Moreover, the passenger services in many of the newer Member States in Central and Eastern Europe have to be improved not only by HSR but also through upgrading the conventional network.

MIMP: The White Paper goal has a special character as it requires a policy *framework* by 2020 (Figure 1). The actual *implementation* of full-scale MIMP services is therefore not covered in the TRANSFORuM project and increasing capacities is not particularly relevant for creating the framework.

2.4 The specific role of funding

Funding and financing were discussed across all four of TRANSFORuM's thematic areas. The main questions are: How to secure funds to finance new investments but also long-term maintenance? Where should financial resources come from (governments, private investors, user payments)? How can investments be recouped, when they should be spent, on what, by whom? Moreover, keeping the vision of sustainable mobility in mind (and not always just increasing passenger and freight traffic), pricing is also important; not only as a financing mechanism but also as a signal to firms and households.

Real traffic has to be taken into account when planning for investments, so that investments are guaranteed to be paid back over a life time (but considering the wider economic benefits for society). This is a challenge for the organisation of infrastructure projects in particular. Importantly, financing and funding must be differentiated by their different applications: While there are different financing models available (e.g. state investment or public private partnerships), the funding will ultimately always come from users and/or taxpayers. This is closely related to a discussion about risk – where allocating risks to the private sector involves a clear challenge – since major projects may need to be rescued by the state in case of unforeseen, or escalating costs. Because much infrastructure is already there, users'

willingness to pay directly for new elements is limited and projects in the public interest will often therefore need subsidies. However, it must also be stated that not all investments in the transport sector prove to be successful – as traffic forecasts are made in a complex environment and we have to accept the fact that traffic forecasts are often unhelpful because they include significant uncertainties, and their accuracy is often overrated.

Individual projects and a network focus need to be differentiated. Financing instruments should consider this difference and ensure solutions that are beneficial in a wider sense (e.g. network-based pricing instead of bridge and tunnel tolls). External costs and marginal infrastructure costs must also be considered and a balance must be found between costs and what users/operators pay. There are also more variable financing instruments available, for example letting businesses or landowners contribute profit from a given projected infrastructure (e.g. via specific tax models). Yet, in other cases, EU or national subsidies for the build-up of infrastructures will be needed to pass the first hurdles when introducing more radical technologies or instruments (e.g. road charging for private cars). During the TRANSFORuM project, partnership approaches were frequently mentioned as a useful tool not only in terms of financing models via public private partnerships, but also in terms of clearly delineating roles and responsibilities. Partnerships have in many cases proven to be an important factor for successful collaborations.

Overall, there remains a debate about which investments and costs for users are most useful to help achieve the different White Paper goals. The White Paper itself states that it must be expected that higher costs will need to be carried by transport users in the future, and regarding the internalisation of external costs etc. this is a necessity. Only in this way the investments, developments and behaviour changes suggested by the White Paper can be achieved. The White Paper goals are therefore challenging but promise better and more sustainable mobility for the future; and it may therefore still be worthwhile for Europe to carry the drawback of higher transport costs for users.

3 Trade-offs and synergies across the roadmaps

In the following section, we present a number of topics that highlight interrelations between the four roadmaps. This can be trade-offs but also synergies. This includes information and communication technologies (ICT) as an enabler and problems occurring on the last mile of both passenger and freight transport. Particular attention is paid to the link between the long-distance freight and HSR thematic fields, since these impose a specific challenge because both (high-speed) passenger and freight trains physically use the same infrastructure. We discuss trade-offs and synergies in a common because these are often closely interrelated. Where trade-offs are expected, the challenge is to search such solutions and policy approaches that are still beneficial for fulfilling goals (or even provide synergies across different goals), but without compromising or endangering the fulfilment of neighbouring goals.

3.1 ICT: a ubiquitous enabler – and a ubiquitous need for cooperation

Despite the media hype about alternative, non-conventional fuels and about electric vehicles (cars) in particular, most technological advances in the transport sector over the past decades can actually be linked to progress in the ICT sector. Huge advances were made over the past decades; for example information on and booking of transport services has been strongly transformed as compared with the 1990s.

Innovative ICT solutions do not only facilitate single measures to foster developments in specific technical fields, but they allow linkages between these fields, and the achievement of more efficient solutions taking account of the wider challenges of the transport sector.

In the urban mobility area, for example, the application of ICT allows more flexible sharing solutions for vehicles (e.g. free-floating car-sharing, “dynamic ridership”) or more comprehensive real-time monitoring of transport flows which in turn allows the application of real-time traffic management measures. Many of these policy measures can hardly be competitive without the application of complex ICT systems, which make such approaches smart and user-friendly. More importantly, however, is the potential that is provided by the links between ICT technologies and MIMP schemes. A comprehensive MIMP system is not just a technical desideratum involving stakeholders from the technical side, but it will at the same time provide an instrument to urban policy, e.g. to incentivise the use of public transport, contributing to the aspired modal shift (see also section 3.2 below). Similarly, MIMP schemes can contribute to modal shift in the long-distance passenger sector (HSR White Paper goal). Passenger rights in rail traffic provide an example of the kind of required considerations: MIMP systems may on the one hand facilitate the linkage of multiple modes of public transport across multiple operators through a single portal, doing justice to the claim for more competition on European rails. On the other

hand, from the users' point of view this should not come at the cost of compromising passenger rights. Today buying a train ticket that involves more than one operator often means two or more contracts in legal terms (particularly relevant for international journeys, but also depending on cooperation between operators, national regulations, etc.), leaving the passenger alone with no specific rights in case of a lost connection etc.[2]

Under the recently launched Shift2Rail initiative, a public private partnership between the European Commission and the European rail industry, the relevance of innovative ICT approaches is prominently acknowledged: as well as more research on technical areas of rail operations, funding is also dedicated in order to "provide integrated ticketing and journey planners – it [the Shift2Rail initiative] will develop innovative IT solutions and services" (CEC, DG Mobility and Transport, 2014a).

ICT applications are often mentioned in the context of freight transport. Shifting cargo from road to rail/water on longer distances means that there will be additional transhipment procedures that result from additional hauliers, additional documentation and, thus, costs. Operators should be supported by advanced ICT solutions for reducing the complexity of intermodal logistic chains. ICT facilitates documentation and payment procedures, saving time and costs and this should increase the competitiveness of intermodal solutions. ICT connects all transport modes and service providers in real-time, and this should allow for an optimised management of logistics, helping to avoid empty runs. This is crucial for the quality of intermodal services, and it allows constant supervision of the consignment and quick response in case of delay, loss or damage. It would also help to facilitate such a one stop shop as has been identified as desirable across the TRANSFORuM project.

Some conclusions are listed below:

- Modern ICT applications are relevant across all thematic fields of transport policy. ICT offers significant potential for innovation and a more efficient transport system – but there are conflicts of interest and different visions about how ICT should contribute to a better transport system;
- Different actors and stakeholder groups must communicate and cooperate where ICT links fields of interest (e.g. cities with individual transport policy goals, public transport operators, and telecommunication providers);

[2] In some cases, like between Deutsche Bahn and SNCF, a limited cooperation does exist but does not use the full potential of modern ICT technology. In other cases, like the Thalys and ICE services between Cologne and Brussels, there is even less cooperation than it used to exist. In general, Jansen and Schiefelbusch (2014) observe very limited cooperation in the rail sector, compared to the airline sector, leading e.g. to the frequent result of Deutsche Bahn's journey planner saying "unbekannter Auslandstarif" ("unknown foreign country tariff") for train connections abroad (Perez, 2014).

- ICT applications also influence the built environment, e.g. by facilitating intermodal transport they increasingly impose a requirement for improving the physical conditions at those places where transport modes connect (train stations with a need for public transport links, car-sharing parking lots, bicycle parking facilities etc.);
- For rail freight within a deregulated market there are many operators, and the current supply is more a combination of interactions and services, rather than a complete and integrated network. In particular, smaller freight customers not yet using rail freight have difficulties to get an overview of the supply. Therefore there is a need for a common information system to publicise the offer for prospective customers. European policy may further initiate and strengthen such approaches;
- In some cases it will be necessary to take decisions as to whether ICT innovations should be left to the private sector with its own interests, or whether ICT applications should be strategically used and influenced in order to help with the implementation of political visions and measures (e.g. multimodal journey planners actively promoting environmentally-friendly modes of transport). As a first step into a wider debate, this conflict of interest needs to be acknowledged by all involved stakeholders;
- In a wider sense, the balance between the operators' and the users' perspective (the latter being represented by political actors) also affects the legal framework conditions of ICT services. This balance must be transparently negotiated.[3]

3.2 The last mile: a crux for passenger transport

The convenient door-to-door service offered is a major advantage of private car use. Besides many other disadvantages of private car traffic, including the negative impacts, particularly on cities and the environment (e.g. space requirements, noise, air pollution, greenhouse gas emissions), policies and strategies that aim at rebalancing the transport modes must consider this convenience when trying to offer attractive alternatives.

Here TRANSFORuM's urban mobility, HSR, and MIMP themes come together. Together, they aim at increasing the modal share of public transport and environmentally-friendly modes such as walking and cycling.[4] In order to make these attractive and convenient alternatives, ease of changing between

[3] With a particular perspective on payment applications, section 5.3 of the MIMP roadmap also discusses such kinds of legal requirements for a reasoned integration of ICT services in the transport system.

[4] For the urban mobility theme, the favouring of modes other than private car transport is part of a whole range of proposed policies that also include measures aimed at reducing the emissions of private cars (alternative fuels, electric cars etc.), but keep the cars on the road.

transport modes must be facilitated. In the urban mobility roadmap, this is part of the key building block under the heading “Reduced use of private passenger cars for transport in cities”. In the HSR roadmap, there is a dedicated policy package on “Providing good access at stations”. Finally, the MIMP theme is all about facilitating intermodal transport, including applications and providing interfaces not only for conventional public transport, but also for car-sharing, bike-sharing systems etc. (see also section 3.1).

The following key conclusions can be drawn from this overarching perspective on intermodal mobility and its facilitation in all three respective thematic fields:

- Train stations are key nodes for intermodal transport. It is self-evident that rail operators, businesses, city administrations, local transport operators etc. each have their different – and relevant – interests and requirements and must work together;
- Rail operators must consider how their passengers get to trains stations and how they reach their final destinations. Good intermodal transport connections are therefore in the vital interest of rail operators and should be handled strategically;
- Innovative ICT solutions contributing to an inclusive future MIMP system can help to meet the challenges mentioned above – see section 3.1.

3.3 The last mile: a crux for freight transport

The last mile is often the most expensive and weakest link in the rail freight system. For wagon loads, industrial sidings and related services have been abandoned to a large extent and new storage facilities are often localised without or far from rail connections. For intermodal freight transport, terminal handling and feeder transport are rather costly compared to the long-distance journey itself. Therefore it is crucial to develop more efficient terminal handling systems which make it possible to have more terminals, thereby reducing feeder distances. It is also important to stop the negative development of industrial wagon load traffic by making marshalling yards and feeder transport available for more operators in addition to the incumbent companies.

For waterborne transport, the last part of delivery is a crucial determinant of the size of the freight volume that is transported. Usually, at a certain point only road transport is able to carry the last mile delivery with appropriate flexibility and speed. There is a need to look for solutions in road transport that increase efficiency and decrease negative environmental impact. In cities it is important to keep terminals in or nearby the cities so freight can be transported by rail/vessel as close to the destinations as possible, and can then be transported the shortest distance by electric or other environmentally-friendly trucks. Achieving the urban goal for freight is only possible if trips are intermodal and split at terminals. Here, the build-up of CLSCs is an essential measure. However, there

may sometimes be a land use conflict with residential areas, as these should also be planned in proximity to city centres, for easy accessibility by public transport and cycling.

3.4 A matter of rail capacity: Long-distance freight and HSR

Two of TRANSFORuM's four thematic areas (and the White Paper's respective goals) relate to rail services: The long-distance freight theme considers a shift of road freight to rail freight (and waterborne freight), and the HSR theme is about extending HSR rail infrastructure and generally increasing the modal share of rail services in passenger transport. In both thematic fields, the shortage of capacity and congestion are important issues that are considered in both thematic roadmaps. However, the technical nature of rail transport implies a direct interrelation between both themes, and the present section will provide specific insights into the issues and propose policy initiatives to overcome them.

Congestion in the European rail network

The European rail network is predominantly used by passenger trains: 78% of all train-km are passengers trains (CEC, 2014). In some countries, rail traffic is basically mixed, combining passenger and freight trains, e.g. in Germany (mostly), Switzerland or Austria. In other countries, e.g. France, a differentiation of traffic between HSR (passenger) and classical rail operation (for passenger and freight) suggests a different rail system, with a more hierarchical network organisation and less congestion (at least in an initial analysis, because of double networks). In fact, congestion appears at the nodes of the French system (at connecting points which are bottlenecks of the rail systems), like at the bypass of Lyon which is heavily congested (freight trains operate during the night through Lyon and wait north or south of Lyon during the day when regional passenger trains and HSR trains operate).

The intensity of network use is also a very clear indicator showing a high level of congestion on the rail network: at one extreme, there are the dense networks of the Netherlands and the UK, under strong pressure of commuter services, followed by Germany, Austria and Belgium, and at the other extreme, the relatively underused rail networks of the Baltic States and South-Eastern Europe. There are four times more train-km per km of track in the Netherlands than in Bulgaria, Romania and Estonia (CEC, 2014).

Increasing capacities for rail

The increased demand for rail services implied by both the long-distance freight and the HSR White Paper goals. Despite activities to improve coordination and to make more efficient use of existing infrastructure, there is still a need to extend rail capacities across Europe, mainly in those places where rail corridors are already congested and in those places where the shift of freight and passengers will have the greatest effect.

Whether the long-distance freight goal will be met will be very much dependent on the future demand for freight. If it is met, the demand for rail freight will be 3-4 times as large as today, and at the same time passenger demand will also increase by the same order of magnitude. This increase in demand will happen on the same corridors both for freight and passengers. This is natural because the demand for both passenger and freight transport is generated by the population, except some freight transport of raw materials.

Rail freight can benefit from new HSR lines. Moving faster trains on dedicated infrastructure will free capacity on conventional lines that can be used for freight trains and regional trains. It is however important that capacity is partly reserved for future freight rail demand and is not fully occupied by regional trains from the outset – even if this appears to be possible at present. Common targets to increase service standards are essential.

Figure 2 provides an overview of the general outline of different strategies to increase rail capacities, starting from the differentiation between situations of mixed operation and opposed to separated infrastructures for HSR services, which imply different kinds of challenges for the capacity issue.

The Trans-European Transport Networks (TEN-T) programme gives clear objectives in terms of transport network development. But the development of the European rail system until 2025 faces many difficulties: cross-border trains and services do not always follow the progress of the European network. A focus on cross-border links (e.g. between the French and the German HSR network) and on reduction of congestion in specific corridors (e.g. Mannheim–Karlsruhe–Basel) is a key necessity.

Good practice: Longer freight trains, double-decker and wide passenger trains

Longer freight trains optimise capacities by reducing frequencies. Trains longer than the standard 750m are already in operation in Germany, Denmark (835m) and France (850m). The 'Marathon' project conducted a successful operation in 2014 with a 1.5km long train that gives about 75% operational efficiency gain, without needing extra path allocation.

For passenger trains, capacity use can be optimised by **double-decker and wide trains** with efficient seating. Examples are the TALGO 350 train (single-deck, 2,9m wide; 1.6 passengers/meter train), the TGV Duplex (double-deck, 2.9m wide; 2.7 pass/m), and the Japanese E4 Max (double-deck, 3,4m wide; 4.1 pass/m). But unlike the length of the train, some of the older rail networks and infrastructure in Europe (in the UK for example) cannot accommodate higher trains, so this is an approach that would either need significant investment, or could not be easily utilised on cross-border connections straight away.

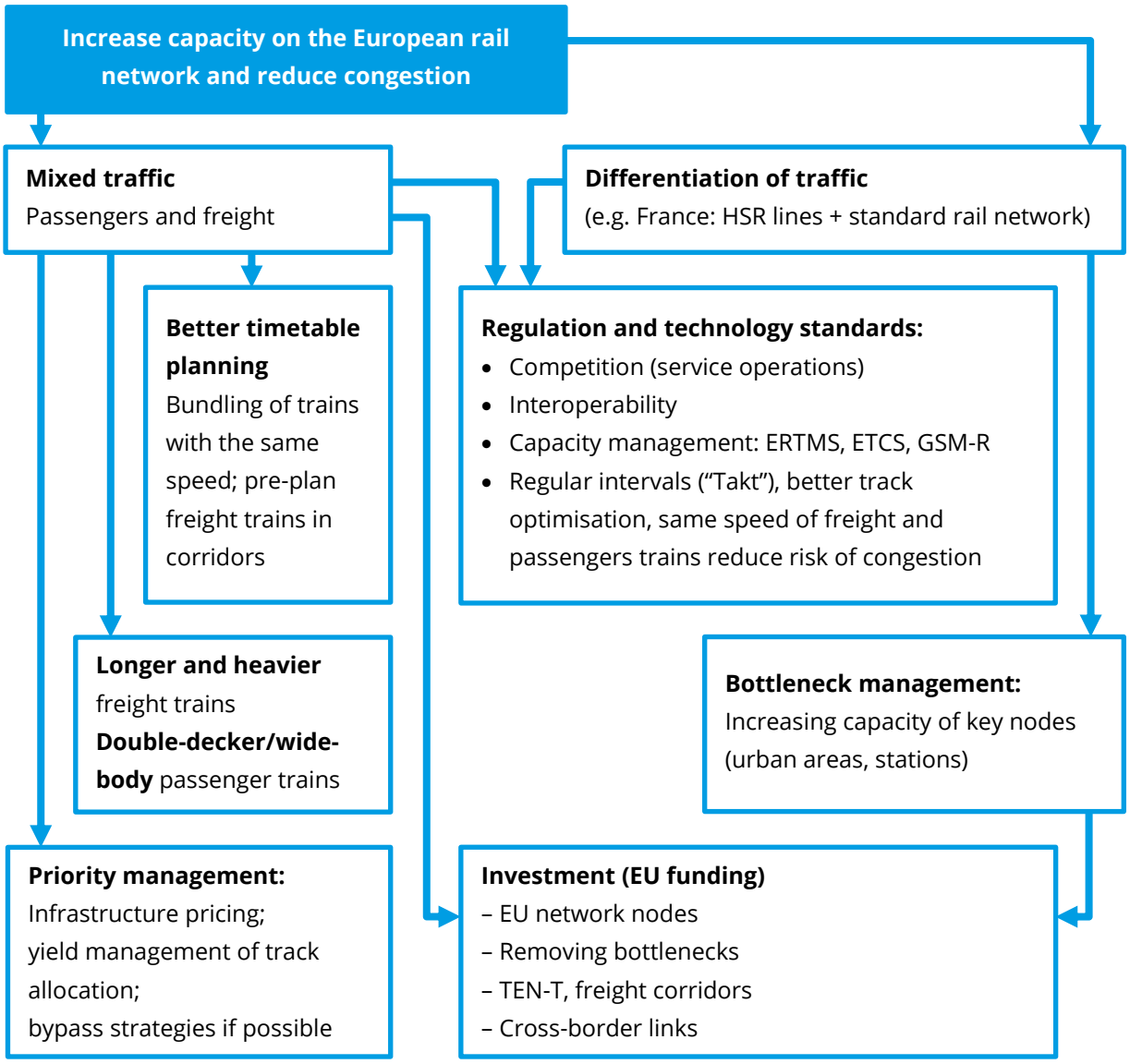

Figure 2: General possibilities to increase capacity on the European rail network

The recent TEN-T call for proposals (related to the Connecting Europe Facility (CEF)) points in the right direction as it focuses on the European core network, cross-border links, improved operability – those issues are found to be particularly relevant in the context of the TRANSFORuM project (CEC, DG Mobility and Transport, 2014b). We must work on these missing links: the example of Strasbourg–Offenburg and the missing link between Germany–France indicates this clearly. The two networks currently remain mainly national. Out of 15 HSR trains on the TGV-Est line, only four continue to Germany; out of six HSR trains on the "TGV Rhin-Rhône" line, only one continues to Germany –around 15 million habitants living in a dynamic region are ignored by most of the TGVs (Perez, 2014). Moreover, between Strasbourg and Karlsruhe, different tariffs between the few TGVs, the regional trains and the ICEs are implemented: "no integration, no synergies, you must know before which train you will take"

(Perez, 2014) – further reducing the economic value of already existing train capacities. Similar missing links exist e.g. between France and Spain (Irún–Hendaye) and in many other places around Europe (Cramer, 2014).

In order to increase efficiency in the network, we suggest the implementation of the ERTMS version 2 standard on the missing links (Guihery, Laroche, 2014): on the issue of capacity, the implementation of ERTMS on the network is reducing the time between trains to one minute (Tourbier, 2014), implying an increase of the theoretical maximum capacity of the track from 15 trains to 20 trains per hour. This increase in capacity can be used to for a better adjustment of delays and can give flexibility to the rail system (Tourbier, 2014). In combination with loans by the European Investment Bank, the TEN-T programme can also help with carrying the cost burden of introducing ERTMS. The conversion of rolling stock today has to be carried by rail operators alone, but they cannot get the full benefit from it until the network conversion is completed. The provision of financial instruments to support fleet conversion should therefore be an interest of European rail policy.

To conclude, neither developing the HSR network nor developing freight corridors alone is enough to achieve a better integration of European markets and reduce congestion on the rail network. A focus needs to be given to cross-border projects. The existing rail infrastructure provides a base, but should not be underused like in the case of some solely national HSR lines. Moreover, the importance of nodes between existing national networks has been neglected until recently (Guihery, 2014; Perez, 2014). In the future, for improving European cross-border HSR and long-distance freight corridors, Europe should shift its effort from only co-financing infrastructure lines (e.g. via TEN-T) to a more balanced policy with the following priorities:

- **Priority 1:** Identify key European rail network nodes that are relevant for HSR and freight rail at the same time, and concentrate short- and medium-term investment efforts on congested railway hubs.
- **Priority 2:** Consider investments in rail freight corridors to allow operation with longer freight trains on the whole corridor length; develop ERTMS for increasing capacity and a better interoperability of European rail networks and systems; harmonise technical standards.
- **Priority 3:** Improve dual mode cross-border links (including infrastructure) that are relevant for HSR and freight rail at the same time, taking into account medium-term and long-term demand perspectives.
- **Priority 4:** Consider infrastructure investments in the remaining network, thinking of the railway network as a whole and particularly considering HSR links to major urban centres as well other new rail infrastructure including small regional lines that can sometimes be reactivated.

4 Conclusions and key lessons learned

The present document focuses solely on recommendations relating to cross-cutting issues that are important across all four thematic areas in TRANSFORuM. It is therefore not a substitute or a summary of the four thematic roadmaps; it needs to be put side-by-side with these since it provides an additional perspective.

TRANSFORuM in general and the specific roadmaps are targeted on actions to support achieving the specific White Paper goals. Actions need actors who are prepared to take the initiative and responsibility. This is not solely about policymakers; governance is more than just political interventions. Yet, the political realm has a specific role to play: to act in the public interest. Across the different themes of TRANSFORuM and the respective roadmaps, the relevance of different political levels varies.

For the **urban mobility** theme, the main responsibilities for action are at local and regional levels, as this is where the actual challenge exists and must be met. However, the national and EU level policies remain important. Actions at the Member State level are especially needed to create favourable framework conditions and incentives for actions at the urban level. Member States need to provide adequate legal frameworks and taxation policies that will enable cities and regions to apply innovative solutions and find suitable pathways. EU level support is essential in the form of technical standards, as well as via platforms where knowledge on urban mobility solutions can be collected and exchanged on a European scale.

In the **long-distance freight** theme, infrastructure managers are responsible for organising rail freight corridors and making them attractive to the customers via the operators. European policy needs to establish a competitive market also in practice where the rail operators have the responsibility to provide high quality and low-cost services which are competitive to road. Member States are responsible for creating of a level playing field between transport modes, including the internalisation of external costs which are crucial for achieving the modal shift target in freight transport. In addition, local and regional actors must engage and cooperate in developing and implementing efficient solutions e.g. for localisation of industries and storage in connection with rail and waterborne services. At the EU level support can be given by removing infrastructural bottlenecks of European relevance. Special attention should be given to sea ports and terminals, as these are crucial transport nodes where several stakeholders meet with different requirements and capabilities.

In the **HSR** theme, rail operators are responsible for providing innovative approaches to rail services that are attractive to users – beyond journey times. This includes on-board services as well as integration with the wider transport network beyond high-speed services. The EU level policy is mainly

faced with the challenge of setting priorities and formulating a perspective for the future European rail network, e.g. providing focus on the improvement of cross-border connections and the removal of bottlenecks – moving away from inherited national planning philosophies. The creation of a level playing field between transport modes is a crucial issue for achieving the modal shift targets in passenger (and freight) transport. In addition, local and regional actors must engage and cooperate to develop and implement efficient solutions e.g. for the integration of HSR services with local transport networks.

The **MIMP** theme has a special character as it is looking for a MIMP *framework*. This means that the main challenge in this field is to discuss and eventually align the multiple existent visions of what a MIMP framework should look like and what its purpose should be. Therefore all political levels and all other actors (industrial suppliers, transport operators, passenger associations) are asked to engage in a constructive debate in order to shape and design this framework.

Key lessons learned

Having in mind both the four thematic roadmaps and the cross-cutting perspective applied in this document, a number of concrete conclusions can be drawn. At the same time they outline a way to develop further the roadmaps and the stakeholder forum established in TRANSFORuM:

1. A key conclusion of TRANSFORuM is that the **all four selected White Paper goals are helpful to achieve progress in their respective fields**. Transitions need orientation in the form of visions that are able to generate long-term commitment. The White Paper goals point in the right direction but further benefit could be derived from them if the following was improved:
    - The White Paper goals should be further communicated and developed;
    - The White Paper goals should be differentiated between regions (e.g. EU-15 vs. EU-28 Member States), including different time frames;
    - Indicators should be developed to monitor the success in moving towards achieving the White Paper goals. The TRANSFORuM roadmaps can serve as a basis for this.
2. **Deliberative fora provide the means for all parties to engage in constructive debates** to further ensure the fulfilment of the White Paper goals and the related visions. In all of the thematic areas, the stakeholders in TRANSFORuM identified significant potential that can be exploited by improved communication, cooperation and coordination. However, to ensure stakeholder commitment, these **fora need clear objectives** ("Why do we talk?"), **a clear mandate** ("What happens with the results?") **and a clear structure** ("How do we get to the results?"). Stakeholders' commitment can only be achieved if the benefits of such fora can be identified. This is also a process of learning. Roadmaps, such as the ones produced in

TRANSFORuM, appear to be a good basis to structure, trigger and orient the debates in stakeholder fora – and they help to **transfer the outcomes of the debates into concrete policy options**. Such fora have their limitations, for example when no consensus can be achieved and they are not able to achieve any of the White Paper goals on their own since usually some investments and/or political decisions are needed – but they provide a sound and often necessary basis for progress.

- Ensure an ongoing debate about (the implementation of) the White Paper goals;
- Communicate the objectives and potential benefits of these debates;
- Be aware of and transparent about the limitations of a deliberative process (clear mandate).

3. There is a need to further **improve our knowledge** about what is happening in the transport system and which trends and factors determine the mobility of goods and peoples now and in the future. For example, there is a clear lack of data about urban freight movement, but such a data base is crucial to enable reasonable debates, coordination and planning in this field.

   - EU to support public research and development of coherent data basis.

4. Generally, there is **too much focus on the most successful examples** and on making the strong ones even stronger. A good example is the field of urban transport where the majority of the 800 cities in Europe are not amongst the frontrunners pushing towards clean urban mobility. Simple measures, that have been implemented elsewhere long ago, can help here. In all thematic areas such "reverse salients"[5] can be identified. It is not always the case that new and innovative approaches are needed. **"More of the same" is a necessity as well.** In this context, more of the same means to further promote exchange of knowledge about what already exists with various internet platforms and projects. But funding mechanisms should also be open to foster the implementation of "old" measures as long as they promise to break up lock-ins and trigger change in areas where there has been not much change so far. An approach could be to set up a funding scheme where a key criterion for the allocation of funds is the size of the bottleneck towards a White Paper goal that can be removed – and not the general novelty or innovative character of the approach.

[5] In contrast to "best practices" or "front-runners" that show and apply innovative approaches in transport policy, including proactive communication of their efforts, "reverse salients" refer to the cases at the other end of the spectrum, where up-to-date approaches in transport policy are rarely taken up, where competences are missing, or where existing transport policy challenges are not even recognized.

- Do not only focus on what is new and innovative; a clear focus on the diffusion of older but good approaches is essential for achieving any of the White Paper goals;
- Tackle more explicitly the "reverse salients".

5. It has been a key finding of the TRANSFORuM process that stakeholders and actors agreed that "**where there is a will there is a way"**. But often, a missing culture of change creates a significant hurdle for moving towards any specific goal in transport policy. **A culture of change** is about enabling transition, keeping eyes open when designing policies, being prepared to experiment, reflect on progress, and alter course as necessary. It is also about taking up experiences and learning from good practices. The many good practice cases emerging during the course of the TRANSFORuM project show this potential in an exemplary way. The culture of change is closely related to a culture of sharing experiences – which allows **learning from each other** and also strategically thinking about the transferability of good practice cases. Moreover, learning from 'bad' practice was also identified as important across the thematic areas. Ideas or initiatives that don't work offer valuable insights that can prevent similar mistakes being made elsewhere. The culture surrounding the reticence of failure and the need to forget such experiences in favour of high-profile success stories is something that could be altered for the greater good.

   - Develop indicators for a "culture of change".
   - Lose the fear of failure and embrace this as part of the process of change.

6. The **balance between infrastructure investments and low-hanging fruits** needs to be thoughtfully considered. Measures to make better use of existing infrastructure must be more developed and prioritised before making big investments. It should also be taken into account that this is the most robust strategy since it does not depend so much on good economic development and on the availability of financial resources.

   - Focus more explicitly on improving efficiency and service quality, making the best use of existing capacities across the whole transport system.

7. The **stakeholder forum** established during the TRANSFORuM project has proven to be valuable in its own right. The workshops that were held over the past two years were more than just talking for the sake of talking. Instead, people at the workshop were talking in order to learn and share experiences. The roadmaps and the reflections in the present document are therefore truly a result of the **continuous dialogue with and between all involved actors and stakeholders**. Policymaking is a dynamic and not a static process; decisions taken today have to prove their usefulness under tomorrow's conditions. This is particularly true when it comes to the transition of complex socio-technical systems such as the transport system.

Working towards long-term goals requires a continuous and structured stakeholder engagement over time. This can help breaking down barriers for change as well as enabling reaction to new developments (e.g. in science and technology but also societal trends and changing attitudes) and changing framework conditions (e.g. global economic development, accelerating climate change).

- Further support for stakeholder fora such as TRANSFORuM.

The roadmaps and the document at hand show that the extent to which the different political levels are relevant or even dominating differs between the four roadmaps. However, the conclusions and policy recommendations listed above illustrate well that there is huge scope for action at the European level – in all four thematic areas. The Commission should continue to support the development of frameworks and databases through research, monitoring and dialogue with stakeholders.

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