

Deliverable 9.1  
Executive Summary

*The derived infrastructure  
development*

## Executive summary

### Recap of infrastructure gaps and actions in place

Following the methodology already supporting the elaboration of WP5, a number of gaps have been identified. Most of them are directly or indirectly related to the infrastructure and their influence on performance. In the perspective of achieving the “White Paper” targets, the capacity availability is very important.

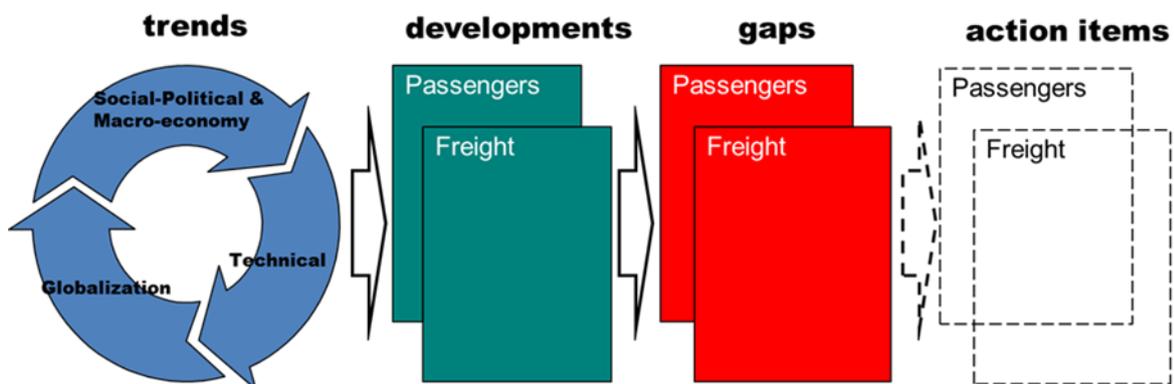


Figure 1: Methodological sequence

### Drivers of change to be leveraged for maximizing infrastructure impact

Among different enabling drivers of changes as described in WP6, a short comment is hereby included regarding the ones considered more impacting the infrastructures Roadmap. For Passengers the trend to Urbanization/Aging/Life Styles and other societal trends require increased capacity of urban transport and connection between local and external networks through co modal solutions. The role of the stations is crucial since stations are the place for co modal integration and for locating value added services. Integration with digital technology is a must for a number of features such as locational maps, information on onward local ground transportation options or cross mode integrated handling due to different mobility providers. Technology extends the rail services competitive range, improves efficiency and communications and supports closer systems integration with costs reduction, improvement of service quality and safety.

High Speed integration with traditional network has co-modal links in stations while contributing to increase capacity. Integration allows new ways to interact with urban territory through stations multilevel space management, by passes, etc. Also local rail transport solutions such as underground contribute in driving urban expansion according to travelling time and not to physical distance. Co modal integration needs to be friendly and approachable to people with reduced mobility for comfort and safety.

Slow Growing Economy and Globalization increase transport demand with low cost expectations. High speed, convenience, reliability, environmentally conscious behaviour encourage shift from road to rail. Ticketless journeys at EU level need to be compatible with local transport fare management systems, standardization of information procedure and ticketing. Liberalisation creates increased competition, encourages new entrants; alters the cost base since operators seek efficiencies and leverage their scale. Structural separation of Traffic and infrastructures creates common interest for increasing capacity and efficiency of infrastructures while sharing cost in a transparent charging model.



**Figure 2: Co-modal Transport alternatives available at stations-Various Sources**

In Freight transport some trends apply in the same way with differences necessary for adapting to the specific industry environment. The technology acts to extend the competitive range of rail services, supports communications, integration and control of systems operations, enables the full utilization of capacity, reduces costs and allows improvement of service quality, safety and sustainability.

Also for freight the Nodes are crucial for allowing modal shift and co-modal efficiency. The Nodes have different role and profile according to a multilevel network concept. So the Nodes are the points to access the network either as hubs connecting to major corridors or entry points to a local facility, affording logistic functions while connecting to the main network.

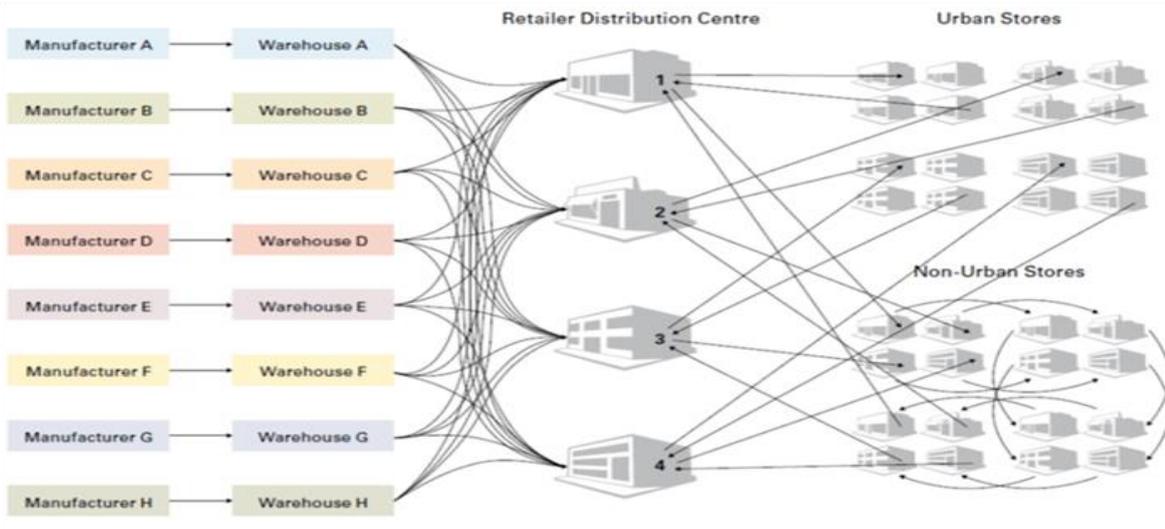
The Nodes enable efficiency to the entire traffic flow. They concentrate traffic allowing transport in economy of scale. Sea ports are key examples of this organisation with rail capacity to be able to face megaships handling requirements. Inland nodes called mega hubs or dry ports become even more important in the light of 1500 m trains, longer commercially faster and heavier trains as demonstrated by the Marathon project to be affordable in Europe. Specific examples are related to the Eastern connections with new generation of mechatronic equipment capable of efficient and fast transshipment.

The capability to develop value added services increases the attractiveness of nodes contributing to concentrate traffic while minimizing intermediate moves. In this perspective logistics nodes are expected to become places where to locate industry and distribution facilities interested in benefiting from rail infrastructure connectivity. Also the innovation in reverse logistics both in recycling and in minimizing waste, need specialized technologies with shared scale benefit.

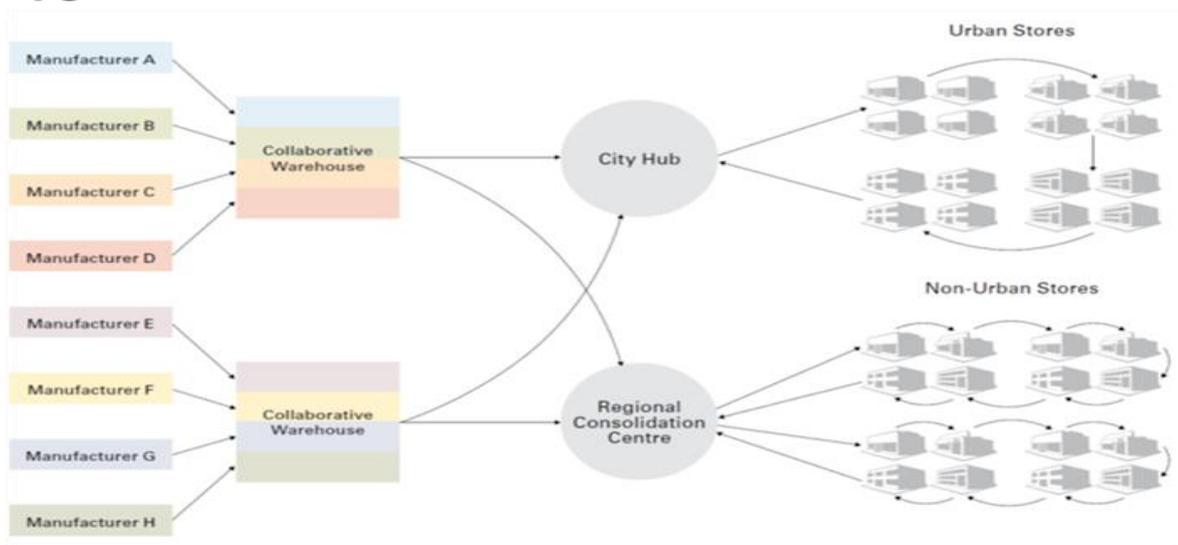
A key element for accelerating modal shift is to leverage the dynamics of restructuring the flow according to comprehensive collaboration approaches minded to increase efficiencies minimizing the last transport legs. The "last mile" distribution concept is the most impacting both on cost and environment.

The Fast Moving Consumer Goods Industry is a leading mover of freight with visionary approach based on collaboration and traffic concentration in shared facilities compliant with city logistics. New solutions are available also for perishable goods due to new temperature controlled technologies. New regulations for such new business models facilitate condition for infrastructure efficiency and facilitate investment allocation both for public and private funds.

## FROM



## TO



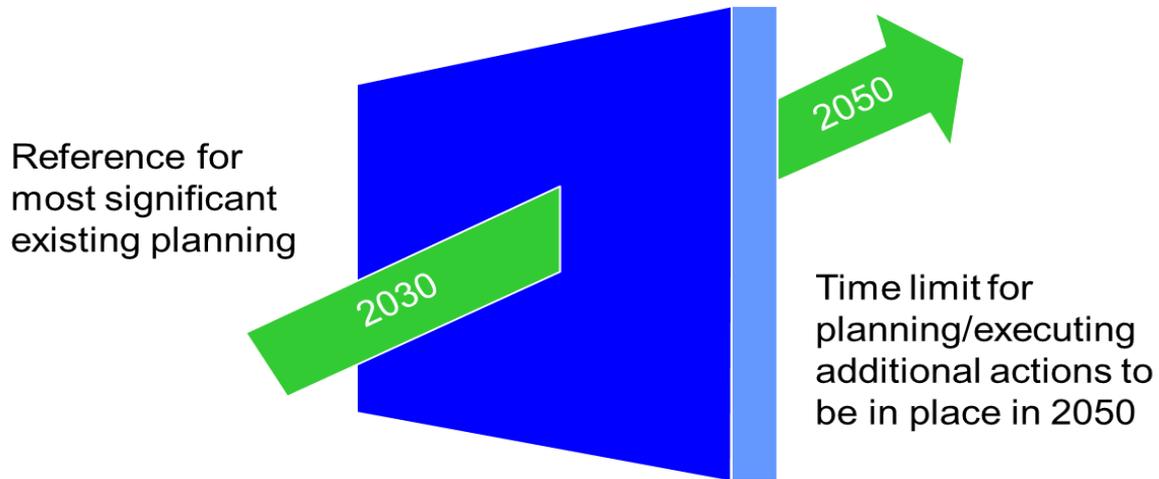
**Figure 3: Restructuring of flow in Fast Moving Consumer Industry – Source: Future Value Chain ECR/CGF**

### Actions in place to fill the gaps up to 2030 and 2050

Actions already planned are targeting 2030 while for the following decades beyond 2030 it is appropriate to say that only general guidelines exist.

Year 2030 is a key reference point for two reasons:

- It is the target for most ongoing plans; some of them go to 2020/2025 but time adjustments are necessary so 2030 appears to be a realistic timeline.
- The 2030 timeline is the "last" date limit for deciding actions to be accomplished within 2050 in order to contribute to the "White Paper" targets realization, considering the lead time for identifying, planning and implementing new rail initiatives or investments in addition to those already in execution.



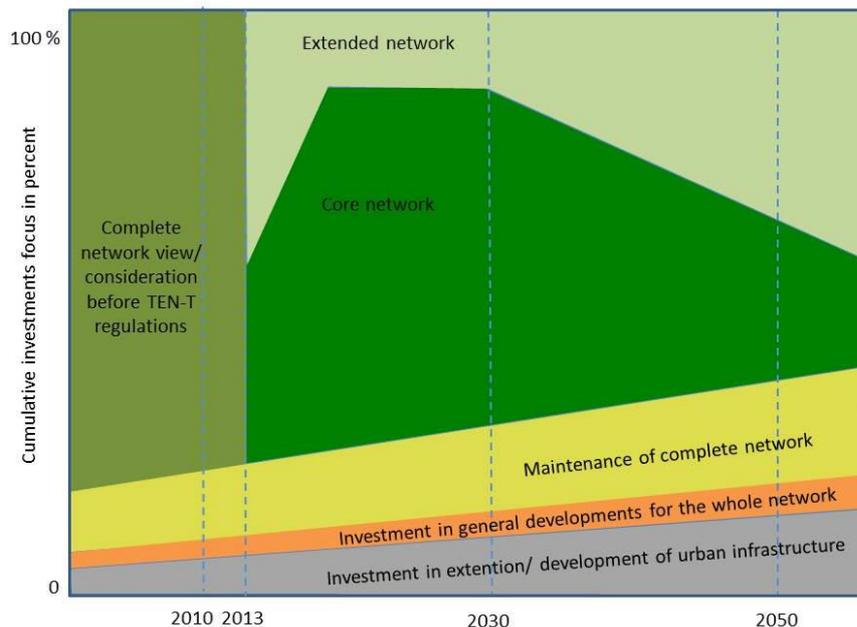
**Figure 4: Intermediate 2030 "gate"**

The ongoing actions can be grouped in 2 clusters:

- Corridor related actions impacting the core network including High Speed
- Urban mobility actions not fully covered by TEN T program

The planned actions have impacts on capacity and on performances. Capacity and performances are the two building blocks for driving the change.

Looking at the aggregate picture of actions up to 2030 and in the following 2 decades up to 2050, differences can be identified. The performance aspect can be expected as impacting less the action results after 2030. Satisfactory performances should be already achieved before 2030, otherwise the "White Book" target would be at high risk. According to the assumption that at 2030 performances are not an issue, most of the expected benefits of the following actions, at "systemic level", should impact "only" on capacity while at "local level" performance improvements may be significant.



**Figure 5: Focus of infra structural efforts by time periods**

### From Core Network to Comprehensive Network

This objective of the development of Comprehensive Network concerns the integration of peripheral regions, as well as central regions when they face congestion and bottlenecks, which deteriorate transport performance. The important concepts here are the accessibility which is applied at different spatial levels and improved intra-regional connections with in particular accessibility to urban centres.

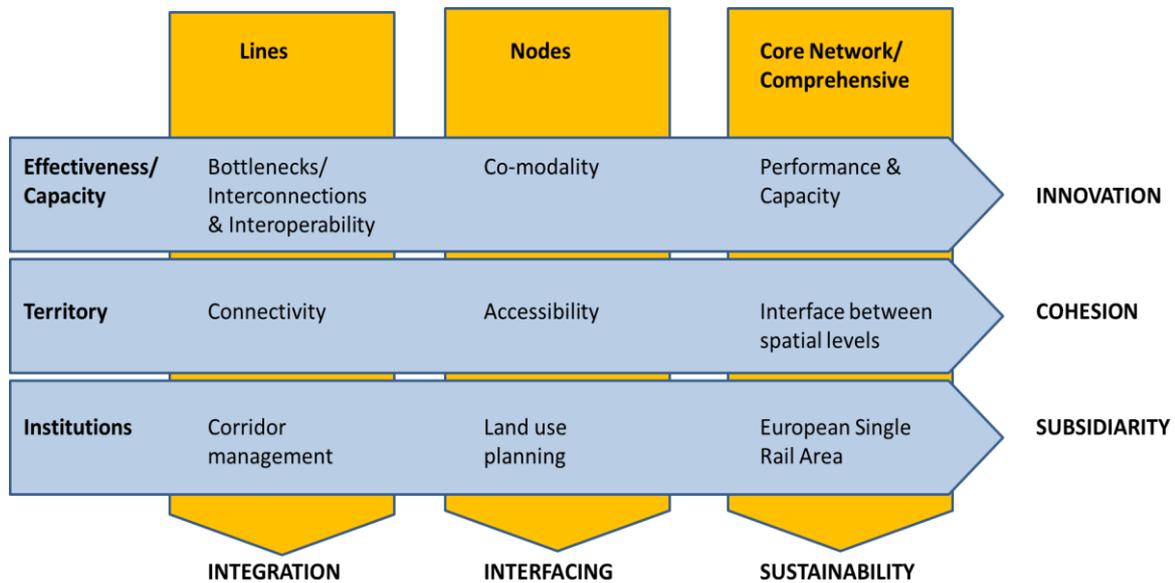
The definition of this Road Map depends upon the Governance of the comprehensive network's implementation, on the top and partially in parallel with the implementation of the core network corridors. The Governance issue implies the application of the Subsidiarity principles when necessary.

The integration of local networks needs to be compatible with the sustainable development of EU markets and territorial cohesion.

Key point is the implementation of nodes from which interconnections between the core and comprehensive networks will be achieved.

The extension from a "core" network to a comprehensive network is not just a change of scale with more links or more nodes to be considered. It is a complete integration of the spatial dimension in the transport system, with local specificities and a more complex decision process in order to leverage and to be compliant with co-modality principles.

For this purpose the spatial dimension of the 2050 Comprehensive Network objectives for transport must be supported by a spatial vision and the decision process regarding the transport planning processes with much deeper local integration than the Core Network.



**Figure 6: Comprehensive Network implementation ingredients – Source: SPIDER PLUS project adapted by BG Group**

## Passengers

The objective is that progressively, and by 2050, the great majority of Europe's citizens and businesses will be no more than 30 minutes in travel time from the Core network. The development of Comprehensive Network is based on the principle of improved accessibility and connections with the main rail services based on limited number of changes and door to door time.

A particular attention is dedicated to cross border connections, as the increased European integration will generate new demand traffic segments in connections where interoperability issues need to be afforded and new services need to be created.

## Freight

For Freight the evolution of the Comprehensive can be addressed with multiple segmentations.

The main segmentation refers to the type of traffic:

- Containerized goods coming/going overseas
- Inland traffic non-bulk
- Inland traffic bulk

**Containerised goods** coming/going overseas will benefit of actions developed for Core Network. In particular new rail infrastructures will improve accessibility to inland traffic and inland water ways with natural benefit for modal shift. The further developments needs to identify specific medium/long distance traffic segments not served within the Core Network in order to define priorities for additional electrified rail lines and services. In addition the integration with local territories while minimizing congestion will attract significant short distance traffic to the rail mode as well.

**Land traffic non-bulk** will be developing in a better condition for Rail in Central Europe because of traffic and network density. These are the same reasons partially explaining the present relatively higher share of rail mode. The Comprehensive Network objective is to support cohesion of additional territories with similar infrastructures and services.

Priorities for Comprehensive Network development need to be smart in leveraging as far as possible specific conditions in order to create efficient and effective services. This means in particular to combine long distance traffic opportunities with local services supporting city logistics, possibly leveraging already existing infrastructural asset to be properly revamped. Territory planning will have specific role in defining priorities especially where local/short distance environment and congestion requirements can meet medium/long distance traffic requirements for the same area.

Territory planning can influence industry localization decisions supporting the acceleration of the existing trend in localizing industrial and commercial activities in freight villages in order maximizing scale benefits.

Also product specialization can contribute in justifying rail integrated logistics solutions.

**Inland traffic bulk** will remain significantly concentrated in port locations and will partially benefit of infrastructural and service development already reported for containerized goods Further Comprehensive Network development will be driven by specialized solution according to the specific geography.

## Derived infrastructure Roadmap

### Aggregate Roadmap picture

The "Vision" elaborated in WP7 is demonstrating that the White Book Targets can be achieved by 2050 in a co modal mobility system based on electrified rail.

For achieving such ambitious results a number of actions need to be put in place and a comprehensive monitoring system is required. Significant delays in certain areas may imply delays also in other areas with potential risk for the entire plan fulfilment. The risk of not being on time with "mobility becoming a determinant of value-creation in societies" (source Transport for a Changing World - Thinking beyond the Trends – Shaping Responses – International Transport Forum 2014) may affect economic and social growth. So being too late is not an option.

The comprehensive Roadmap is here below very shortly summarized. Additional descriptions are included in the following pages with graphics support integrating summary descriptions in words. Graphics can be more intuitive and can show better multiple relationships between different elements.

Starting from the bottom of the following picture, there are actions starting to operate in 2015 up to achieving intermediate and full target results in 2050.

Actions are grouped in clusters, gathering items related to:

- Investments for planning and bottlenecks, interconnections and interoperability
- Governance and territory planning
- Technology
- Market uptake

These groupings represent the pillars on which to build up in continuity with the previous parts of the study the needed interventions.

Actions are controlled in their progressive evolution to the expected results through “Milestones” listed in the reference years:

- **2015**: the check is verifying the process status in **filling the gaps and accelerating transformation speed** while coordinating “hard” and “soft” components
- **2020**: the check is not only minded to verify the status of infrastructural programs but also to the process of **leveraging drivers of change for maximizing impacts** while implementing the actions of the next decade
- **2030**: the milestones look at the achievement of intermediate results in **building offer towards the demand growth** and to the process of exploiting plan to mid-century targets aligning mobility with societal evolutions.
- **2050**: Looks at the **objectives fulfilment** assuming that the back casting process contributed to eliminate over the decades the possible constraints generated by the conflict between the restraining and the favourable forces.

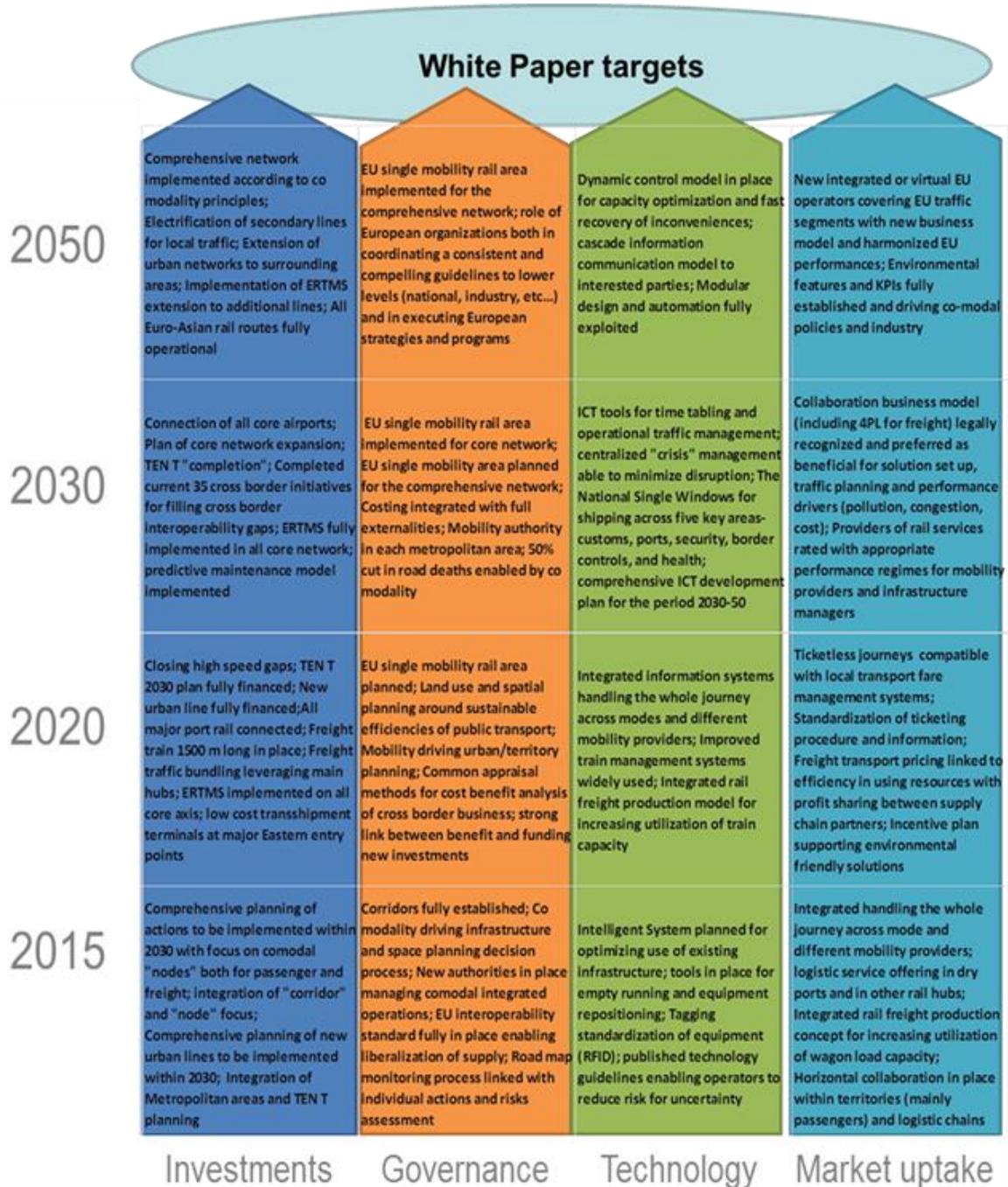
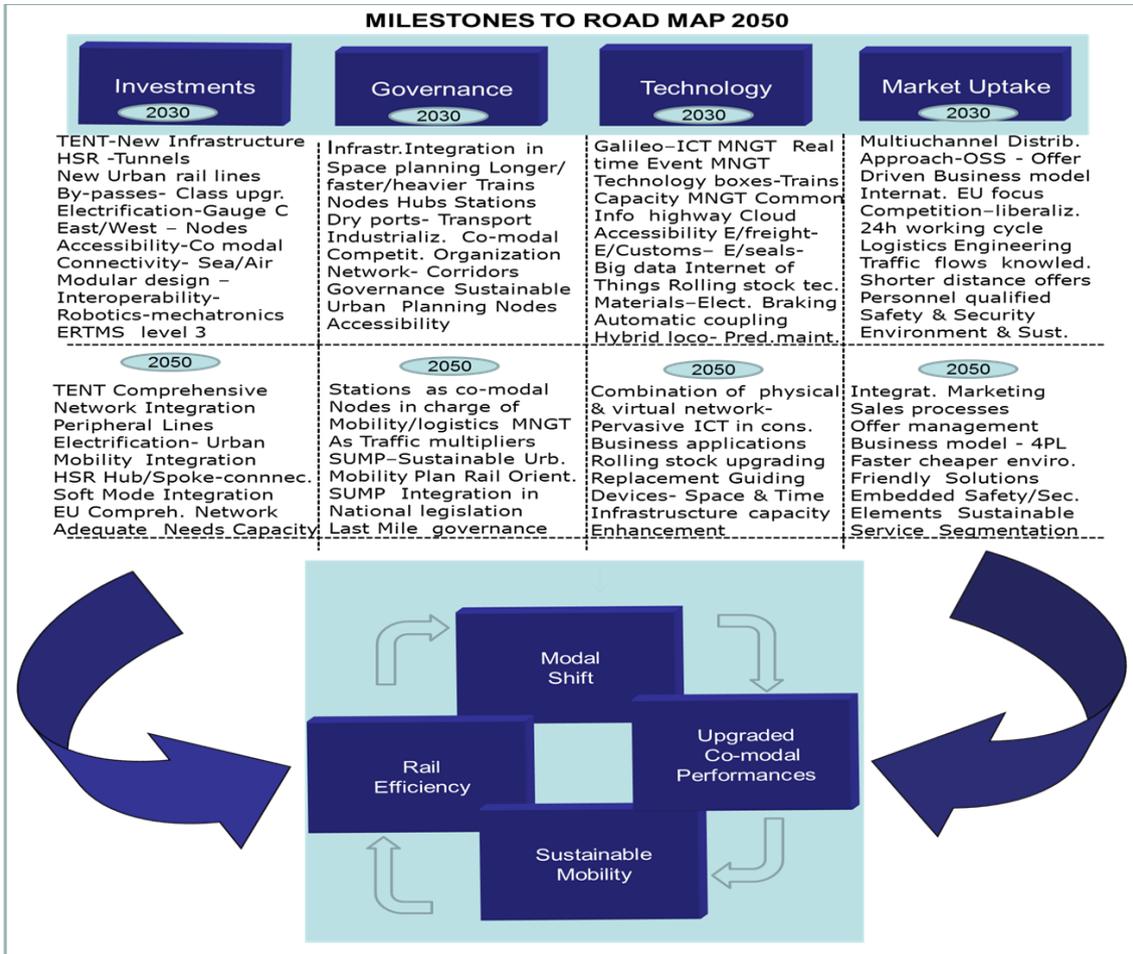


Figure 7: Roadmap summary to 2050 targets

### Conclusive Mind Map

In extreme synthesis the following mind map wants to sum up all the above concepts encompassing in one page the intervention areas and the needed actions involving the 4 pillars of **Investments, Governance, Plan/RTD/Technology and Market Uptake** sustaining the building to 2050 White Paper construction. The Road Map proves that the White Paper objectives are achievable.

**Figure 8: Mind map: Roadmap maximizing co-modality efficiency based on electrified Rail**



**Achievements of Last Decade**

When one look at the future and realizes the magnitude of the challenges to be accomplished by 2050 a sense of impotence and frustration might creep in. Although this might be justified in front of the long time to market and the very many actions needed whose decision centre is spread in so many European Authorities/Governments, one has to take confidence from the achievements of the last decade. Many strategic actions have already been accomplished which are instrumental for a further step change. Some of these strategic actions are here below reported (not exhaustive)

- The EU Commission issued four Railways Packages for liberalizing the Rail sector and promoting effective competition. These Rail packages promoted the separation of the infrastructure from the operations opening up the market to Private Operators.
- The EU Commission issued the Urban Mobility Package.
- The EU Commission fostered and is pushing forward the implementation of the TE T corridors promoting the development of the European Core Network, for further integration into the Comprehensive Network.

- The EU Commission promoted the ERTMS program for managing more efficiently the rail traffic on the European network with planned improvements over time up to ERTMS level 3 achieving substantial productivity gains on the infrastructure.
- The EU Commission developed the Galileo system for the European ICT satellite communication network visioning the future. From Galileo a series of other numerous applications of advanced technologies are possible and promoted.
- The European Commission created ERA and INEA. The first one for making the European technologies and systems on rail interoperable for standardizing the application throughout the European rail Space. The Second is the Agency for making the interface with the market place more agile and efficient saving time and money.
- The European Commission together with the Private Sector promoted and supported the "Join Undertaking" for achieving the Shift to Rail policies and the objectives of the Horizon 2020 targets.
- The European Commission issued the Passengers rights regulations signifying a considerable step change in the recognition of the market service requirements and the adequate service standards to be respected in a modern Society.
- The European Commission while opening up the European zone to the new accessing countries towards the East, fostered at the same time the development of their surface network both road, rail air and waterborne.
- The European Commission together with local Governments promoted the development of High Speed Rail which is a market segment in great development answering the new mobility needs of an evolved and more sophisticated Society. Together with it the Connecting Europe Facility became a realistic objective from an original wishful thinking.
- The Co-modality approach again launched by the European Commission represents a target yet to be conquered although in the Last few years a greater awareness started to be more widespread. All transport modes should deliver their best performances concurring to a more sustainable mobility.
- The Sustainable mobility the inferior dependence from fossil fuels together with the environmental issues in all its facets have been battle horses in the last decade of the European Commission policies. Now Europe as a whole seems to be more attentive to the mobility and energy aspects in a low costs approach.
- The results of all these actions have been Rail Traffic liberalization, more competition on the rail tracks, better services to the users, lower costs, private operators competing with the incumbents who in turn have been forced to eliminate their monopoly attitudes restructuring themselves for servicing better their customers. This liberalization has happened both on rail freight as well as on passengers' transport.
- The technology dimension has also been developed as a result of the push given by Authorities to the ICT sector which is fundamental for mobility.

Such technology development fostered the rail transport modernization both in Passengers and Freight. For Freight in particular the longer commercially faster and heavier trains will become a reality in the foreseeable future, while a number of other regulations such as the European Swap Body standard and best practices such as the preventive maintenance are making our European network more effective and resilient. For the Passengers the High Speed rail and the integration of the European Network into the urban areas seems to be the greatest innovations