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Scandinavian Mediterranean

Second Work Plan of the European Coordinator

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Mobility and Transport

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This report represents the opinion of the European Coordinator and does not prejudice the official position of the European Commission.

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1 Towards the second Scandinavian-Mediterranean Corridor work plan

1.1 *General Introduction*

Transport is a policy pillar that can make a vital contribution to boosting the long-term competitiveness, sustainable growth and development of the internal market and the wider European economy. Efficiency improvements in the transport of people and goods within the internal market and between it and the wider world, enhanced deployment of intelligent transport systems and the greening of the sector and its infrastructure are key elements of the new TEN T policy. Short to medium term capital investment in transport infrastructure and systems generate a considerable direct and indirect employment effect at a time when joblessness remains stubbornly high in so many EU economies. Additionally, technological and systems innovation can be expected to foster the development of supporting business ecosystems specialising in the servicing and management of ICT and sustainability challenges.

In this context it is my privilege and pleasure as European Coordinator to present to the Member States for appraisal and approval the second generation of the work plan for the Scandinavian-Mediterranean Core Network Corridor (Scan-Med). This plan is founded on the provisions of Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013 which establishes Union guidelines for the development of the trans-European transport network (the Regulation)[1] and on the first Work Plan which was presented at the TEN-T days in Riga on 22-23 June 2015.

It is transmitted in accordance with Article 47.1 of the Regulation, which enjoins each European Coordinator to 'submit to the Member States concerned a work plan analysing the development of the corridor'.

This work plan is grounded in the collaborative efforts of the Member States and Norway, the European Commission and associated agencies, assisted by external contractors and chaired by the European Coordinator. It has been elaborated over the course of eight consultative Corridor Forum meetings since 2014 and has benefitted progressively from the input of numerous stakeholders.

I would like to take this opportunity to thank all those organisations and public officials who contributed such valuable time and insights to this challenging and complex exercise.

The concept of the core network corridor, as described in Article 42.1 of the Regulation, is an instrument that acts as the centre of gravity around which our work on modal integration, interoperability and coordinated development of infrastructure orbits. The Scan-Med Corridor is a crucial axis for the European economy, crossing almost the whole continent from North to South.

[1] OJ L 348, 20.12.2013.

1.2 Technical Introduction

The Scan-Med Corridor encompasses seven EU Member States (Finland, Sweden, Denmark, Germany, Austria, Italy and Malta) and one Member State of the European Economic Area, Norway. It is the largest of the corridors in terms of core network length – with more than 9.300 km of core rail and greater than 6.300 km of core road network – together with 25 core ports, 19 core airports, 45 core intermodal terminals and 19 core urban nodes. The regions along the Scan-Med Corridor[2] constitute an important socio-economic area within the EU. In 2012 they accounted for a population share of 15% and an employment share 10% of the EU 28. The Scan-Med Corridor regions generated 20% of the EU's GDP, with an above EU-average income per capita of €33.700.

Table 1: Socio economic indicators of Scan Med Corridors in the year 2012

	Inhabitants	Employment	GDP (million €)
EU28	504.060.345	344.777.276	12.959.735
Scan-Med Corridor regions (NUTS 3)	76.731.169	35.645.000	2.586.855
	15,2%	10,3%	20,0%

Source: Prognos analysis, 6/2016

As regards the 82% of identified projects for which a total cost value has been provided, the total investment required until 2030 for the realisation of the objectives of the Scan-Med Corridor amounts to €172.0bn.

Under the Connecting Europe Facility (CEF)[3] calls for proposals were launched in 2014 and 2015. €12.8bn has been allocated for the 2014 CEF Transport Calls. Further €7.5bn has been allocated for the 2015 CEF Transport Calls. All Calls registered a strong demand.

Together, the 2014 and 2015 CEF Transport Calls represent about 90% of the total budget of €22.4bn which has been allocated to co-fund TEN-T projects in the EU Member States for the period 2014-2020. In addition to CEF funding, consideration will need to be given as to how to deploy innovative financial instruments and parallel policy initiatives as these evolve in order to help achieve corridor objectives.

The European Coordinator shall use his best endeavours to encourage the facilitation of measures to design the right systems of governance and identify appropriate sources of finance, both private and public, especially as regards complex cross border projects that represent a clear network and EU added value.

[2] "NUTS-3-Regions touched by the corridor", according to definition by the Key Performance Indicators (KPI)-Working Group across all corridors.
[3] Regulation (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility, OJ L 348, 20.12.2013.

What follows is a detailed description of the key characteristics of the Scan-Med Corridor as derived from the corridor study undertaken and accomplished in December 2014 as well as the preliminary results of the current and on-going corridor study undertaken by the consultants, as assisted by the comments and insights of the Member States, Norway, the European Commission and invited stakeholders. These results now require Member State appraisal with a view to approving this 2nd generation of the corridor work plan. The primary objective of this plan is the ultimate realisation of the Scan-Med Corridor between now and 2030 as a matter of common interest and shared responsibility.

When completed, this second iteration in planning the Scan-Med corridor will permit the Coordinator to focus on the agreed key priorities with a view to ensuring that it makes the fullest contribution to realising the objectives of the Trans-European Transport network.

2 Characteristics of the Scandinavian-Mediterranean Corridor

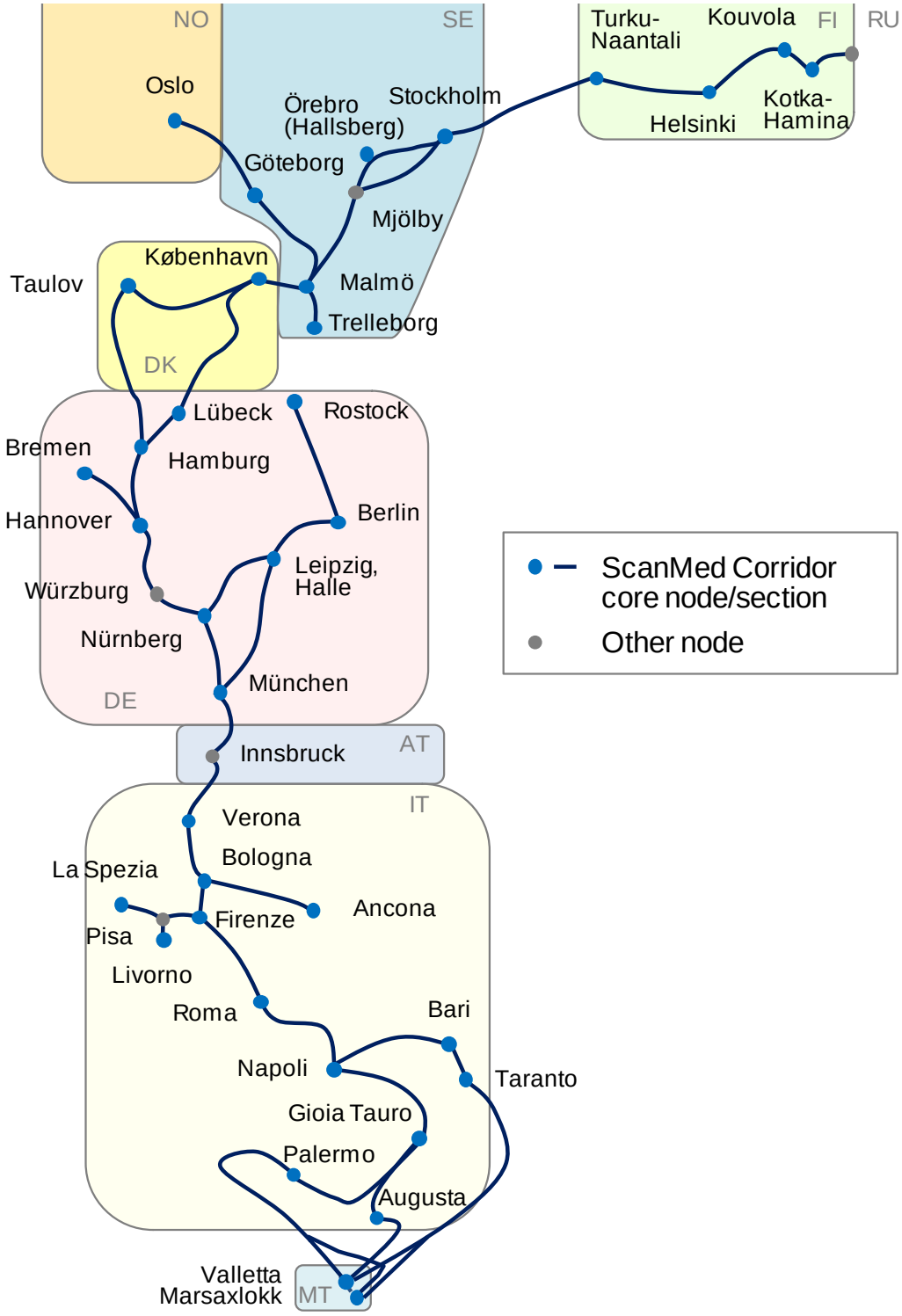
2.1 *Corridor alignment*

The Scan-Med Corridor links the major urban centres in Germany and Italy to Scandinavia (Oslo, Copenhagen, Stockholm and Helsinki) and the Mediterranean (Italian seaports, Sicily and Malta). It covers seven EU Member States and Norway and represents a crucial axis for the European economy, crossing almost the whole continent from North to South. This Corridor also needs to be looked at in the context of developing global transport routes. The cross-border section between Finland and Russia plays a significant role for the terrestrial connections to the eastern and northern markets in Russia, China and Asia, while the North Sea and Mediterranean ports provide maritime access to the American and African continents and the rest of the global trading network. The cartogram in Figure 1 shows the corridor's schematic alignment and its core nodes according to the TEN-T and CEF-Regulations, in particular the Annex I, Part 1 Alignment as well as Pre-identified sections including projects.

Rail and road but not inland waterways are the key "linear" modes of transport designated in the Scan-Med corridor. Several sections of the alignment are sea crossings ("Motorways of the Sea"), in particular the connections from Finland – Sweden – Denmark - Germany and Italy – Malta. The maritime dimension, however, goes far beyond the single corridor and connects European countries with each other and the rest of the World. The horizontal priority "Motorways of the Sea" is led by a separate European Coordinator. He has presented a detailed implementation plan which will be subject to consultation by the European Parliament, the Member States and industry stakeholders during autumn 2016 with a view to presenting a more specific "Motorways of the Sea" plan in June 2017. There is a regular exchange of information between the "Motorways of the Sea" Coordinators and the nine Corridor Coordinators.

The other dimension of the Scan-Med corridor is composed of "nodal" infrastructure such as airports, seaports and rail-road terminals of the core network. As regards modal and infrastructural interconnection between the Trans-European, regional and local transport networks "urban nodes" are of specific importance as generators of both passenger and freight traffic. In freight transport, freight villages or "interporti" are often used to consolidate cargoes. Eight out of the "Top 20" European freight villages, including the top four, are located on the Scan-Med corridor.

Figure 1: Alignment of the Scan-Med Corridor



Source: KombiConsult analysis, 10/2016

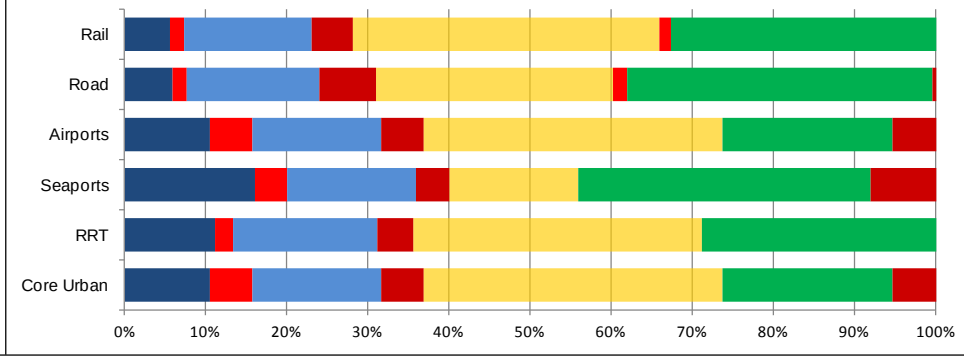
2.2 Corridor characteristics

The Scan-Med Corridor is the largest in terms of core network length of rail (> 9.300 km), road (> 6.300 km) and number of core ports, airports and rail-road terminals (in total about 90 sites). An overview of the quantitative characteristics of the corridor is provided in figure 2:

Figure 2: Characteristics of Scan-Med Corridor in the year 2016

Mode/Node	Dimension									Total
Rail	network length [km]	518	169	1.462	476	3.532	127	3.053	-	9.337
Road		376	116	1.039	440	1.869	109	2.401	22	6.372
Airports	number	2	1	3	1	7	-	4	1	19
Seaports		4	1	4	1	4	-	9	2	25
RRT		5	1	8	2	16	0	13	-	45
Core Urban		2	1	3	1	7	0	4	1	19

Country Shares



Source: HaCon, Ramböll, Uniconsult, GruppoCLAS, KombiConsult analysis, 6/2016

With Munich, Rome, Copenhagen, Stockholm and Berlin five of the TOP 20 European airports are located on the Scan-Med corridor. These airports also act as hubs linking smaller airports and regions to the international aviation network. Scan-Med seaports also rank high for both passenger and freight transport. Helsinki, Stockholm and Naples are ranked among the Top 10 European passenger ports while Hamburg, Bremen and Gioia Tauro are among Europe's largest container ports. While other corridors focus on a few ports and concentrated trade lanes, the strength of the Scan-Med corridor lies in its variety of ports, alternative routes and resulting flexibility for transport users.

2.3 Compliance with technical infrastructure parameters of the TEN-T guidelines (incl. KPI analysis results)

Article 4 of the Regulation (EU) No 1315/2013 describes the objectives of the trans-European transport network, which shall strengthen the social, economic and territorial cohesion of the European Union. The aim is to create a single European

transport area, which is efficient and sustainable, to increase the benefits for its users and to support inclusive growth. The Member States agreed to the following list of specific objectives, which have to be met by the Scan-Med Corridor by 2030 at the latest.

Table 2: Objectives of Scan-Med Corridor

Mode	Objective
Rail	Full electrification
	Axle load 22.5 t (for all Freight lines on the Core Network only)
	Line speed 100 km/h, minimum (for all Freight lines on the Core Network only)
	740 m freight trains (for all Freight lines on the Core Network only)
	ERMTS fully implemented
	Standard gauge 1435 mm for new lines
Road	Express road or motorway
	Intelligent transport systems (ITS) / toll collection systems comply with Directive 2004/52/EC, Commission Decision No 2009/750/EC and Directive 2010/40/EU [SE]
	Parking areas every 100 km, minimum
	Infrastructure for alternative clean fuels
Airports	Terminal open to all operators
	Infrastructure for air traffic management, SESAR
	Infrastructure for alternative clean fuels
	Main airports (according to Article 41 N° 3 of the Regulation (EU) 1315/2013) connected to (high-speed) rail network
Maritime transport, Ports, MoS	Freight terminal open to all operators
	Connection to rail, road, IWW (where possible)
	Infrastructure for alternative clean fuels
	Facilities for ship generated waste
	VTMIS, SafeSeaNet, e-Maritime services
Rail Road Terminals (RRT)	Sufficient transhipment equipment on freight terminals
	740m train terminal accessibility
	Electrified train terminal accessibility
Multimodal transport	All transport modes connected at freight terminals, passenger stations, airports, maritime ports
	Real time information on freight terminals, maritime ports, cargo airports
	Continuous passenger traffic through equipment and telematic applications in railway stations, coach stations, airports, maritime ports
Environmental targets	Specific target values more detailed than those mentioned in the Regulation (EU) 1315/2013 could be identified for specific sections of the corridor by the Member States concerned in accordance with European legislation.

On the basis of these objectives a compliance analysis was performed. The compliance analysis compares the current (infrastructure) parameters and target values set for the year 2030. The analysis uncovered the deficits on single corridor sections and nodes. Key Performance Indicators (KPI) have been defined across all core network corridors. These will monitor and measure the extent to which target values are being realised. The results of the compliance analysis provide baseline values for the KPI exercise.

The KPI's are displayed in the harmonised format structured by generic supply side, generic demand-side KPI's and the corridor modal share based on the agreed methodology[4]. The basic concept of the KPI is to define a baseline and monitor the evolution over time until 2030. It was therefore essential that the data be recorded by and available from public sources in order to create a time series. The baseline values have been quoted from the 2014 Study and refer to data for the years 2012 or 2013, published by mid-2014. 'Status 2016' refers to data currently available (2014/2015). In most cases the data sources are the mode managers' websites since the current version of TENtec does not provide reliable data.

Compliance with respect to most parameters was already quite good. However, the values for airport connection to rail and availability of clean fuels could be improved compared to the baseline.

[4] See KPI Working Group (2016) „Core Network Corridors – KPI Framework" (MOVE/B1/2014-710)

Table 3: Generic supply-side KPI, baseline 2014, status 2016[5] and target 2030

Mode	Generic supply-side KPI	Unit	Baseline value (2014)	Status (2016)	Target 2030
Rail network	Electrification	%	96	96	100
	Track gauge 1435mm	%	94.5-100	94.5-100	100
	ERTMS implementation	%	6	6	100
	Line speed (≥100km/h)	%	93	93	100
	Axle load (≥22.5t)	%	94	94	100
	Train length (≥740m)	%	66	66	100
Inland water-way network	CEMT requirements for class IV	%	n.a.*	n.a.*	n.a.*
	Permissible Draught (min 2.5m)	%	n.a.*	n.a.*	n.a.*
	Permissible Height under bridges(min. 5.25m)	%	n.a.*	n.a.*	n.a.*
	RIS implementation	%	n.a.*	n.a.*	n.a.*
Road network	Express road/ motorway	%	99	99.1	100
	Availability of clean fuels	Num-ber	n.a.	CNG 2.271** LNG 7** H2 3** ECP 9.318**	****
Airport	Connection to rail	%	60	63	100
	Availability of at least one terminal open to all operators in a non-discriminatory way and application of transparent, relevant and fair charges	%	100	100	100
	Availability of clean fuels	%	5	n.a.	100
Seaport	Connection to rail	%	100	100	100
	Connection to inland waterway CEMT class IV	%	50	50	100
	Availability of clean fuels	%	12	20	100
	Availability of at least one freight terminal open to all operators in a non-discriminatory way and application of transparent charges	%	100	100	100
	Facilities for ship generated waste	%	100	100	100
Inland ports	CEMT Class IV waterway connection	%	n.a.*	n.a.*	n.a.*
	Connection to rail	%	n.a.*	n.a.*	n.a.*
	Availability of clean fuels	%	n.a.*	n.a.*	n.a.*
	Availability of at least one freight terminal open to all operators ...	%	n.a.*	n.a.*	n.a.*
Rail Road Terminals (RRT)	Capability for intermodal (unitised) transhipment	%	71-100	71-100	100
	740m train terminal accessibility	%	***)	18	100
	Electrified train terminal accessibility	%	***)	32	100
	Availability of at least one freight terminal open to all operators	%	75-100	75-100	100

*) Inland waterways and inland ports are not part of Scan-Med Corridor, these KPI are not applicable (n.a.)
**) Compressed Natural Gas (CNG), Liquefied Natural Gas (LNG), Hydrogene (H2) fueling stations and electric charging points (ECP) in the Scan-Med Corridor countries. Data for 2016
***) Data only partly available from publicly available sources (terminals websites, network statements, since it requires detailed definitions.
****) KPIs are commonly defined. A target number of fueling stations at roads cannot be given thus the cell

[5] As per definition given on page 11.

is empty. The term clean fuels at airports is to be understood as the offer of clean fuels for aircrafts at the appropriate airport and does not consider the availability of clean fuels for any other mode of transport. It does however not measure if the offer is sufficient with regard to the available quantity. It is further not considered if aircrafts (and ships) are really using clean fuels and to what extent. Setting a quantified target would be subject to political agreement.

Source: HaCon, Ramböll, Uniconsult, GruppoCLAS, KombiConsult, Prognos analysis, 6/2016

As with the supply-side, the demand-side also is subject to generic KPI's, of which the inland waterway freight flow is not relevant for Scan-Med. Scan-Med airports increased both their passenger (+10 index points) and freight flows (+5 index points) over two years. Scan-Med ports also recorded positive developments with an increase of two index points between the years 2013 and 2014 for passenger and freight flows.

Table 4: Generic demand-side KPI, baseline 2014 and status 2016[6]

Mode	Generic demand-side KPI	Unit	Baseline value (2014)	Status (2016)
Inland waterway network	Total inland waterway freight flows	index (2014=100) (Tonne Kms)	Not applicable	Not applicable
Seaports/ inland waterway ports	Total passenger flows	index (2014=100) (Passengers)	100 51.453.000	102 52.349.00
	Total freight flows	index (2014=100) (Tonnes)	100 589.985.000	102 602.936.000
Airports	Total passenger flows	index (2014=100) (Passengers)	100 238.540.582	110 262.516.692
	Total freight flows	index (2014=100) (Tonnes)	100 1.974.524	105 2.065.888

Source: Uniconsult analysis based on port statistics, data for 2013 and 2014 (since 2015 is not fully available, yet); GruppoCLAS analysis based on aviation statistics, data for 2013 and 2015 respectively

The modal share indicators show the share of each transport mode in the total national traffic performance measured in person-kilometres for passenger transport and tonne-kilometres for freight transport. For the overall indicator, the national traffic performances of all Scan-Med corridor countries are aggregated and the respective share is calculated. Both passenger railways and freight inland waterways have gained one per cent from road since the baseline value.

[6] As per definition given on page 11.

Table 5: Corridor modal share, baseline 2014 and status 2016[7]

Mode	Modal share index	Unit	Baseline value (2014)	Status (2016)
Inland Surface Transport	Modal Split in National Passenger Inland Surface Transport	Percent (%)	Passenger Cars: 83 Buses and Coaches: 9 Railways: 7 Trams and Metro 1	Passenger Cars: 82 Buses and Coaches: 9 Railways: 8 Trams and Metro 1
Inland Surface Transport	Modal Split in National Freight Inland Surface Transport	Percent (%)	Road: 70 Rail: 23 Inland Waterways: 7	Road: 69 Rail: 23 Inland Waterways: 8

Source: Prognosis based on EU Transport in figures - Statistical Pocketbook 2015, Chapters 2.3 and 2.4; data of 2011 and 2013 respectively

The Scan-Med Rail Network

The compliance analysis with respect to the **rail** objectives reveals the following, in particular:

- The standard track gauge is available on all corridor lines with the exception of Finland, which is exempt because of its isolated network;
- Electrification is available on almost all lines. A few non-electrified sections in Germany (e.g. Lübeck – Puttgarden) and one in Denmark (the Ringsted-Fehmarn section, which will be electrified before the completion of the Fehmarn Belt Fixed Link) require a change of locomotive and diesel traction. Most of the non-electrified lines in Germany are due to be electrified in the framework of agreed projects, "if they are part of the requirement plan"[8];
- Interoperability constraints partly result from different electrification standards (15 kV 16 2/3 Hz in Sweden, Germany and Austria, 25 kV 50 Hz in Denmark and 3 kV DC in Italy on the existing lines used for freight transport, and 25 kV for HSL and new lines like the Brenner Base Tunnel);
- There are different standards with regard to:
  - train length being below standard parameters, in particular in parts of Sweden (630 m)[9], on the Brenner line to Florence/Ancona (600 m), and on many sections in Italy south of Firenze (400/600 m);[10]
  - axle loads below the standard parameter (< 22.5 t) on 18% of the sections in Italy;
  - loading profile for the transport of semi-trailers ("P400") in unaccompanied intermodal transport which is not achieved on the current lines in Italy south of Firenze/Bologna;

[7] As per definition given on page 11.
[8] Feedback provided by BMVI by e-mail, 17.10.2014.
[9] According to the Swedish Network Statement "Normal train length on the Swedish Transport Administration's network is 630 meter. The train lengths that are permitted for specific lines are determined in the process of allocation of capacity."
[10] According to DB Netz "for the German corridor network a train length up to 740m is basically possible, due to restrictions in timetabling and operational situations the actually possible train length can be influenced."

- A low rate of ERTMS, in particular ETCS[11] implementation, with the exception of Austria and Denmark[12], diverse time horizons resulting in a "patchwork" of ERTMS implementation and detailed practical challenges. The latter are caused by long realisation periods with different ERTMS levels and software releases being applied by infrastructure managers, the rail industry and railway undertakings. This requires detailed observation and monitoring if ERTMS is to supply the intended benefits to the rail transport market.
- In December 2014, the European ERTMS Coordinator started a consultation with Member States about ERTMS implementation of the core network corridors, with the aim to review the current European Deployment Plan (EDP) of 2009. This activity launched a close dialogue in all TEN-T corridors with the Member States. The ERTMS Coordinator had numerous bilateral discussions with high-level representatives of the Transport Ministries and Rail Infrastructure Managers. This review process has been closed and the new EDP will be part of the Work Plan for ERTMS 2016. The revised ERTMS deployment plan will cover all TEN-T Corridor alignments and will be subject to an adoption procedure by the Commission to be finalised by the end of 2016.

The Scan-Med Road Infrastructure

The compliance analysis with respect to **road** objectives shows the following results:

- Currently, the minimum road standard of Express Road or Motorway as referred to in Article 17(3) points (a) and (b) of Regulation (EU) No 1315/2013 is covered by all routes with the exception of some sections in Finland, Italy and Malta amounting to about 1% of the total distance of the corridor;
- There is no formal requirement for a minimum number of lanes. Nevertheless, the number of lanes provides, together with the road standard, a quality measure for the corridor. The number of sections without at least two lanes in each direction in Finland, Sweden and Malta amounts to about 2% of the total length of the corridor. However, it should be noted that also measures regarding traffic flow management, safety and environmental aspects can have an impact on the quality of the roads;
- According to the TEN-T Regulation priority shall be given to appropriate parking space for commercial users offering an appropriate level of safety and security. Parking areas can be simple stops with access to simple sanitary facilities or include restaurants, floodlighting even enclosures, guards or video surveillance. There is no “minimum” standard defined. Some countries have deeper coverage of safe parking/rest areas than others but all countries have these facilities;

[11] The European Rail Traffic Management Systems is basically made of GSM-R as mobile communication standard, which is widely implemented and the European Trains Control System (ETCS) where harmonized implementation is lacking.

[12] Denmark will be the first country to implement ETCS (Level 2 Baseline 3) on the entire conventional railway network (expected by 2023).

- Traffic Management Systems, usually known as Intelligent Transport Systems (ITS), are an array of different technological developments with many purposes, including Traffic Management Systems. No standardised definition of ITS exists, but a standard for data and information exchange is existing and implemented. Comprehensive work in this field is being carried out within both CEN and ISO, and numerous technical standards exist. In accordance with the Delegated Regulations 885/2013, 886/2013 and 2015/962 DATEX II is identified as the standard for data exchange. Comprehensive work in this field is being carried out within both CEN and ISO, and numerous technical standards exist. The Issues Paper 'Boosting Intelligent Transport Systems' drafted by the European Coordinators Pat Cox and Catherine Trautmann sets the scene for the future evolution of ITS along the corridors[13];
- Traveller Information services are implemented in a high fragmented manner, resulting in an incoherent traveller information along the corridor. While in some countries (e.g. Austria) national traveller information services exist, other countries provide regional services (e.g. Germany) and finally some countries only provide 3rd party services (e.g. Finland). Additionally the quality, actuality and robustness of the traveller information is not harmonised which again results in fragmented traveller information services.
- Alternative fuels include various different technologies and standards. The type of fuel and technology for refuelling has not been harmonised in the EU and it is therefore impossible to apply a compliance analysis. Today there is dense coverage in some countries for certain types of alternative fuel and practically no coverage in others. For example hydrogen filling stations[14] exist in Sweden only in the three largest cities and there is no coverage south of Rome;
- There are significant congestion problems on the road network around most large cities during peak-periods. These generally are taken into account in the national and regional plans for each country. Inter-urban roads generally have less congestion problems. Road infrastructure improvement measures relate not only to physical capacity but also to the smooth flow of traffic, increasing traffic safety or avoiding demographically or environmentally sensitive areas. In some cases, such as the Fehmarn Belt Fixed Link, there will be significant time-saving compared with some ferry alternatives or the longer route through Jutland. Other important measures, not directly related to road infrastructure, such as regulations, technological improvements or improved vehicle capacity unitisation are also important. To address these measures cooperation is necessary between all interested parties, public and private. Public expenditure is unlikely to finance all necessary infrastructures (safe parking areas, filling stations etc.) but it can impact outcomes through policy incentives and disincentives designed to achieve behavioural change among users. While private sector actors will expect positive returns on any investments made.

[13] http://ec.europa.eu/transport/themes/infrastructure/news/2016-06-20-ten-t-days-2016_en.htm
[14] http://www.netinform.net/h2/H2Stations/H2Stations.aspx

This complexity should be a spur to action to develop appropriate policy tools to deliver desired policy outcomes.

The Scan-Med Air Transport Infrastructure

Open access is basically available in all core **airports**. Connectivity with the TEN-T road network exists for all airports, with 12 airports also connected to rail. The Helsinki ring rail line to the airport was opened in July 2015.

Implementation of Single European Sky for Scan-Med corridor airports will be on the basis of the "2015 European ATM Masterplan – The roadmap for delivering high performing aviation for Europe"[15]. On 5 December 2014 the Commission appointed the SESAR Deployment Alliance as the body charged with the deployment phase (SESAR Deployment Manager).[16]

110 “green projects” submitted to the 2014 CEF Call for proposals have been listed in the Deployment Programme and analysed in order to identify implementation priorities and gaps for the 2015 call. The final version of the SESAR Deployment Programme 2015 provides information on the projects awarded and an update on the gaps identified. The following list reports the CEF 2014 projects awards along the Scan-Med Corridor:

- AMAN Upgrade to include Extended Horizon function (Stockholm)
- Geographic Database for Procedure Design (Italy)
- Basic A-CDM (Stockholm)
- A-SMGCS Level 1 and 2 (Copenhagen, Munich, Stockholm)
- Airport Safety Net associated with A-SMGCS (Level 2) (Rome)
- Upgrade of ATM systems (NM, ANSPs, Aus) to support Direct Routings (DCTs) and Free Routing Airspace (FRA) (Italy)
- Interface ATM systems to NM Systems (Italy
- Stakeholder Internet Protocol Compliance (Denmark))
- Upgrade / Implement Aeronautical Information Exchange System/service (Sweden)
- Upgrade / Implement Flight Information Exchange System/Service (Italy)

The results of the 2015 CEF Call were published on 17 June 2016 and will be taken into account in the next Work Plan. The Draft Deployment Programme 2016 is currently undergoing stakeholder consultation.

When comparing passenger traffic and capacity indicators, a few airports appear to have reached an annual traffic level above their potential capacity, as expressed in terms of passengers/year (Oslo, Gothenburg, Berlin (both airports), Hamburg, Hannover, Rome), while few others (Stockholm, Bologna, Palermo, Malta) appear close to their limits. Projects aimed at improving capacity, both planned and underway, should lead to compliance with the criteria set in the Regulation. The

[15] SESAR Joint Undertaking, 2015
[16] http://ec.europa.eu/transport/modes/air/news/2014-12-05-funding_en.htm

anticipated opening of the Berlin Brandenburg airport will constitute a substantial improvement of airport capacity on the corridor and highlight the role of the Capital Region of Berlin as an urban node at the crossroads of three of the nine core network corridors.

The Scan-Med Maritime Infrastructure

The 25 Scan-Med core ports, as regards maritime and hinterland transport infrastructure, largely fulfil the core requirements of the Regulation (EU) No 1315/2013 on ports. However, for the hinterland connections a more qualitative analysis will be needed and the Commission has appointed a consortium of consultants to deliver this in the framework of the "MoS-Study" by summer 2016. It is important to note that port environmental infrastructure is still developing (see for example the Italian "Green Ports" priority which corresponds to the Italian strategy for ports (Azione 7 PSNPL[17])). Consequently, several MoS-Projects have been selected for CEF-co-funding to address identified gaps. Infrastructures for alternatives fuels; "green" shipping (LNG fuelling, Scrubbers, Methanol); logistics platforms (Taranto); coordination among business (WiderMos, B2Mos) and cooperation among administrations (ANA); as well as the technical modifications of classical shipping services (e.g. hybrid ferries which were phased into the existing services Rødby – Puttgarden and Trelleborg – Rostock) are among the projects completed by 2015. Information and Communication Technologies are well developed on the corridor. Vessel Traffic Service (VTS) and SafeSeaNet (SSN) are fully implemented; e-Maritime services need to be further developed with a focus on harmonisation of IT and data exchange, especially through "single window" solutions. MoS projects selected under both the 2014 and 2015 CEF Calls address this need, but individual ports need to keep this under constant review. An Ideas Laboratory on Ports was hosted by Copenhagen-Malmö Port in Malmö on 8 February 2016. Main subjects discussed at this workshop were "improving the 'green profile' of ports through sustainability and modal shift and "a focus on ports' cooperation versus competition". The recent Italian ports reform has established 15 Port Authorities Systems, regrouping ports that were managed separately so far. The identification of these Port Authority Systems is influenced by the TEN-T core network planning and is conducive to streamlined investments for more competitive and larger ports.

The Scan-Med Rail-Road Terminal Infrastructure

All 28 **rail-road terminals** (RRT) in the 2015 analysis meet the requirements set out in Article 28 of the TEN-T Regulation, through being connected to rail and road by at least one rail track or road lane; by having the technical and operational capability to tranship all types of intermodal loading units and by generally being open to all

[17] PSNPL = Il Piano Strategico Nazionale della Portualità e della Logistica, the Italian National Strategic Plan for Ports and for Logistics of 2015.

operators in a non-discriminatory way. An Ideas Laboratory, which was hosted by Interporto Verona, on 19/20 of April 2016, confirmed that in most cases terminal operation systems provide information flows and data exchange between RRT managers and connected transport mode operators such as railway undertakings, intermodal operators and forwarders. However, it was confirmed that individual improvements are needed and the use of data exchange in the logistics sector could be improved. A further important requirement results from Article 39 of the TEN-T Regulation, namely the operation of electrified trains with 22.5 tons axle load and 740 m train length. In order to allow a seamless and efficient operation double-sided, electrified access with full train length is a target that requires the reception and departure sidings and the transhipment tracks to be of suitable length. Only four of 28 RRT's of the corridor provide for this feature and expansion options need to be examined at local level. It is recommended that rail infrastructure managers and terminal managers cooperate towards realizing the tracks-side and terminal side improvement of that parameter in a coordinated way.

3 Results of the transport market study

In the year 2010, the latest year for which disaggregated data could be retrieved, the international freight traffic on the corridor amounted to 129.0 million tons by sea, of which 59.9 million tons are between core ports, 50.3 million tons by road and 36.0 million tons by rail.

The seaborne freight transport between all ports of the corridor countries is distinctly higher than the continental corridor flows (rail and road). The dominant relations are located in the northern part of the corridor, mainly related to Germany and Sweden, supplemented by the flows from the remaining Scandinavian countries. These volumes amount to 64 % of international sea freight flows. In 2010, approximately 80 percent of all exports from the Scandinavian countries to countries in the core network corridor are transported by sea[18].

As regards international road freight flows, the relations Denmark – Germany, Italy – Germany and Finland – Sweden (in both ways) are dominant with a share of almost 70 %. The structure of flows illustrates a broader spatial distribution of important relations on the corridor, locating the "gravity centre" of road freight volumes in the southern part of the corridor and to a lesser extent in the far northern part.

The most important rail freight flows are, in both ways: Sweden - Germany, Austria – Germany, Germany – Italy and Italy – Austria. They amount to almost 90 % of all relevant international rail freight flows. The "gravity centre" of rail freight flows is located in Germany and Austria.

The multi-modal transport market study carried out in 2014 sought to identify the “big picture” of the present and future situation of the transport market for the Scan-Med Corridor. A comprehensive overview including all relevant transport modes and infrastructure was prepared. This was based on an extensive literature review including studies, reports and forecasts investigating corridor market sections and nodes and assembled from existing databases supplemented by additional data provided by infrastructure managers, Ministries and other stakeholders. Using this approach, it was possible to identify the core network areas with the highest transport volumes expected by 2030. With respect to rail, both passenger and freight, these are: Mjölby – Malmö, Gothenburg – Malmö, Malmö – Copenhagen – Taulov, Bremen/Hamburg – Hannover – Würzburg, Munich – Innsbruck, Bologna – Florence – Rome – Naples. With respect to road these are: Lübeck – Hamburg/Bremen – Hannover, Würzburg – Nuremberg – Munich, Florence – Rome.

It should be noted that this approach has taken into account the network load, both passenger and freight, resulting from international, domestic and regional/local traffic using the corridor infrastructures and not only the traffic between corridor regions, which could be a – minor – subset of the global traffic volume. Only by this means can traffic demand be identified that may lead to early or future capacity constraints.

[18] See Final Report 2014, share of exports by FI, NO, SE, DK by sea (Table 42) in total exports by these countries (sum of Tables 40,41,42) on p.170f

4 Capacity issues

The comparison of the expected traffic volumes and network loads in the year 2030 facilitates the identification of possible capacity constraints (bottlenecks).

The overview for capacity constraints and capacity utilisation provides a valuable indication that, even after the construction of new infrastructure (in particular Fehmarn Belt Fixed Link, Brenner Base Tunnel and their access lines), some bottlenecks will remain along the Scan-Med Corridor. These may impede future growth of passenger and freight transport and most notably are:

- In Finland, for rail: Kouvola – HaminaKotka, Luumäki – Vainikkala, Helsinki, node, Helsinki – Turku; and for road: regions of Turku and Helsinki and the section Kotka–Hamina–Vaalimaa;
- In Sweden, for rail: Stockholm and Gothenburg node, Hässleholm – Lund, Trelleborg – Malmö (- Copenhagen);
- In Denmark, for rail: (Malmö-) Copenhagen region;
- In Germany[19], for rail: nodes Hamburg, Bremen and Kassel as well as a section Hamburg – Ahrensburg – (Lübeck) ; and for road: regions of Hamburg, Hannover, Berlin and Munich;
- In Italy for rail, based on information provided by RFI: Verona - Ponte Gardena until the completion of the entire access lines to Brenner Base Tunnel; Florence - Livorno/La Spezia related to the ports' traffic development; additionally there will be some constraints in the traffic of urban areas[20];
- In Malta for the connection between the port of Marsaxlokk, the airport and the capital city with its port.

In Austria, no capacity problems are expected after the infrastructure projects foreseen have been completed.

[19] Sections with capacity utilization ">110% Überlastung"/overloaded according to the draft (3/2016) Bundesverkehrswegeplan 2030 under the assumption that all priority projects will be realized ("Zielnetz"). If a reasonable capacity utilization of 85-110% "Vollauslastung" is applied more sections on the corridor become congested.
[20] Feedback from RFI, e-mail 28.11.2014

5 The identified planned projects

Already the 2014 Study and, based on that, the Work Plan of 2015 refer to a long list of projects. In the framework of the 2015 Study the list was updated having regard to three elements: 1) the data included in the 374 projects was to be improved, 2) the number and quality of project parameters was expanded and 3) further projects were added. Five sources of information were used by the consultants:

- the 2014 Study;
- the comprehensive project list;
- the 2014 CEF Call results;
- National Transport Master Plans / Transport Operational Programme;
- The Rail Freight Corridor Scan-Med Implementation Plan of November 2015.

Stakeholders, Member States and Norway contributed to this exercise in two "rounds" in 2016: a first ending in February and a second until end of April. The Contractor Consortium has consolidated into the final list all information received on time (by 22.04.2016 for stakeholders and by 13.05.2016 for Member States and Norway) consistent with the required data fields. The draft Final Report on the Project List was circulated to and commented by the Member States. Improvement to the projects' data was taken into account, whereas any new projects will be integrated only in the next update in 2017. This comprehensive indicative list will form the basis for the implementation of the corridor.

As presented in the table below, the project list, as completed on 13.06.2016, includes 543 projects and measures related to the Scan-Med corridor.[21]

48 of these projects are located on "cross-border" sections, 90 on "last-mile" sections and 130 are qualified by "pre-identified CEF section or project" according to Annex I Part 1 of the CEF-Regulation.

From the 77% of the projects where the end dates are known 47 projects (9%) have already been completed since the adoption of the TEN-T Regulation and by the end of 2015, 227 projects (42%) are supposed to be completed by 2020 and 138 projects (25%) are completed after that.

[21] Some of the projects are related to sections or nodes shared with other core network corridors, such as Helsinki, Hamburg/Bremen – Hannover, Rostock – Berlin, Halle/Leipzig, Würzburg – Nuremberg, Munich, Verona, Bologna.

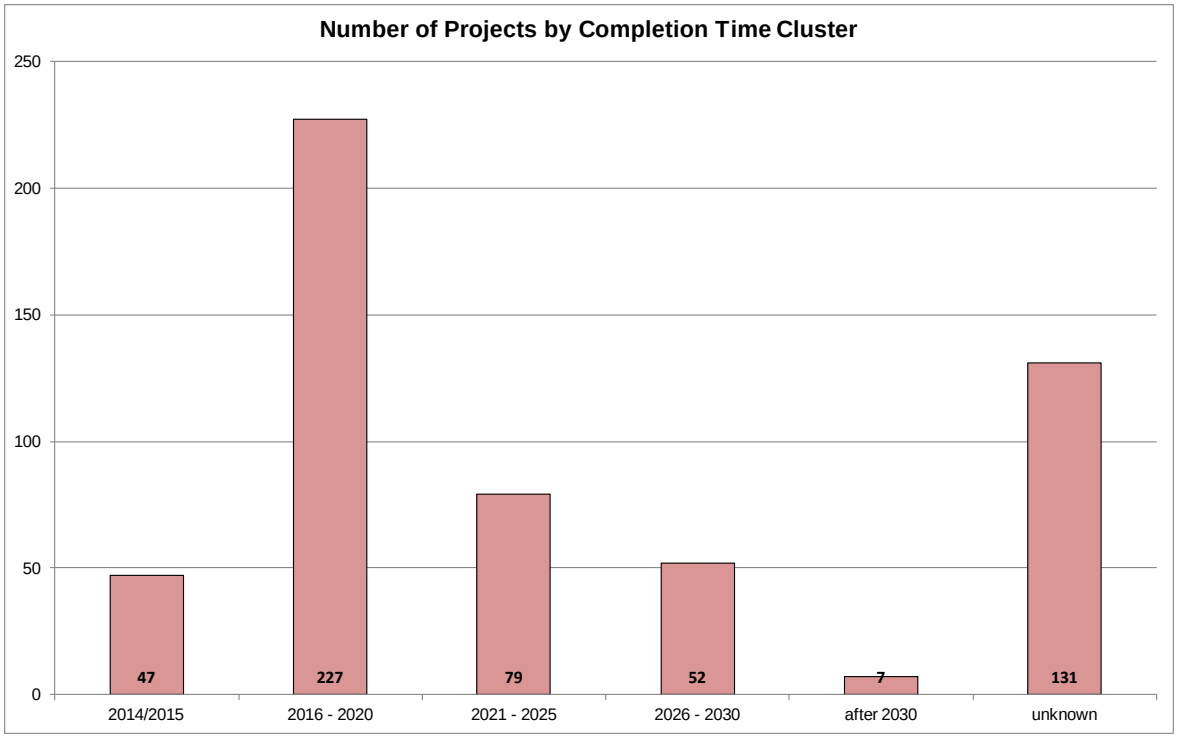
Table 6: Number of projects by mode and country

Mode/Country	Rail	Rail ERTMS	Rail + Port	Rail + Road	Road	Maritime	MoS	Airport	Multimodal	Innovation, Other	Total
FI	16			1	6	6		2	3	3	37
FI/SE							1				1
SE	29	2			15	6	2	3	3		60
SE/DK				1							1
DK	8	1			6	2		2	2		21
DK/DE	1			1							2
DE	28	1			37	53	1	30	8	2	160
DE/AT					2						2
AT	8				11						19
AT/IT	2										2
IT	44		6		16	36	5	22	17	10	156
IT/MT							1	2			3
MT					5	22		8			35
NO		4						1			5
NO/SE	1										1
Multiple	1				3	2	25	1		6	38
Total	138	8	6	3	101	127	35	71	33	21	543

Source: KombiConsult analysis on the Final Project List 13.06.2016; "Multiple" = multi-country projects.

From the total of 543 projects 94 (or 17%) did not provide a total cost figure. The others were grouped according to the total costs into different cost classes ranging from small to large projects. The majority of projects (185 or 34%) range between €10m and €100m, 87 (or 16%) are in the classes of €1m to €10m and 89 (or 16%) are in the classes of €100m to €500m. Finally, 31 projects (or 6%) are costing between €500m and €1bn and 42 (or 8%) are costing more than €1bn.

Figure 3: Number of projects by cost classes



Source: KombiConsult analysis on the Final Project List 23.06.2016

For those projects which provided a cost figure the accumulated total costs is €172bn. Like the number of projects the costs are not equally distributed over the categories. The majority of project costs are related to rail (€94bn or 55%), followed by road (€33.8bn, 20%), airport (€11.7bn, or 7%), Rail ERTMS (€10bn, or 6%) and maritime (€8.8bn, or 5%). Other categories of projects such as Motorways of the Sea (MoS), multimodal, combined "rail + port" or "rail + road" projects as well as innovation and other projects make a smaller share of €4.1bn or less than 4% of the total costs recorded.

For €100.7bn or 59% of the costs financing details are provided by the project promoters already. For about €84.9bn, which makes 50% of the known total cost or 84% of the financed projects, the finance is already "approved".

Against the background of these findings the tasks for the forthcoming years are to further improve the quality of data in the project list and to assure that the projects of highest Corridor relevance and maturity are realised in time.

6 Infrastructure funding and innovative financial instruments

The development of core network corridors requires, inter alia, a critical mass of investment to take place within a short time-framework. Therefore a careful examination of potential financial sources has to accompany corridor planning. Some key criteria to be appraised are reported in this section of the work plan.

The projects to be developed can be ranked in three different categories from the point of view of funding and financing needs:

a. For several revenue generating projects "closer to the market" in terms of development (technological components, large infrastructure of key European interest, brownfield upgrade) or service provision (terminals for freight / passengers, enhancement of infrastructure capacity / performances), a substantial component of the project funding can come from own resources (e.g. equity) and financing resources gathered by the project promoters on the market (e.g. in the form of equity, loans or bonds). Private investors would need to recover their initial costs of capital and receive a reward for the risk borne (the higher the risk the higher the return required).

Projects may seek conventional lending from public and private banks, alternative financing from institutional investors (e.g. bonds) and/or financial instruments, for example to cope with imbalances in cash-flow during the construction and/or ramp-up phases. Addressing particular risks and market failures or securing lending with long maturity adds to the need to explore all financial options. Financial instruments could be sought in the form of credit enhancement or guarantees, including state guarantees (be they a specific legal or financial guarantee to ease access to financing).

b. Hard-infrastructure, Greenfield, risky, long-term projects such as the majority of cross-border railway connections as well as inland waterway navigability improvements might require a substantial public support through public funding, even if innovative approaches can apply to project development and/or to specific components of the investment. Public funding can be structured in different ways (also depending on the budgetary constraints of the public authorities) such as lump sum subsidy (grant), fiscal incentives, operational deficit coverage and availability payment schemes.

c. In a variety of intermediate cases the project will require a more limited funding component in order to reinforce its financial viability – these projects could be supported through a blending of funding (e.g. grants) and financing.

In this respect, besides the national budget, the funding contribution can effectively come from the EU centralised managed funds, such as the Connecting Europe Facility (CEF) and from decentralised managed funds such as the European Structural and Investment Funds (ESIF) while the financing resources may came from the EU financial instruments, such as the CEF Debt Instruments and financial products available under the European Fund for Strategic Investment (EFSI).

For these three categories of project public intervention through resource transfer is justified on the grounds of high socio-economic and/or EU added value; meeting public service obligations; addressing suboptimal investment levels; market failures and distortion due to externalities.

When considering the project funding structure in a comprehensive and multimodal setting, earmarking of revenues and cross-financing solutions, applying "polluter-pays" and "user-pays" principles ought to be explored.

A project can be fully developed through project financing if the revenue stream (secured by public and/or private funding), exceeds the investment and operational costs (CAPEX+OPEX). Such an approach calls for a careful risk sharing between the Member States (project management) and private partners.

To deliver on time, quality and cost and to minimise future public liabilities user financed projects need to define clear responsibilities and risk sharing between project promoters, sponsors and implementing bodies and to consider total life cycle project cost.

A pre-condition for project financing is a conducive regulatory and legal environment in order to set the right incentives to enhance public and private sector involvement in the delivery of infrastructure investment.

It is worth highlighting the following projects along the corridor supported through innovative financial instruments, for their potential for cross-fertilisation:

- On the Scan-Med Corridor, the Øresund Fixed Link stands out for its model grouping cross-financing and market-base funding. This cross-border rail-road project which provides access to the corridor through two core ports (Malmö and Copenhagen) is structured almost entirely on funds raised on the international financial markets, except for equity of approximately €7m. The Danish and Swedish states are jointly and severally liable for the loans for this cross-border project. This model is known as the state guarantee model. The project rests on a sound financial footing and is within its planned repayment period. The Danish state is now using the same state guarantee model for the upcoming fixed link across the Fehmarn belt.
- One of the significant motorway improvement projects on the German part of the Scan-Med Corridor is the upgrade of the federal motorway A7 heading from Hamburg to the Danish border on the section Bordesholmer Dreieck – Schnelsen Nord to six respectively 8 lanes (about 65 km) and the maintenance of about 59 km between Hamburg-Nordwest and Neumünster-Nord over 30 years. The project is a public-private-partnership (PPP) another form of innovative finance.

Within the Scan-Med Corridor, a screening exercise by the Commission services on the project list has highlighted a number of possibilities for their future potential development through Innovative Financial Instruments. These projects mainly concern port and airport capacity and terminal expansion.

7 Critical issues on the Scandinavian-Mediterranean Corridor

Issues critical to the realisation of the objectives of the corridor have been identified in this study. Results of the compliance analysis and multimodal transport market study were discussed with corridor stakeholders, which confirmed the findings and identified the measures to mitigate additional critical issues. The main conclusions have been arranged by mode and section of the corridor (from north to south) in the following paragraphs. The number of projects, however, and the qualification that the list of projects is indicative does not allow presenting the projects in detail in this Work Plan.

Railway Infrastructure

In terms of **good practice,** the following can be highlighted:

- The Great Belt Fixed Link bridge/tunnel construction (opened in 1997 (rail link) /1998 (road link));
- Completion and operational start of the Øresund Fixed Link (in 2000) as a combined two track rail and four lane road bridge and tunnel across the Øresund between Sweden and Denmark;
- Realisation of a maximum permitted train length of 835 m for freight trains between Maschen (DE) and Padborg (DK);
- Mixed high-speed lines and dedicated passenger HSL in Germany;
- The upgraded railway line (Ausbaustrecke [ABS]) Rostock – Berlin (€0,7bn expenditured investments in rail infrastructure) up to 2014; Berlin – Leipzig (€1,7bn expenditured investments in rail infrastructure) up to 2014, the Berlin node (€5,4bn expenditured investments in rail infrastructure) up to 2014, NBS/ABS Erfurt – Leipzig/Halle (€2,6bn expenditured investments in rail infrastructure) up to 2014, and the newly built line (Neubaustrecke [ABS/NBS]) Erfurt – Nuremberg – Ingolstadt (- Munich) (€7,0 bn expenditured investments in rail infrastructure) up to 2014 ;
- Construction and opening of the "Unterinntal" rail line in Austria with ERTMS Level 2 providing a major part of the northern access to the envisaged Brenner Base Tunnel;
- Realisation of a loading profile (“P400”) allowing the transport of standard mega trailers on modern pocket wagons along almost all parts of the corridor north of Verona/Bologna and thereby supporting increases to the transport of these types of units in continental intermodal transport;
- Milan – Rome – Naples high speed line which became fully operational with the completion of the section between Bologna and Firenze at the end of 2009.

The following section identifies **critical issues by member state**:

Finland is somewhat isolated from the rest of the Scan-Med rail infrastructure and is therefore exempted from complying with the European rail gauge standard. Concerning this parameter, the Finnish rail network is similar to the Russian network. A comprehensive view of the future of the Finnish railway system within Europe

focuses on the Scan-Med Corridor for the East-West traffic and the North Sea-Baltic Corridor for the north-south traffic. Both corridors are interrelated at the node of Helsinki. Consequently, some major rail projects are located in that urban node to improve the network capacity, such as: Ring rail to Helsinki airport (the project has been completed), improvements near Helsinki end station (new track to Pasila, urban rail to Espoo, improvements at Helsinki yard) and separation of commuter and long distance trains to their own tracks (city rail loop) as well as the port connection. These are complemented by a measure in the freight terminal Kouvola (RRT). Further measures to mitigate additional critical issues are, in particular:

- Repairs to areas with ground frost damage and soft soils along main railway lines;
- A new shortcut railway Espoo – Lohja - Salo on the Helsinki - Turku section;
- Investigation of the Helsinki – Turku - Tampere triangle;
- Improvements to service levels along the railway section Kouvola – Kotka/Hamina: Several improvement measures for the railway yards as well as different railway and road sections (combined rail and road project);
- The current railway connection from the Russian border to Helsinki, which is one of the pre-identified sections included in the TEN-T Regulation, has insufficient capacity for the growing passenger and cargo volumes. A new border crossing point especially for rail freight is planned in Imatra to complement the existing Vainikkala border station that faces the continuously growing demand for the Allegro trains between Helsinki and St. Petersburg.
- Implementation of ERMTS.

The technical parameters are basically fulfilled by the **Swedish** rail network, with the exception of the freight train length of 740 m and the implementation of parts of ERTMS Corridor B: Stockholm – Malmö, Hallsberg – Katrineholm, Hallsberg – Mjölby. The main concerns result from current and even more ambitious future passenger and freight volumes to be transported by rail. In order to link major urban areas across Norway, Sweden, and Denmark with reasonable travel times, the network lines need to be upgraded or newly built, both in the designated urban nodes of Stockholm, Gothenburg and Malmö, as well as the relevant sections in between these nodes, in particular:

- Stockholm C – Stockholm Södra;
- Citybanan: tunnel under central Stockholm with two new stations;
- Ostlänken: new 2-track line for HS Trains on section Linköping – Järna;
- Hallsberg - Åsbro - Dunsjö - Degerön (-Mjölby): upgrade to 2-track and grade separation (elimination of level crossings) on respective sections;
- Malmö – Jönköping: HS Link study;
- Oslo-Gothenburg: studies and measures for improved capacity, travel time and quality of the cross border section;
- Western Sweden/Gothenburg: different improvement measures including a city tunnel “West link project”;
- Gothenburg: Olskroken (grade separation);

- Western and Southern Sweden: Western Main Line Ängelholm – Maria station, Åstorp – Teckomotorp - Arlöv (expansion and new stations);
- Varberg-Hamra (new 2-track), Western Main Line;
- Southern Main Line Arlöv – Lund (two sections with improvement works);
- Skåne region: capacity enhancement measures.

The Hallandsås 2-track tunnel has been opened in 2015.

The technical parameters (axle load, operating speed for freight trains) are basically fulfilled by the **Norwegian** rail network, with the exception of the required freight train length of 740 m and the implementation of ERTMS. However parts of the Oslo – Gothenburg link have a capacity constraint due to single-track sections between Ski (some 25km south of Oslo) to Halden, close to the Swedish border. Further south from Halden over Kornsjö to Öxnered, a dual track line also is missing. Furthermore there are two sections of the link with critical gradients above 12.5 ‰ . These are Tistedalen, south bound between Halden and the Swedish border and Brynsbakken (in Oslo), north bound, both with 25 ‰ gradient (Network Statement 2016). The Tistedalen section is part of the Oslo – Gothenburg study, e.g. Halden – Swedish border, while the latter is not part of any study at this moment. The following sections are currently in a construction or in a planning stage:

- Oslo – Ski: 2-track tunnel under construction, enhancing capacity from two to 4 tracks;
- Sandbukta – Moss – Såstad: New 2-track line is in a construction planning phase;
- Haug (Råde) – Halden: new 2-track section. Preliminary planning stages are completed;
- Oslo-Gothenburg: studies and measures for improved capacity, travel time and quality of the cross border section.
-

The technical parameters (axle load, operating speed for freight trains) are basically fulfilled by the **Danish** rail network, with the exception of some areas which do not fulfil the required full electrification, implementation of ERTMS and at least 740 m freight train length on all sections today. This will be changed in the next years with planned projects. Currently interoperability on the border crossing sections Malmö/Copenhagen and Padborg/Hamburg is achieved by multi-system locomotives of the railway undertakings and transition rules. Like in Sweden current and even more ambitious future passenger and freight volumes by rail[22] cause concern. Consequently, network lines need to be upgraded or newly built, both in the urban node Copenhagen and the relevant sections connecting it with Sweden and Germany. Additional capacity, reduction of travel time and more efficient rail operations can be achieved through in particular:

[22] Recent data as per Trafik-og Byggestyrelsen: "Fremme af Gods på Bane", Transport- og Bygningsudvalget 2015-16, TRU Alm.del Bilag 141.

- Full attention on the completion of the Fehmarn Belt Fixed Link for road and rail by 2026-28 (timing depending on the plan approval and permitting scenario in Germany);
- Ringsted - Fehmarn: Upgrade and renew the 115 km long railway line to a new, future-proof line (electrification, double track, 200 km/h speed, and allowing for 1,000 meter long rail freight trains);
- New Storstrøm Bridge (primarily rail, but includes also road and bicycle lanes);
- Capacity increase on the Øresund railway line to eliminate potential future bottleneck;
- Increase the capacity of Copenhagen central station through development of Ny Ellebjerg station;
- New HS rail line between Copenhagen and Ringsted via Køge (up to 250 km/h for passenger trains);
- Speed increase Ringsted-Odense;
- New railway line on Western Funen Kauslunde – Odense of about 35 km;
- Construction of a 2-track line between Vamdrup and Vojens (opened in 2015). Now the section Tinglev-Padborg just north of the DK-DE border is the only remaining single track section on the current main rail freight line between Malmö/Copenhagen and Hamburg via The Great Belt Bridge. Construction of double track on this section would increase capacity on the Scan-Med Corridor further. However, as of yet, a political decision has not been taken to go ahead with the project;
- ERTMS Level 2, Baseline 3 on the entire conventional railway network in Denmark expected by 2023.

As regards the capacity increase at Copenhagen Central Station, the construction act of a fly-over at Ny Ellebjerg, which is the first element in developing Ny Ellebjerg Station, was passed in April 2015. The construction works are progressing.

The Danish Parliament passed a construction act approving the Fehmarn Belt Fixed Link in April 2015. In May 2016, contracts for the major construction works were signed, but commencement of the construction works awaits planning approval from the German authorities. It is the common goal of the German and Danish authorities as well as the Danish state-owned project company, Femern A/S, that the approvals should be ready by the end of 2017, which would mean that the link would be open for traffic during the course of 2026. However, the planning approval in Germany may be subject to appeal to the Federal Administrative Court. Should this be so, one may anticipate an opening in 2028.

The Ringsted-Fehmarn railway line was approved when the Danish Parliament passed the construction act approving the Fehmarn Belt project in April 2015. In March 2016 it was politically decided to begin the construction works on the northern part of the Ringsted-Fehmarn railway line. The construction works are progressing. In 2021 the section between Ringsted and Nykøbing Falster will be upgraded to double-track, the roll out of ERTMS will be completed, and passenger trains will be allowed to go 200 km/h. By 2024, the section will be electrified. The construction works on the southern

part between Nykøbing Falster and Rødby will start soon enough to ensure that the section will be upgraded before the opening of the fixed link.

In 2015, the construction act for the New Storstrøm Bridge was passed by the Danish Parliament, and in 2016 it was decided to advance the construction works. The construction works will begin in 2018. The road section will be ready in 2022 and the rail section in 2023, as opposed to previously 2024.

Despite the high technical standard of the **German** rail network, some parameters are not met along entire sections of the Scan-Med, e.g. electrification, operating speed and ERTMS implementation. Multi-system locomotives and transition rules currently achieve interoperability on border crossing sections Padborg/Hamburg. More ambitious passenger and freight volumes by rail require upgraded or newly built lines, both in the urban nodes and the relevant access lines connecting with Denmark and Austria. Denmark is reached in two ways: via Jutland and the Fehmarn Belt, involving the Fixed Link as a combined rail and road tunnel. Austria is reached at the Kufstein border station.

The following measures can mitigate critical issues on the German rail network:

- Completion of the Fehmarn Belt Fixed Link by the end of 2026-2028. The southern access will be completed according the regional planning decision in Schleswig-Holstein from 06.05.2014. Furthermore a reasonable and economically viable solution for upgrade/replacement of Fehmarnsund bridge must be found;
- ERTMS deployment of the main freight corridors with clear timelines, in particular the entry points (detailed information is provided for in the ERTMS Coordinator's 2nd workplan) ;
- Increasing capacity of Hamburg and Bremen nodes.
- Realisation of high priority improvements ("enlarged alpha e project") of the railway network (as foreseen in the "Bundesverkehrswegeplan 2030, draft 3/2016" on the lines Bremen/Hamburg – Hannover;
- Realisation of high priority improvements of the railway network (as foreseen in the "Bundesverkehrswegeplan 2003" and "Bundesverkehrswegeplan 2030" on the lines Ingolstadt – Munich (until 2019), node Munich;
- Expansion of rail routes from the port of Rostock to an axle load of 25 tons;
- New lines/Upgrades on VDE (Verkehrsprojekte Deutsche Einheit) 8.2 Erfurt - Halle/Leipzig (opened in 2015), VDE 8.1 Nuremberg – Erfurt (will open in 2017);
- Identification of basic parameters for a possible extension/upgrade for the Brenner tunnel access according to a bilateral agreement between Austria and Germany (joint planning area);
- Flexible coordination and definition of market attractive train paths on mixed lines in particular around the nodes of Hamburg, Bremen, Hannover, Nuremberg and Munich, considering the specific needs of passenger transport;

- Improve technical parameters, by electrification of the 188 km railway line between Hof and Regensburg Hbf and increasing capacity by a 3rd track between Regensburg and Obertraubling;
- Regional projects in the Capital Region Berlin-Brandenburg identified by the region such as the improvement of the rail connections to the terminals / freight villages and intermodal freight capacities[23].

The following issues are to be coordinated between **Germany and Austria** (border crossing project):

- Timely completion of studies and works on the remaining parts of the northern access lines to the Brenner Base Tunnel in the area of Kundl/Radfeld – Kufstein – Rosenheim – Munich, where a joint project has been agreed upon between Germany and Austria and is currently carried out by DB Netz and ÖBB respectively;
- Second step capacity improvement for border crossing rail traffic between DE/AT border and Schaftenau (Unterinntalbahn); The existing double track line will be expanded by construction of a new double track line of about 8 km to reduce the travel time and to expand the capacity (expected finalisation after 2030).

On the **Austrian** section of the Scan-Med corridor, the technical parameters are basically achieved, with the exception of operating speed on the present Brenner mountain line, which is below the standard. Due to the slope, the train length (in connection with the weight) is also limited. However, Austria has made considerable progress with building the new Unterinntal railway line for high speed passenger and freight trains. Interoperability on two border crossings (Kufstein, Brenner/Brennero) is currently achieved by multi-system locomotives of the railway undertakings and respective transition rules, which had to be modified in conjunction with the implementation of ETCS level 2 between Kufstein and Brenner. As in other countries on the Scan-Med corridor high ambition levels as regards rail freight and passengers traffic are expected to put pressure on the infrastructure network in the future. In order to meet these ambitions the network lines need to be upgraded or newly built or completed as follows:

- Full attention on the completion of the Brenner Base Tunnel mitigating the inherent risk elements such as financing, environmental assessment, involvement of civil society; While the main tunnel section Tulfes – Pfons has been under construction since 19 March 2015, tendering for the only remaining Austrian tunnel section Pfons – Brenner is due to start in summer 2016;
- Short term infrastructural, operational and regulatory measures on the section Munich - Verona to improve interoperability the quality of the service and the efficiency until the base tunnel is in operation;
- Second step expansion of the section Schaftenau – Kundl/Radfeld as part of the Unterinntalbahn (expected finalisation after 2030);

[23] These projects could mitigate critical issues on the local rail network but projects will only be funded from the federal budget when they are part of the "requirement plan" (see also footnote 8 on p. 16).

- Reconstruction of the railway station Schwaz and improvement of the freight station Hall i.T.

Further measures as part of the "framework programme 2016-2021": Data networks and mobile radio, train condition checkpoints.

On the **Italian** sections of the Scan-Med corridor several technical parameters, with the exception of 1435 mm gauge and electrification, are not yet fully achieved. Axle loads are compliant with the standard parameter in Regulation (EU) No 1315/2013 in most line sections of the corridor (82%). The lines Rome-Naples (via Casino) and Salerno-Battipaglia are planned to be upgraded by 2021 and 2026. Train length is below 740 m on the Brenner line to Florence/Ancona (600 m) and on many sections in Italy south of Firenze (400/600 m). Upgrading to 750 m track length is planned on most line sections, starting from Brennero-Florence, to be achieved in 2018. Loading profile for the transport of semi-trailers ("P400")[24] on the current lines in Italy south of Bologna is ensured between Bologna and Brennero and between Bologna and Ancona. Upgrading works are planned on most remaining corridor lines until 2026. Interoperability on the Brenner border crossing (Brenner/Brennero) is currently achieved by multi-system locomotives of the railway undertakings and transition rules, which will have to be modified in conjunction with the implementation of ETCS level 2 between Kufstein and Brenner and in Italy. The network lines have to be upgraded, newly built or completed as follows[25]:

- Timely completion of the studies and works on the remaining parts of the southern access lines to the Brenner Base Tunnel (section Fortezza – Verona including bypasses and nodes of Bolzano, Trento and Verona);
- Short term infrastructural, operational and regulatory measures on the section Munich - Verona, in particular Brenner/Brennero station, to improve interoperability the quality of the service and the efficiency until the base tunnel is in operation;
- Upgrading, including doubling of tracks, completion of sections and increasing speed: Napoli – Bari HSL, Messina - Catania – Palermo, Salerno - Reggio Calabria, Bologna - Ancona / Bari – Taranto, Bologna - Florence - Pisa - Livorno/La Spezia, Florence - Rome - Naples - Salerno;
- ERTMS equipment: Naples – Bari HSL, Napoli – Reggio Calabria, Brennero – Verona, Verona – Bologna, Bologna – Ancona, Bologna – Florence, Florence – Pisa – La Spezia – Livorno - Rome, Florence – Rome, Rome – Naples, Messina – Catania – Palermo, Bicocca – Augusta;
- Technical and infrastructural upgrade of the following nodes: Bari, Palermo, Florence, Falconara/Ancona, Naples, Foggia, Salerno, Verona high-speed node, Catania, Rome.

[24] The loading profile "P400" is not part of the objectives included in Regulation (EU) No 1315/2013. It is however of significant importance for capturing additional freight from road and to supply competitive advantages for rail freight transportation.

[25] The technical nature of the measures is described in detail in the Final Report on the Project List and the Preliminary Report on the Elements of the Work Plan which is annexed to this Work Plan.

On various sections, which are to be identified by RFI in detail, the present non-compliance with technical standards shall be mitigated:

- Compliance to TSI in stations: improve accessibility, service quality and compliance to TSI;
- Elimination of level crossings: improving safety;
- Improving maximum axle weight to 22,5 tonne/axle;
- Deployment of ERTMS trackside equipment;
- Improving maximum speed on HS "antenna" lines: improving the maximum speed allowed on lines feeding the HS network on Scan-Med Corridor;
- Increasing line speed: compliance with standard of 100 km/h operating speed for freight.

In order to connect the Rail Road Terminals to international rail freight transport via Brenner/Brennero it is essential that their access and the aligned rail infrastructure provides for the loading profile P 400. The upgrading to that standard in Italy should therefore start from the North (Bologna/Firenze) to the South so that respective sections will become effective to the market stepwise.

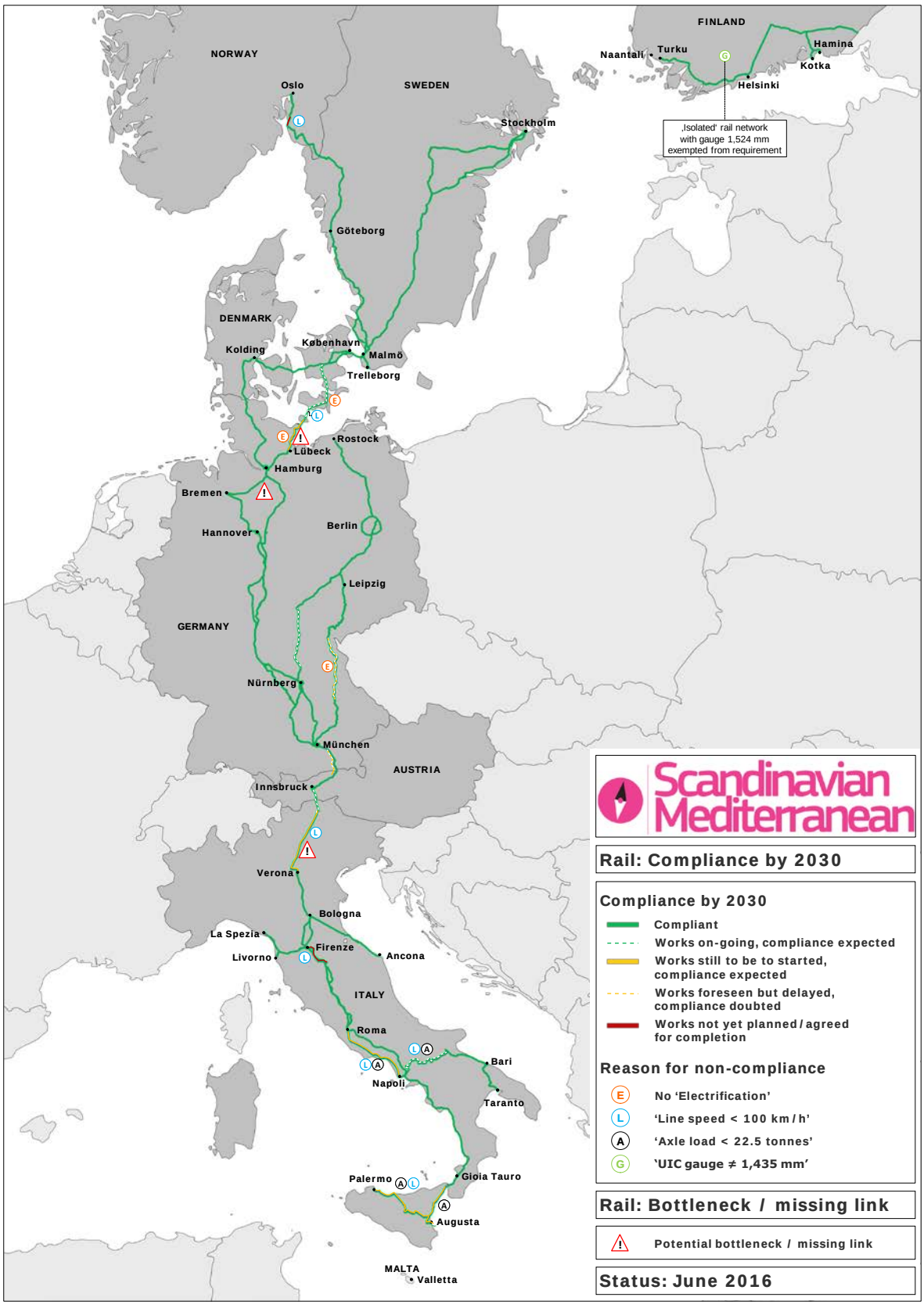
An overview of the critical issues for each transport mode was given at Scan-Med corridor meeting at the TEN-T days in Rotterdam on 22 June 2016. Based on this overview the Coordinator presented his key priorities: the Fehmarn Belt Fixed Link and its access line in Germany (Hamburg-Lübeck-Puttgarden), rail capacity between the sea ports of Hamburg and Bremen and the node Hannover (enlarged alpha e project) and the Brenner Base Tunnel and its access lines in Germany (Munich – Rosenheim – DE/AT border[26]) and Italy (Fortezza - Verona).

A further priority would be to exploit the possibilities of allowing a higher permitted train length in Northern Germany, Denmark and Sweden. Between Maschen (Hamburg) and Padborg towards the Copenhagen – Øresund Bridge, and in the future also through the Fehmarn Belt Fixed Link, a train length of 835m is permitted under specific circumstances. Between Malmö and the largest Swedish rail yard in Hallsberg it is currently possible to allow trains up to 730m upon specific request to the annual time table.[27]

[26] With all measures of the Bundesverkehrswegeplan 2030 implemented this line does not show capacity limitation in 2030.

[27] See report https://trafikverket.ineko.se/se/tv000260 about the possibilities of running longer and heavier trains on existing network.

Figure 4: Results of the compliance analysis of the ScanMed railway infrastructure



Road Infrastructure

Despite good practice on cross-border road projects, such as the completion and operation of the Øresund Bridge, some critical issues regarding road transport should be noted. The 2nd generation of the Work Plan lists critical issues of a general nature. An indicative detailed list of concrete measures per country is available for information in the Preliminary Report on Elements of the Work Plan (June 2016)

High quality roads are indispensable for maintaining speed and safety standards and to mitigate critical issues on the corridor's road network. To avoid congestion in and around large cities or in geographically limiting areas, bottlenecks and missing links need to be addressed. Availability of a variety of alternative fuels and filling stations is needed along the entire corridor. The location or co-location of stations for alternative fuels should be agreed. Information systems and ITS solutions to inform and steer the traffic to/from desired routes must be implemented to avoid delays or accidents further down the network, to re-route in case of big events or simply to control the traffic flows via traffic metering. The regulation also requires safe parking facilities along the route. General developments of vehicle technology, emission regulations, weights and dimensions regulation etc. also could have a significant effect on the Scan-Med Corridor. "Greening" is also an important element of the corridor. Projects such as SWIFTLY Green can provide concrete advice on issues such as reducing noise and air emissions as well as increased environmental efficiency by mode. Finally, there is no common view between countries or regions on the issue of allowing "longer and heavier trucks" thus exempting parts of the road freight transport from the maximum permitted parameters defined in Directive 96/53/EEC. Larger and heavier trucks are currently allowed in Sweden and Finland. Denmark is testing the same vehicle dimensions on the major road network (including all state roads and national roads). The potential benefits of this solution are a better use of available capacity as well as lower emissions per ton transported and lower costs. Others (Austria and Italy) remain concerned with regard to larger trucks as they fear an additional reason for deferring the intended shift of freight traffic from road to rail. Germany has started field-tests on some roads for selected applicants which are on-going, whereas Austria and Italy already have stated that they will not accept such vehicles.

Airports

In general, airports of the core nodes aligned with the corridor suffer from saturated road access at peak times and capacity enlargement plans that frequently are disputed at local level. The early completion of Berlin-Brandenburg remains a key TEN-T corridor objective. Airport managers, industry representatives and residents impacted by the noise and other airport emissions and the resulting air and land traffic are discussing whether and how the capacity can be increased in a sustainable way.

For the Scan-Med airports of Helsinki, Stockholm, Berlin, Hamburg, Munich and Rome the possibility and necessity for a connection to the high-speed railway network has to be analysed and studied by these airports and regional stakeholders.

It should be discussed with the airport managers and public authorities whether airports as single installations should require a local, regional or national coordination (e.g. the German "Flughafenkonzept" and the Italian "Piano Nazionale degli Aeroporti"), rather than or in addition to a European Corridor coordination. As regards corridor coordination it should however be noted that for some their "land" catchment areas cross borders (e.g. Copenhagen/Malmö). Moreover, issuing a "National Airport Plan" could lead to incoherence with the current definition of the core network. For example, the latest version of Italian "Piano Nazionale degli Aeroporti"[28], which provides for a cluster of 10 "strategic" airports (one per "traffic basin"), and 26 other "airports of national interest", identifies 3 "strategic" airports that are geographically located on Scan-Med corridor but are not part of the core network, namely Firenze/Pisa, Bari and Catania.

As regards airports detailed measures and associated projects have been identified jointly with the stakeholders concerned. The indicative list is annexed to the Preliminary Report on Elements of the Work Plan (June 2016).

Seaports

Most of the Scan-Med core ports are equipped with access to rail, road and inland waterway network, unless the geographical and climate structure does not provide any inland waterways for freight transport, such as Italian and Maltese Ports.

In general, the Scan-Med core ports are connected with railway access to the hinterland (except, understandably, Maltese ports of Marsaxlokk and Valletta, as Malta does not have any railways). However, the number of railway tracks connecting the core ports with the hinterland does not represent the real infrastructure capacity. Ports with a multitude of tracks may face similar problems of local capacity bottlenecks to ports with fewer tracks. These local capacity bottlenecks may occur within the port area itself or at the intersection between the port and the railway network.

Therefore, it is important to pay attention to these local capacity bottlenecks, e.g. by considering improved linkages, new rail stretches, extension and equipping of existing tracks an upgrading of handling operations at rail terminals. Only in case of adequate and matched capacities can it be ensured that the ports can fulfil their role in the TEN-T core network to the utmost extent.

Another critical issue is to maintain good ice-breaking capacity throughout the year to ensure access to the ports in the Northern Baltic Sea (e.g. HaminaKotka, Helsinki, Turku/Naantali, and Stockholm). However the need for such capacities is less important in the Port of Rostock although it has been pre-identified as a relevant project under annex 1 in the Regulation (EU) No 1315/2013. The frequent traffic of ferries with adequate Ice-class seems to be sufficient to ensure free access to the port of Rostock. Nevertheless, it is of high importance to reconsider the impact of climate

[28] Released by Italian Government on 30.09.2014.

change and in consequence the higher likelihood of extreme weathers, including very cold periods also in the Southern Baltic Sea.

Regulation (EU) No 1315/2013 and other EU legislation on sustainability, energy efficiency and CO2 reduction require publicly accessible alternative clean fuels for maritime (and IWW) transport to be provided by all the maritime core ports by 2030. In general there seems to be "sufficient" time to achieve this objective. However, progress needs to be kept under constant review.

With regard to progress discrepancies can be observed between the northern ports and the rest of the ports of the Scan-Med-corridor. Many ports within the Emission Control Area (ECA) of North and Baltic Sea already have established or are planning LNG bunkering facilities. In particular, the Scandinavian and Finish ports already provide LNG for ships and ferries or the appropriate facilities are under construction or planned. However, planning for LNG facilities is at an early and conceptual phase at most of the German ports. By having two advanced projects covering the supply side on the one hand and the demand side on the other, the port of Bremen is an exception in Germany within this field. Both of these projects are CEF-funded.

Focussing on the ports in the southern part of the corridor, the situation resembles that in Germany. All ports in the southern part of the corridor have started LNG planning activities. Much still needs to be done within the German and Mediterranean ports to fulfil the objective of the availability of alternative clean fuels by 2030.

Since January 2015 ships operating in the Emission Control Areas (ECAs) of the Baltic Sea and the North Sea face the challenge of the IMO conventions on emissions. The sulphur content of fumes has to be below 0.10% in these waters. These requirements can be fulfilled with the help of so called scrubbers (which are treating the fumes), the use of cleaner but more expensive fuel oil (Marine Gas Oil) or the use of alternative clean fuels (LNG and methanol). Outside the ECAs in the Mediterranean the limit on maritime emissions will become stricter from January 2020 to January 2025. The limit on sulphur content will drop from 3.50% to 0.50%.

This issue is not directly linked to the land based corridor approach since it targets operations at sea. However, it directly affects ferry lines operating in this area. Since the new regulations took effect in the North Sea and the Baltic Sea oil prices have been low mitigating the cost implications for operators. The low oil prices unburden the operators from increased costs for maritime fuels. The longer term implications remain to be seen if and when oil prices return to a higher plateau.

At present and under the current general framework the Scan-Med ports exhibit a wide range of frequencies of regular freight and passenger connections between Finland and Sweden (Turku/Naantali and Stockholm), Denmark and Norway (Copenhagen – Oslo), Southern Sweden/Germany (Malmö/Trelleborg/Gothenburg to Lübeck-Travemünde/Rostock) as well as between Italian and Maltese ports (Taranto to Valletta/Marsaxlokk and Palermo to Valletta/Marsaxlokk).

While the numbers of ferry connections (short sea routes) are determined by market demand and supply, the supporting port infrastructure and hinterland access, administration, regulations and information systems play an additional role. The status of the current analysis, however, does not yet allow for specific comments on “critical issues” on the MoS conditions of the Scan-Med Corridor.

Article 29 of Decree no. 133 of September 12th, 2014 ("Decreto Sblocca Italia") issued by the Italian government proposed the number of port authorities to be reduced in the framework of a "Strategic Plan for Ports and Logistics". The aim is to increase traffic for key Italian ports, in particular for those selected as “hubs” for international transport on the land side of the Corridor, and for deep sea traffic to/from the Far East.

Accordingly to this decision, the Ministry has developed in 2015 a reform plan called “Il Piano Strategico Nazionale della Portualità e della Logistica”, aiming to enhance the competitiveness of the national system. The strategic plan identifies 10 key actions which must be applied to the national ports system including measures dedicated to the enhancement of accessibility, infrastructural empowerment, technological innovation and sustainability (energy efficiency and minimisation of environmental impact). The Decree no. 169 officially published on August 7th 2016 (Riorganizzazione, razionalizzazione e semplificazione della disciplina concernente le Autorita' di Sistema portuali), containing the Italian Ports Reform, has been approved by the Ministry Council on 28/07/2016.

Within the area of seaports, critical issues, measures and projects have been identified jointly with the stakeholders concerned and are included in the List of Projects.

Rail-Road Terminals

With respect to rail-road terminals the critical issues generally relate to rail and road access as well as handling and intermediate storage capacity. However, recently completed enlargement programmes, which were initiated along the corridor by the Brenner Action Plan of 2003 and updated in the “Action Plan Brenner 2009” have resulted in sufficient capacity for the current traffic demand. The total capacity utilisation rate of the related terminals in the year 2015 was 58%. However, with ranges between 10% and 114% of the nominal capacity it calls for action at some sites, like Hannover where a new Mega hub terminal is to be built. Among the good practices observed were double sided electrified rail access, e.g. in Hamburg-Billwerder and Munich-Riem and the replacement of old equipment by modern Rail Mounted Gantry Cranes, e.g. in Stockholm-Arsta or Rostock to name but a few from recent completion.

In Germany the Development concept 2025 for the intermodal transport in Germany[29] highlighted the future capacity needs by location area (not single terminals) and suggested a continuation of the successful financial support for infrastructure construction. According to the Development Concept 2025, the growth of the intermodal market volume requires an increase of handling capacity in several terminal areas while leaving the decision on the exact terminal and improvement measure to the private sector.

Taking the results of the compliance analysis, the conclusions of the Ideas Laboratory on Rail Road Terminals in Verona and the present Project List collectively, the supply of efficient access for trains with maximum permitted parameters (≥ 740 trains length, electrified), the offering of buffer storage capacity and the further improvement of ICT systems to connect with other mode operators more efficiently are among the critical issues identified in relation to Rail-Road terminals.

Multimodal Dimension

Multimodality has many dimensions. Article 3 (n) of Regulation (EU) No 1315/2013 defines, "multimodal transport" as: the carriage of passengers or freight, or both, using two or more modes of transport. In the first phase of the corridor analysis the main focus has been on the port-rail dimension. Several measures have been identified, for example in Hamburg the construction of a new Railroad Bridge Kattwyk and track doubling Nordkurve Kornweide and in Gothenburg the Port line (upgrade to double track). Also in the Italian ports (Ancona, Taranto, Naples, Gioia Tauro, Bari, Palermo, Augusta and Livorno) and in Lübeck railway links need to be upgraded or constructed. However, upgrading and construction of railway links in the vicinity of the ports should also be taken into consideration (last mile connection) when linking the ports to their hinterland.

In spite of the focus on the port-rail dimension, other dimensions have also been taken into account:

- Road, Rail and Sea: renewal of road, sea and rail traffic control systems in Finland (nationwide);
- Multimodal passenger traffic: long distance commuting in Helsinki;
- Enhanced and developed multimodal passenger transport in the urban node Norrkoping;
- Seaport and MoS: Improvements of the maritime access as well as infrastructure and services for alternative fuels, development of intermodality and e-Freight, studies and potential services for further cross-border port interconnections;

[29] Entwicklungskonzept KV 2025 in Deutschland als Entscheidungshilfe für die Bewilligungsbehörden, Aktenzeichen Z14/SEV/288.3/1154/UI32;UI32/3141.4/1, Abschlussbericht, Hannover, Frankfurt am Main, November 2012.

- Rail and Airport: airport connections, upgrading of rail link and stations (Gothenburg-Landvetter, Hamburg, Catania Fontanarossa, Rome Fiumicino);
- Rail and Road: Fehmarn Belt Fixed Link, renovation and redesign of road and rail connections of the container terminal Burchardkai (Hamburg);
- Rail and Rail Road Terminals: rail connection in Stockholm Nord (Rosersberg) and new public siding in Bari Lamasinata Freight Village, improving of capacity of Verona Quadrante Europa terminal.

The multimodal dimension will be amplified by the results of the analysis of the "urban nodes" which will be completed in June 2016 and presented in the Preliminary Report on Elements of the Work Plan.

For each of the nineteen urban nodes the analysis displays the alignment of the linear infrastructures of all corridors, the nodal infrastructures such as airports, (sea-)ports, rail road terminals and passenger stations as well as the comprehensive network within that urban node. The analysis indicates where action is needed to connecting the respective urban node and the corridor(s) and where projects are already identified. The "zoom-in" is carried out for the first time now.

8 Recommendations and outlook by the European Coordinator

Opening remarks

This second iteration of the Scan-Med work plan deepens and enriches understanding of the scale, nature and detail of the challenges that lie ahead. That some projects already have been achieved is encouraging but allows no room for complacency having regard to the scale and complexity of what is needed to realise the core network objectives.

The governance structures have been working well. The Corridor Forum, Working Groups and the Ideas Laboratories will continue to offer platforms to share bottom up and top down perspectives and to facilitate peer-to-peer communication. Given the maturing of shared analysis and understanding and the development of KPIs, it may be appropriate to consider the rhythm and frequency of Corridor Forum meetings. These should be often enough genuinely to be informative and useful but not so often as to lapse into a burdensome routine.

In addition, the Coordinator remains willing, within reason, to seek to address or meet various stakeholders associated with the corridor or its hinterland. Keeping the public informed and positively engaged is an indispensable requirement of any successful long term infrastructure planning and delivery.

The current corridor alignment has been clearly defined. However, taking into account geopolitical developments, a future extension of the corridor cannot be excluded. In particular in view of forming a strategic gateway to the Arctic region, connecting the Scandinavian-Mediterranean Corridor with the North Sea-Baltic Corridor at the border between Finland and Sweden through the so-called Bothnian extension should be taken into consideration.

The 'hardware' elements of corridors now are well identified. Progress needs to be encouraged and monitored but it is time to begin adding other necessary layers of complexity to reflect the mandate conferred by the TEN T Guidelines. In addition to increased efficiency transport policy must focus on improved environmental sustainability and the challenges posed by climate change.

Climate challenge

The COP 21 in Paris saw commitments to act defined through intended nationally determined contributions (INDCs). On 6 March 2015, the EU submitted its INDC to the UNFCCC formally putting forward a binding, economy-wide target of at least 40% domestic greenhouse gas emissions reductions below 1990 levels by 2030. The state-by-state and sector-by-sector breakdown needs to be established.

Transport is responsible for around a quarter of EU greenhouse gas emissions making it the second biggest greenhouse gas-emitting sector after energy. Road transport

alone contributes about one-fifth of the EU's total emissions of carbon dioxide (CO^2), the main greenhouse gas. While emissions from other sectors are generally falling, those from transport have continued to increase until 2008 when transport emissions started to decrease on the back of increased efficiency of passenger cars and slower growth in mobility.

There are also significant emissions from the aviation and maritime sectors and these sectors are experiencing the fastest growth in emissions, meaning that policies to reduce greenhouse gas emissions are required for a range of transport modes.

Greenhouse gas emissions in other sectors decreased 15% between 1990 and 2007 but emissions from transport increased 36% during the same period. This increase happened despite improved vehicle efficiency because the amount of personal and freight transport has increased. Since 2008 greenhouse gas emissions from transport have started to decrease. Despite this trend transport emissions in 2012 were still 20.5 % above 1990 levels and would need to fall by 67 % by 2050 in order to meet the 2011 Transport White paper target reduction of 60% compared to 1990.

For transport, greenhouse gas emissions are not the only climate related challenge. Climate change for road, rail, ports, airports and inland waterways has another important dimension. The resilience of all infrastructures in the face of extreme weather events needs to be known and understood. Evidence of intense heat waves, cold snaps, floods, droughts, landslides, soil erosion and wildfires abounds. Their impact on transport networks and their implications for whole network effects is a form of risk evaluation that has not been done at the level of core network corridors.

These challenges need to begin to find expression in the work of the core network corridors, their governance structures and future studies. There are many actors involved in this climate dimension and the Scan-Med corridor is only one of these but as a strategic priority climate change needs to be integrated into future work plans.

Issues papers, innovation policy and policy innovation

A set of five issues papers has been prepared on: enabling multimodality and efficient logistics; boosting intelligent transport systems; boosting new technologies and innovation; effectively integrating urban nodes and extending cooperation with third countries. All stakeholders were invited to reflect on their content to ensure that these crucial matters play their full part in the development of TEN-T policy and in particular on the Scan-Med Corridor.

Corridors can act as a readily available inter-regional and international cross border test bed and platform to learn-by-doing beyond local and national boundaries. They are open to public and private actors and public-private consortia prepared to innovate and willing to move from the abstract to the concrete in developing interoperable and seamless multimodal transport concepts and options. It would be helpful if Corridor Forum participants could assist in the identification of partners- governmental, regional, municipal, academic, commercial, NGO or others - who would be prepared to

exploit this opportunity to experiment and to lead change. Key is the need to find partnerships across borders.

At another level sustainable and innovative transport will be found in the multitude of individual initiatives taken by cities, ports, airports, inland waterways and rail-road terminals. Such diversity is a great strength. That capacity can be multiplied through peer-to-peer exchanges. The Ideas Laboratories pioneered by the Scan-Med Corridor can be a kind of stock exchange for ideas where good people and leaders doing good things can motivate and encourage other good people who would like to try harder.

The nodes are the most complex points of intersection along the corridor. More needs to be learned and shared about who is doing what by way of ambitious plans to address climate change or noise reduction; the development of low or ultra-low urban emissions zones; the practical issues associated with planning to reinvent last mile urban or port logistics; or the encouragement and development of end-to-end connected transport solutions for passengers and freight. This is an area where collectively we need to raise our sights and to raise our game. The corridor governance model can assist in this task but requires the imaginative input of all the stakeholders. Imagination knows no borders.

Innovation policy needs to be accompanied by policy innovation. New business ecosystems, innovative economic instruments designed to induce behavioural changes and the development of new fiscal and non-fiscal instruments in the transport sector need to be encouraged and tested. Massive investment in new rail infrastructure, for example, will never be optimised if appropriate accompanying measures are not adopted.

Corridor coherence and accompanying measures

Corridor coherence is greatly to be desired in the definition and delivery of flanking measures, such as road tolls, the internalisation of external costs or cross-financing schemes between transport modes. Large-scale infrastructure projects take time. Adopting accompanying measures institutionally and politically takes perhaps even more time. That is why there is no time to lose. In truth more progress is being made on the emergence of new infrastructures than on the appropriate flanking policy measures. Words are a poor substitute for action and to date action on even beginning to contemplate inter-regional or cross border corridor policy coherence beyond infrastructural investment remains painfully slow.

Finance, CEF, MFF

536 projects have been identified in this second iteration of the Scan-Med Work Plan. For 82% of the projects cost indications have been received. For these projects total investment cost are estimated at €172bn. This plan's horizon extends to 2030. To put this cost estimate in perspective, it is seven times greater than the total available funds for the Connecting Europe Facility (CEF) 2014 to 2020 that applies to all

member states and to all modes of transport. Even when public investment in transport by member states and regions is taken into account it is apparent that public resources and taxpayers alone cannot and therefore will not deliver on the targets that have been agreed. This underlines the necessity for alternative financial instruments and the need, where relevant, to attract private investment as equity or otherwise. These issues have been treated extensively in the Christophersen Bodewig and Secchi Report of June 2015[30]. Revenue generating projects should be encouraged to explore all the available means to proceed and should not wait for grant funding as a precondition. If they do so, they may never materialise despite the possibility that they could be independently viable.

This said, it is clear that some projects, particularly large scale investments such as the Brenner Base Tunnel and the Fehmarn Belt Fixed Link would never take place without grant aid. It is vital that the necessary emphasis on instruments such as the European Fund for Strategic Investment should complement but not replace the CEF. The CEF is an indispensable tool in delivering Europe's shared and ambitious TEN-T programme. It needs to continue into the longer term if the EU hopes to mobilise the commensurate level of member state co-funding for such vital infrastructures.

Brexit threatens a reduction in EU own resources. In future this may lead to pressure for some states to pay a little more into and others to expect a little less from the EU budget, thus negatively impacting future Multiannual Financial Frameworks. Perhaps the time has come to equip the EU with means adequate to finance its aspirations and mutualised responsibilities. A departing UK shows what the cost of disintegration could be. Imagine how much greater this would be in the Union itself was in danger of further fragmentation. The modest extra cost of staying together, but properly financed, pales when compared to the short and long term costs of failure.

Flexibility

Given budget constraints and low levels of economic growth in many member states it should be remarked to their credit how consistent they have been in contributing to their share of Scan-Med co-financing. These projects are part of the TEN-T Guidelines and CEF, each the product of EU public policy voted by the European Parliament and the Council of Ministers. Such projects cannot be dreamed up unilaterally by any member state, whatever the underlying state of its public finances. It would be appropriate that the maximum degree of flexibility in fiscal terms be accorded to member states when they co-fund shared EU infrastructure targets.

[30] Action Plan – making the best use of new financial schemes for European transport infrastructure projects, June 2015

Planning Permits

The delays on the Fehmarn Belt Fixed Link confirm the complexity of seeking to align the planning process and permitting procedures when a route alignment crosses an international border. Citizens with concerns are entitled to exercise their full rights under the law, something which must be respected, but also something which can add considerable time and uncertainty to project planning and delivery. Since the administrative and judicial procedures, where relevant, are unlikely to change state by state any time soon and since planning objections take time to resolve, it is important, as regards cross border projects, that the authorities should plan and publicly communicate route alignments as early as possible. Access routes are essential to the completion and optimisation of major infrastructure projects. Their completion needs to be timely. This suggests as a matter of mutual expectations, loyal engagement and policy coherence that anticipated planning and permitting delays must be factored into strategic project planning. In short, this provides a compelling case for starting the public communication and consultation process as early as possible, the better to ensure that the eventual outcome is consistent with the timelines foreseen and agreed by the main contracting parties.

Conclusion

The intensity of work over the past two years is a tribute to the commitment of so many individuals representing so many facets of our diverse transport ecosystem. Permit to thank everyone, too numerous to mention, who has assisted our task. As Jean Monnet remarked many years ago “Nothing is possible without men (and women!), but nothing lasts without institutions.” We have the policy guidelines, we have financial resources, we have the people who can make the difference and we have the governance institutions to carry us to success. Let this second edition of the Scan-Med Work Plan be a call to action. In this year of 2016, an Olympics year, what better motto for our shared ambition than ‘faster, higher, stronger’.

Contacts



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Background information with useful links:

Corridor website

http://ec.europa.eu/transport/themes/infrastructure/ten-t-guidelines/corridors/scan-med_en.htm

Downloads:

http://ec.europa.eu/transport/themes/infrastructure/ten-t-guidelines/corridors/corridor-studies_en.htm)

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