



Overview of solutions and their (potential) impact

Deliverable 2.2

EUROPEAN COMMISSION

Horizon 2020

H2020-MG-2016-2017

GA No. 769458

Version: final

Date: 28.09.2018

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769458

Document Control Page

Deliverable number	VITALNODES D.2
Deliverable title	Overview of solutions and their (potential) impact
Dissemination level	Public (PU)
Lead participant	Ecorys
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Brief description	Current solutions and their impact on accessibility, liveability, economy and vitality.
Creation date	28 September 2018
Version number	Final
Version date	28 September 2018
Last modified by	
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Table of contents

1	Summary	5
2.	Introduction	6
2.1	General trends / facts	7
2.2	Scope of this report	9
2.3	Relation with other reports of VitalNodes	10
2	Approach and process to gather and validate solutions	11
3	Definition and categorization of solutions and their potential impact	12
3.1	Definition of solutions	12
3.2	Categorization of solutions	12
3.3	Potential impact	15
3.4	Overview of facts and figures including challenges per node of tier 1	17
4	Overview of solutions and their (potential) impact.....	18
4.1	Overview of solutions with (potential) impact in this report	18
4.2	Terminals.....	25
4.3	Solutions with (potential) impact: main category optimizing terminals	26
4.3.1	ELP project, 'Espace Logistique Proximité' (Strasbourg)	26
4.3.2	Micro hub (Gothenborg).....	27
4.3.3	Micro consolidation centre (Budapest).....	28
4.3.4	Micro and midi terminals (Vienna)	29
4.4	Solutions and their (potential) impact: main category adding terminals	30
4.4.1	Wien Süd Cargo terminal (Vienna)	30
4.4.2	Micro hub green logistics park (Mannheim)	31
4.4.3	Port de Lauterbourg (Strasbourg)	32
4.5	Infrastructure	33
4.6	Solutions and their (potential) impact: main category optimizing infrastructure	34
4.6.1	CaaS – Corridor as a Service (Turku).....	35
4.6.2	Theemsweg track for railfreight (Rotterdam).....	36
4.6.3	BASF factory Logistics (Mannheim).....	37
4.7	Solutions and their (potential) impact: main category adding infrastructure	38
4.7.1	Erasmus Bridge (Rotterdam)	39
4.7.2	Bicycle highway (Mannheim)	40



4.7.3	Railway Track (Strasbourg)	41	
4.8	Modes	42	
4.9	Solutions and their (potential) impact: main category optimizing a mode	43	
4.9.1	Ferrobonus (Genova)	44	
4.10	Solutions and their (potential) impact: main category adding a mode	45	
4.10.1	Railport Scandinavia (Gothenborg)	46	
4.10.2	Autonomous shipping (Turku)	47	
4.10.3	Cable car (Gothenborg)	48	
4.10.4	Cable car BASF (Mannheim)	49	
4.10.5	Cable car Gate project (Genova)	50	
4.11	Solutions and their (potential) impact: main category spatial planning	51	
4.11.1	Ringland (Antwerp)	52	
4.11.2	Vienna productive city (Vienna)	53	
4.11.3	Blue Village Franklin (Mannheim)	54	
4.11.4	Waal – Eemhaven (Rotterdam)	55	
4.11.5	Harbour Island (Norrkoping)	56	
4.11.6	Turku Science Park (Turku)	57	
4.12	Solutions and their (potential) impact: main category governance / institutional	58	
4.12.1	Northern Growth Zone (Turku)	59	
4.12.2	Cooperation between the port of Genova and Savona (Genova)	60	
4.12.3	Living lab for city logistics (Rotterdam)	61	
4.12.4	Utilization of road network (Rotterdam)	63	
4.12.5	West Sweden Agreement (Gothenborg)	64	
4.13	Solutions and their (potential) impact: main category business casing	65	
4.13.1	Focus on type of urban logistics in relation to CO ₂ emission (Rotterdam)	66	
5	Conclusions / recommendations ...Error! Bookmark not defined.		
	Attachment 1 - Overview of CEF Funded projects per node	68	
	Budapest	68	
	Genova	68	
	Gothenborg	70	
	Hamburg	71	
	Rotterdam	72	
	Strasbourg	73	
	Turku	74	
	Vienna	75	

1 Summary

Developments with huge impacts on the current networks and transport systems are taking place. Consequences are not fully predictable, but it is evident that things will change and ask for change. While we are now still talking about ‘mobility as a service’, the future might be ‘nodes as a service’. The completion/development of the silk route requires time and may complete network guarantees, on which the current network is not shaped (corridors, functional areas, function of nodes and functional areas).

Relevant steps has been made in thinking of/development of solutions. However, these are in almost all cases first steps or – in other words - an optimization of the current network or systems. Practices – in terms of “ changing practices” - reflecting or facilitating huge developments in the correct policy objectives (impact) are hardly found.

In this report a collection of solutions is shown. These are categorized as follows:

- *Optimize a terminal*
- *Optimize* (the use of existing, sustainable) *infrastructural systems*
- *Add infrastructure*
- *Optimize a mode*
- *Add a mode*
- *Spatial development and planning*
- *Governance and institutional arrangements*
- *Business casing: public authorities strategies and private models*

The lack of data on freight streams on local and functional urban area level means that it is not possible to have a base case, or to assess solutions on impact with data. This means also that it is impossible for authorities – if they are already willing to – to have a strategy on freight / logistics with SMART objectives. Developments occur, which generates good practices including new business models by the private sector. One of the recommendations for the future is however, that these business models fit within the strategy of an authority. So: data are required to build upon.

Another recommendation is to start a discussion about the required function of a node. When does a node have added value for the European network? Does the current chosen 88 urban nodes generate added value given the huge changes and developments?

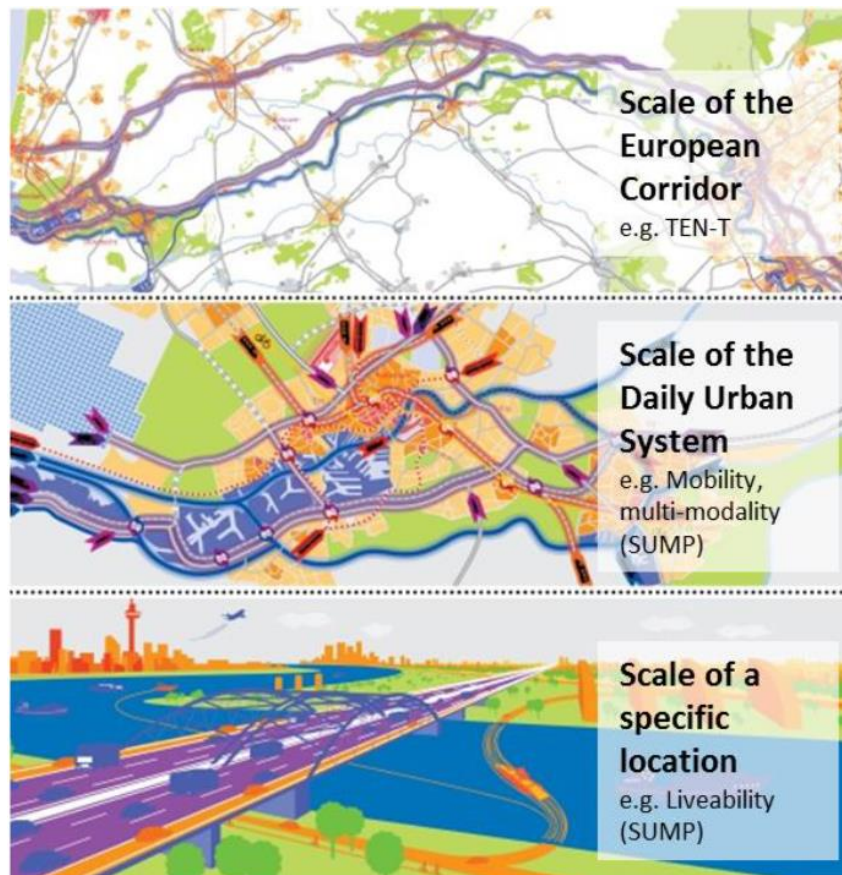
2. Introduction

An effective integration of an urban node in the TEN-T network is complex. Complexities arise from:

- different scales of transport services (local distribution and long distance freight transport are specific logistic expertises);
- different types of stakes and stakeholders involved (economic, infrastructure and environmental policies, etc.);
- different spatial scales of the networks (fine-mazed local/regional road networks, terminals and extensive multi-modal corridors);
- different planning and governance approaches (local, regional, national and cross-border – TEN-T - policies).

Vital Nodes addresses the challenging integration of Urban Nodes in the TEN-T network. It addresses specifically the planning perspectives on three different freight transport scales (TEN-T, functional urban area/Daily Urban System and local scale). These are shown in the figure below.

Figure 1. Linking different levels (see also D3.4)



2.1 General trends / facts

The most important general trends / facts at these three levels are described below.

At the level of international (TEN-T) corridors:

- Global trade results in significant volumes of maritime freight transport. The maritime sector calls at only a limited number of EU gateway or regional ports, and uses the TEN-T distribution networks to access consumers. Volumes of freight transport are large. This requires efficient transport operations and optimized networks over long distances. A global supply chain network based on multi-modal approaches, with logistics terminals and hubs, supports trade between global regions. This trend is driven by globalisation, increased agglomeration effects and a global orchestration of supply chains;
- Final customers in EU member states are serviced by a limited number of EDCs (European Distribution Centres). Logistics chains hardly take account of borders and are optimized predominantly on an international scale;
- Logistic stakeholders are private agents, the TEN-T network facilitates their customer's transport demands.

At the level of metropolitan urban regions (functional urban areas):

- Logistics agents choose their logistics networks, and nodes in their networks (transshipment, or multi-modal locations) based on customer demands, supply chain efficiency (freight transport and logistics) and human resource accessibility (persons, qualified labour);
- Urban (ring) roads are the network segments in which the Corridor and the urban-regional scale merge. Corridor interests and regional interests are competing for the same capacity on the network. The issues above will require a new standard towards multi-modal exchange, vehicle buffering and the quality of the network integration within the urban fabric;
- Urban Logistics is a specific logistic discipline. Routing and meeting the final consumer's delivery needs has high priority for last mile distribution, which is different from the long-distance transport requirements. In relation to urban logistics and distribution, key issues in urban areas are congestion and traffic density, combined with the growing relevance of environmental impact concerns, and e-commerce boom;
- Urban and regional planning aspects are regarded only by governments. Via planning interventions – governance of spatial development, the economy, the transport and infrastructure elements and labour – governments can steer the locations of transport and logistics and the related nodes. Some of the planning aspects are organised at a local level (such as land use planning). Many others are planned at the national and regional level. As a consequence, coordination and collaboration between government layers – multi-level governance – is vital.

At the local level (daily urban systems):

- The local level is where the final consumer receives deliveries. But also, societal impact of transport and mobility are regarded as highly problematic.

- The location of large distribution centres in the metropolitan region has a significant effect on the network resilience and is currently not part of the planning process of governments. Mobility and freight transport policies are planned at local level in most cases via SUMPs.
- Local policy making is fuelled by liability concerns, where emissions, safety and noise are main challenges of commuters and residents. Local policies steer the routing (e.g. traffic-free zoning, or time windows), the vehicle types (e.g. via low emission zoning or maximum length or weight criteria) and logistics behaviour (e.g. via urban consolidation centres).
- Dominantly driven by online sales, currently large distribution centres are being developed jointly with midi and micro hubs in the urban area.
- Many innovations are piloted such as urban freight transport for example automation and electrification of vehicles, light vehicles (cargo bikes, Light Electric Vehicles) and new logistics concepts (urban parcel lockers and micro hubs).

Governance

Optimizing the integration of logistics to ensure vitality and liveability of urban areas is becoming increasingly important to many EU citizens. The local liveability challenges (resulting from freight transport, such as air pollution, noise, safety and congestion) ask for an adapted governance structure. The various levels of institutions (both public and private) need to work together in optimizing the long-distance and local transport chains. This means that there is need for policies relying on a combination of TEN-T related goals and the objectives of sustainable urban mobility plans (SUMP), as promoted by the Commission in the 2013 Urban Mobility Package (UMP) and the regional (cohesion) policies. Actors within various fields (e.g. urban planners, infrastructure coordinators and operators, freight and logistics operators and financiers) need to collaborate to successfully integrate transport solutions on the local as well as on TEN-T level.

Logistics development

Acknowledging these issues, Vital Nodes is looking for solutions that can provide a strong contribution to the better integration of Urban Nodes in the TEN-T network. Some important logistics developments with a huge impact on the question of “required functions of nodes in the future” or “nodes a service” are presented in the box below.

Crowd shipping

Digitalization

E-commerce

Silk route

Logistics sprawl

Environment

Space

Instant delivery

Synchro modality and inter-operability at service level

Fysical internet

2.2 Scope of this report

This report (D2.2) describes the approach and process to gather and validate solutions (chapter 2), the definition and categorization of solutions and their potential impact (chapter 3), as well as solutions (with (potential) impact) within categories (chapter 4). Important notes are described in the text boxes below. In the last chapter we have summarized recommendations to deal with these notes in the future.

Attention point 1: Data of freight streams at the level of city and functional urban area are scarce. This means that the impact of solutions is mostly based on expert judgement.

Attention point 2: Huge developments are taking place as highlighted in chapter 2.1. These developments have a huge impact on current systems and a need for change. Validated solutions as presented in this report are in almost all cases just a first step.

Attention point 3: Impacts of solutions of tier 1 nodes as presented in this report are sometimes based on implementation examples and sometimes based on potential impact (not implemented yet). The impacts are scored per node. This means that impact scores are not in absolute terms; therefore the impact of solutions in nodes might not be used as a benchmark between solutions. This is the reason why we did not categorize solutions via the policy dimension of impact criteria.

Attention point 4: solutions with (potential) impact validated in the tier 1 nodes - and described in this report - are directly related to the context of each node (facts, figures, policy objectives and challenges).

Due to the close co-operation with RWS (leader work package 3) and to overcome doubles in reports, the so called finger prints or typologies of each node is presented in report D3.3 as a co-production of RWS and Ecorys.

2.3 Relation with other reports of VitalNodes

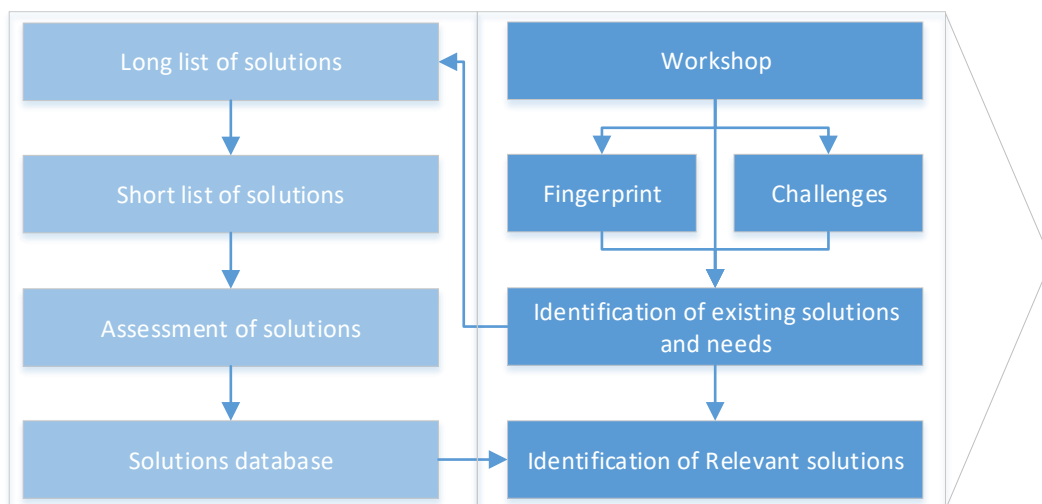
In the last months, Vital Nodes has carried out various workshops with urban node cities across Europe (the 8+1 urban nodes of tier 1) as part of work packages 2 and 3, which are closely related to each other and which will be follow-up in work package 4 that addresses the tier 2 and tier 3 urban nodes. In deliverable D3.3 the outcomes of the tier 1 workshops are discussed in the form of *recommendations* to the EC (NB: D3.1 was issued earlier and provided the preliminary outcomes for the first urban node Vienna).

The work packages WP2 and WP3 as well as WP4 are closely related which makes the deliverables D2.2, D2.3 and D3.3 strongly related with each other as well.

2 Approach and process to gather and validate solutions

The figure below shows the overall approach and process to scan and validate solutions and their potential impact within the project Vital Nodes.

Figure 2. Overall approach identification solutions and their (potential) impact



In this project we have started with compiling a longlist to get an overarching list of possible solutions. This is based on a scan of European projects for the selected workshop nodes. These projects included:

- Projects under Horizon 2020
- Fluxnet, ALICE and study on urban logistics
- CEF-calls Urban Nodes

The conclusion is that there is a huge amount of solutions, amongst others presented in toolboxes or overviews as <http://www.smartcities.at/foerderung/smart-urban-logistics/praxisrelevante-unterlagen>. However, these solutions are not categorized alongside the dimensions or not linked to the different scale levels.

The long list of solutions as well as huge developments has been used as background information for the workshops in tier 1. Several solutions or project experiences has been presented and discussed in the tier 1 workshops, at conferences or working groups of POLIS and Eurocities, with ALICE and with Mr (Lóri) “Tavasszy”. Professor Freight & Logistics at TU Delft. The presented solutions with (potential) impact in this report are a first step in a fast changing world.

3 Definition and categorization of solutions and their potential impact

3.1 Definition of solutions

Solutions are those practices, measures and investments that can advance the integration of Urban Nodes in transport networks. Different types of solutions can be considered. Solutions aim to contribute to the Vital Nodes objective from different angles. In fact, certain benefits may be achieved by two solutions that take an incomparable approach.

In this report solutions with (potential) impact are presented. The impact of a solution varies according to the context of the node. Therefore, facts and figures, challenges and solutions with (potential) impact are presented as an integrated part of this report. However, to overcome doubles these fact sheets are presented in report D 3.3.

Furthermore solutions with (potential) impact found so far, are mainly solutions with impact on the current systems and networks. This might therefore be considered as first step. But that is not enough: Changing practices are needed to generate impact given the huge developments. This includes (governance) solutions based on the reflection on the required function of nodes in a changing network.

3.2 Categorization of solutions

The practices, described in this report, have very different origins and scope. Some are very local, some regional. Some are tested on a very small scale, other lead to large infrastructure developments. Some are implemented, others are in the development phase.

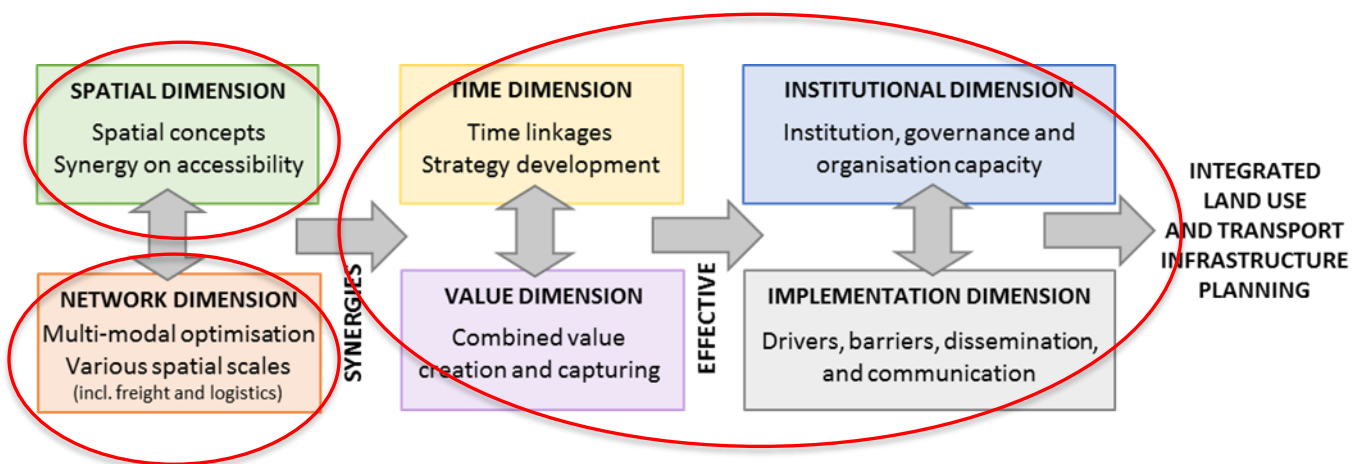
Considering the complexity of the challenges there is no silver solution bullet. A focus on innovative technical solutions/methods will not be enough. As already indicated in the Vital Nodes proposal and further elaborated in D3.4, there is a need for an integrated approach that connects the world of infrastructure, mobility, freight, and logistics, with the world of urban and spatial development. This has been confirmed in the tier 1 workshops (see also D3.3). A need for an approach, in which there is attention for soft innovations addressing the multiplicity of the challenges by integrating not only different spatial scales but also different sectors, modalities, stakeholders and multi-level governance. The challenges in integrating freight logistics of urban nodes into network corridors have a multi-dimensional character. Not only network issues of the (freight logistic) transport and mobility system have to be considered, but also spatial issues related to urban vitality (socio-economic development, spatial and environmental quality and livability), as well as issues of short-term and long-term development, value creation and capturing issues, multi-level governance and institutional issues, and issues related to implementation have to be addressed.

In D3.4 a first preliminary version ('mark 1'), outlining the Vital Nodes 'toolbox-under-construction' has been discussed, which is based on the experiences gained with Networking for Urban Vitality (NUVit)

and enriched with the first experiences gained in the first Vital Nodes urban node workshop in Vienna. Six dimensions have been distinguished:

- Network dimension, regarding infrastructures and terminals, multi-modal optimization, various spatial scales, and which explicitly regards freight logistics;
- Spatial dimension, regarding spatial concepts, synergy on accessibility;
- Time dimension, regarding time linkages between short-term and long-term, strategy development;
- Value dimension, regarding value creation, assessment and capturing of (combined) development;
- Institutional dimension, regarding institutional arrangements, (multi-level) governance, organizational capacity;
- Implementation dimension, regarding drivers, barriers, dissemination and communication.

Figure 3. Linkages between various dimensions (see also D3.4).



The experiences gained suggest that the various dimensions are related in a logical way (see Figure above and D3.4). The spatial and network dimensions regard the linkages between transport infrastructure, mobility and land-use. Resulting in potential synergies. Finally, this requires an adequate institutional and implementation approach to become effective integrative planning. Therefore, transport infrastructure can be carefully coordinated with spatial developments resulting in tailor-made solutions to the local situation, enhanced vitality of regions and well-functioning (inter)national transport corridors and networks.

For the grouping of solutions, the results of the tier 1 workshops (see D2.2 and D3.3) suggest that it is useful to elaborate more on the network dimension, while the time, value and implementation dimensions prove to be closely related to the institutional / governance dimension. Regarding the network dimension a further categorization of solutions is proposed that relates to the principles as described in the FLUXNET study¹, which is closely related to Vital Nodes (see also the Vital Nodes proposal).

As part of the FLUXNET study some 25 good practices have been identified with a broad range of effects

¹ More information can be found at the CEDR website www.cedr.eu

on modalities. The following dimensions are suggested to optimize the multi-modal functioning of the spatial infrastructure network and system (terminals, infrastructure and modalities);

- *Optimize a terminal* stands for improving the internal organization of a terminal. Existing terminals are re-organized in order to increase the efficiency to better serve multiple modes.
- *Add a terminal* stands for (re-) locating a terminal at a multi modal location in order to improve multi-modality and to improve the network performance.
- *Optimize* (the use of existing, sustainable) *infrastructural systems* means that the use of existing traffic infrastructure (rail, water, road, pipeline) is being optimized by physical or organisational measures.
- *Add infrastructure* stands for realizing a new physical, sustainable transport infrastructure (waterway, railway, pipeline) that complements the existing infrastructure network in order to facilitate a modal shift.
- *Optimize a mode* stands for optimizing the use of an existing vehicle on existing infrastructure with the aim to create an alternative for conventional truck transport on the local / regional / corridor road network
- *Add a mode* stands for adding a new vehicle type to existing infrastructure with the aim to create an alternative for conventional truck transport on the local / regional / corridor road network.

According to Fluxnet, often a principle has connections to different fields. For instance: adding a mode at regional level often has connections to adding infrastructure on both regional and local level.

In addition to these categories related to the network dimension, categories are also distinguished in relation to:

- *Spatial planning* - The spatial dimension relates to linking the local and regional, (inter)national transport services in the most optimal way. It regards spatial developments as housing, facilities, business estates, green areas etc., their distribution across a city and region, redeveloping old areas and neighbourhoods (brownfields) as well as (master) planning at local and regional scale. Here, small measures at local scale may help to solve bottlenecks at the Daily Urban System and the corridor level ('smart acupuncture').
- *Governance and institutional arrangements* - This comprises governance approaches and organizational frameworks at all institutional levels and entails also issues of institutional embedding, governance models as well as issues of the cultural setting, resulting in solutions for inter-governmental cooperation (public-public partnerships), market involvement (public-private partnerships), stakeholder engagement (users, citizens, interest groups), the governance of organizational networks, and smart mixes of these. Governance and institutional arrangements also relate closely to (collaboration in) funding, value capturing, time, implementation etc. (see D3.4).

In the process of good practices related to developments, we have added an important aspect of business casing from the logistics perspective.

As a result a grouping of 9 solutions is proposed:

- *Optimize a terminal*
- *Add a terminal*
- *Optimize (the use of existing, sustainable) infrastructural systems*
- *Add infrastructure*
- *Optimize a mode*
- *Add a mode*
- *Spatial development and planning*
- *Governance and institutional arrangements*
- *Business casing: public authorities strategies and private models*

Impact scores are not in absolute terms; therefore the impact of solutions in nodes might not be used as a benchmark between solutions. This is the reason why we did not categorize solutions via the policy dimension of impact criteria. When required data of freight streams are in place in the future, we recommend to include a categorization via the policy dimension of objectives (e.g. accessibility, safety, vitality, connectivity, economy, investment / funding models).

3.3 Potential impact

Each node can apply a range of solutions. At the same time it is likely that the types of solutions differ per node. This is influenced by several factors like the main challenges at hand and the desired impacts. Whether a solution is a solution with (potential) impact – “a good practice” - for a specific node, depends on the context of the node. Therefore, facts and figures, challenges and possible good practices are presented as an integrated deliverable (report D3.3).

For the appraisal methodology we refer to deliverable 2.1 (appraisal methodology and guidelines on its application for WP3 and WP4 workshops).

To avoid unclarity ‘Quality of living’ is defined in criteria of social cohesion (overcoming barriers) as well as energy transition. It might be possible that with the application of the methodology in tier 2, criteria might be specified or added (e.g. circular economy). Example of quality of living score: Urban quality might be raised by (a) moving industry (e.g. moving heavy industry development outside) or (b) urban densification (facing a demand for housing which is fulfilled by means of transforming inner city industrial sites / re developing harbours) or (c) overcoming barriers or (d) circular economy / energy transition. Mostly there is an interaction between vitality and other criteria as economy, as well as a package of solutions.

Figure 4. Overview of impact criteria of solutions (on 5 criteria).

Solutions name	
Type of solution	
Node	
Link or contact	
Investment costs	
Description	
Impact overview	

Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	0
	The solution impacts the route of the flows	0
	The solution impacts the volume of the flows	0
	The solution impacts the timing of the flows	0
	The solution impacts the available infrastructure capacity	0
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	0
	The solution impacts the number of motorised vehicle casualties	0
	The solution impacts the external safety of dangerous goods transport	0
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capturing)	0
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investments (value capturing)	0
	The solution impacts the price of living in urban areas (socio economic)	0
	The solution impacts synergies with other sectors	0
	The solution impacts the GDP	0
D Vitality	The solution impacts the air quality	0
	The solution impacts the noise levels	0
	The solution impacts health of citizens	0
	The solution impacts the ease of moving in the city for citizens	0
	The solution impacts the quality of living	0
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility perspective	0
	The solution impacts the connection between the city and the functional area from a logistics perspective	0
	The solution impacts the connection with other Nodes on the Corridor	0
	The solution impacts the connection with other TEN-T Corridors	0
	The solution impacts the connection with the comprehensive network	0

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

3.4 Overview of facts and figures including challenges per node of tier 1

The validated facts and figures and challenges per node in tier 1 are presented in report D3.3.



4 Overview of solutions and their (potential) impact

The solution and their (potential) impact are categorized as described in chapter 3 as follows:

- Terminal: optimizing
- Terminal: adding
- Infrastructure: optimizing
- Infrastructure: adding
- Mode: optimizing
- Mode: adding
- Spatial planning
- Governance / institutional
- Business casing: public authorities strategies and private models

The main category of the solution is indicated in the structure below. However, a solution can relate to several categories. This is shown in the overview in chapter 4.2.

4.1 Overview of solutions with (potential) impact in this report

Figure 5. Overview of solutions with (potential) impact

Node	Description	Main category of solution								
		Optimize			Add			Spatial planning	Governance	Business casing
		Terminal	Infrastructure	Mode	Terminal	Infrastructure	Mode			
Strasbourg	A private initiative that will start in October 2018: the ELP project, ' Espace Logistique Proximité '. Four light vehicles will cover the Strasbourg region and the initiative is hosted in a space in the rue des Orphelins in Strasbourg city center, as a micro hub. A cargo bike will be used to carry goods.	x								

D2.2 – Overview of solutions and their (potential) impact

Gothenborg	An example of a parcel collection point is the Electricity project in Gothenburg. At the end/starting stop of the bus route 55 in the port area of Gothenburg a parcel collection point is realised.	x							
Vienna	Considering the concentration of intermodal goods traffic in and around Vienna a multifunctional cargo terminal , the RRT Wien Süd, has been built at the southern city border of Vienna.				x				
Mannheim	The concept of the Green Logistic Park can also be used on a smaller scale. At the location of an underpass the city of Mannheim has the plan to build a parcel delivery point, a micro hub. A possible good location might be under the flyover at the Parkring close to the city/port.				x				
Strasbourg	Port de Lauterbourg (R3Flex) is located on the Rhine-Alpine Corridor. It is the second French inland waterway port and has 2 major sites: Strasbourg and Lauterbourg. It is a necessary step for improving the accessibility and the capacity of a multimodal platform. A new terminal will provide a trimodal installation.				x				
Turku	Corridor as a service provides optimized use of infrastructure.		x						
Rotterdam	Theemsweg . The Action is part of a Global Project aiming to remove the bottleneck in the rail freight access of main port Rotterdam connecting three core network, by upgrading Caland Bridge and rerouting rail freight transport via an alternative route.		x						
Mannheim	BASF operates a major site in Ludwigshafen. This facility generates major economic spinoff for the wider region but also major traffic flows. Although many is transported via Rail and IWT further improvements are made. Both night deliveries from a consolidation hub to site are researched as well as improvements on site (an intermodal		x						

D2.2 – Overview of solutions and their (potential) impact

	tankcontainer BT-C with a 66 tonnes and special AGV"s).								
Rotterdam	The Erasmus bridge was built as a new connection between the Rotterdam city center and the Kop van Zuid area south of the river. The bridge was part of the large scale restructuring of older harbor areas no longer used as a harbor into a high density urban area.					x			
Mannheim	An example to improve air quality and connectivity and to contribute to the capacity problems on the roads and in the public transport, is the plan for a bicycle highway between Mannheim and Heidelberg.					x			
Strasbourg	The Strasbourg node, more particularly the Strasbourg-Vendenheim section, is the most frequented in Alsace. No further development of regional, high speed and freight trains will be possible as from 2017 and in 2020-2025 the line will be saturated. The Acton aims to remove a major bottleneck at this section and to improve the capacity of the node.					x			
Vienna	Micro and midi hub last mile deliveries; Vienna is looking for possibilities to develop micro hubs (100 – 150 m2) and midi hubs (1,000 m2) in the city. Perhaps Vienna's main terminals Wien-Süd and Hafen Freudenau offer opportunities.	x							
Budapest	Micro consolidation centers Last mile delivery solution that shifts the parcels from diesel vans to cargo bicycles, tricycles & electric vehicles. In order to keep the distance minimal there must have been a 'Micro Consolidation Centre'	x							

D2.2 – Overview of solutions and their (potential) impact

Genova	Ferrobonus (modal shift incentive stimulation) is the incentive provided by the Government, by Stability Law for the 2016-2018 three-year period to support combined transport and trans-shipment on rail.			x					
Gothenborg	Using freight rail shuttles to/from the Port of Gothenborg. Although rail shuttles should operate on distances larger than 500 km, they are of poor quality and have high lead times, Railport Scandinavia proves the opposite. IT operates on distances smaller than 150 km, is of high quality, punctual and prevents congestion.					x			
Turku	In order to stimulate value capturing and attracting high tech companies a R&D test center has been opened by Rolls Royce with state-of-the-art research facilities. This center aims to develop technologies required to shape the autonomous global shipping industry.					x			
Gothenborg	An example of a successful project framing of this relation linking city, region, national and EU level is the planned Gondola Project covering the construction of a cable car in the city of Gothenburg crossing the Göta älv river. The current public transport system is very radial, like spokes in a wheel passing one narrow hub in the centre near the central station. To connect the northern and southern part of the city, separated by the crossing Göta älv river, all public transport (trams, buses) cross the river at the Göta Älv bridge.					x			
Mannheim	BASF , one of the biggest chemical producing companies of the world, is located on the western riverbank of the Rhine in Ludwigshafen. However, it has also a plant on the eastern side of the river, next to the port area of Mannheim. To reduce their transport to the port by trucks crossing the Rhine via the current bridges, they thought about an innovative transport solution: connecting their plants by a cable car .					x			

D2.2 – Overview of solutions and their (potential) impact

Genova	GATE is a project aiming to realize the intermodal connection from the international airport “Cristoforo Colombo”, located in the west side of the city of Genova, to train and public transport networks.						x		
Antwerp	Ringland The city of is also an urban node at the TEN-T network and is confronted with important and increasing road transport, linked to this function. An initial idea was to complete the ring with new and classical road infrastructure. The projects became legally and politically blocked due to well organized citizens’ protest. A solution was found through the appointment of an independent expert (the ‘intendant’) who managed to bring parties together and devise solutions.							x	
Vienna	From a spatial planning perspective the city, together with other stakeholders, thought about the claim of space this good handling would need, already in an earlier phase. In the ‘ Productive City ’ (Produktieve Stadt), started in November 2017, the city is prominently mentioning the big need for space to handle goods.							x	
Mannheim	In the surrounding of Mannheim different US Army areas are located. Mannheim has different plans for these areas. For the Benjamin Franklin area a housing area is foreseen. It is called the ‘ Blue Village Franklin ’ and forms a ‘model project’ for sustainable spatial planning and mobility.							x	
Rotterdam	Waal Eemhaven The municipality of Rotterdam together with the Port of Rotterdam (port authority) wish to develop the Waal-Eemhaven in Rotterdam from a deep sea terminal to a short-sea container terminal with a higher amount of freight transport via road.							x	

D2.2 – Overview of solutions and their (potential) impact

Norrköping	Harbor Island The development in the Swedish city of Norrköping (130.000 inhabitants) might be inspiring. The city is situated 165 km southwest of Stockholm and is transforming fast due to the building of a new high-speed rail line linking the Swedish capital with Gothenburg and Malmö including a new railway station in Norrköping.							X	
Turku	Over a million squares of new construction, investments of several billions, over 10 000 new jobs and apartments for 20 000 new Turku residents with one hour distance away from the capital region. The Turku Science Park spearhead project is an important component in developing the appeal and competitiveness of Turku. The One Hour Train initiative will connect the area also with the capital region's commuter belt in the future.							X	
Turku	Northern Growth Zone Facilitating collaboration between the state and 14 municipalities and 6 regional councils, the Northern Growth Zone provides a semi-polycentric platform with 5 sub-regions, bringing together an economic area of 333 billion euros. Dealing with challenges on the (Northern) Scandinavian-Mediterranean TEN-T core network Corridor in South West Finland and connections to Stockholm in the West, Tallinn in the South and St. Petersburg in the East.								X
Genova	The ports of Genova and Savona are working together and this is not due only to the recent fusion between the two Port Authorities, but there are many common intents.								X
Rotterdam	Since 2014 Rotterdam uses a ' Living Lab ' approach in city logistics in which the city works together with partners on technical, logistic, behavioral, law, policy and communication aspects.								X

D2.2 – Overview of solutions and their (potential) impact

Rotterdam	Utilization of road network Rotterdam The Bereik! organization is a cooperation of national, regional and local infrastructure authorities whose main work is to develop a network wide traffic management strategy.								x	
Gothenborg	The West Sweden Agreement is of major importance and has enormous impact on the City of Gothenburg. It consists of different public transport plans and the construction of a new bridge (Hisingsbron).								x	
Rotterdam	Focus on urban logistics in relation to emissions The municipality of Rotterdam argues initiatives on logistics in the Maas-city are part of a wider package to form local climate policy and to improve air quality.									x

4.2 Terminals

An important note on adding or optimizing terminals is that the impact on the longer term is depending on the developments. Most practices are focussed on the current network on the three scale levels. However, for a changing practice the discussion should be started: what is the function of a node or functional area on the three scale levels, given the developments? Are the current 88 nodes reflecting these required TEN-T functions or are other areas adding value? Which streams should a terminal facilitate?

“As an example: When connecting the Silk Route via Sofia (BG) to Duisburg (DE), three different TEN-T corridors will be used, passing at least 12 urban nodes. Should we think on an ‘overarching’ corridor level to better facilitate the Silk Route? Besides, which of these 12 urban nodes might play a keyrole in this global link? The risk of suboptimal or individual projects should be avoided.”

4.3 Solutions with (potential) impact: main category optimizing terminals

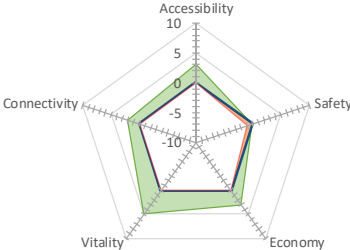
This section presents solutions and their (potential) impact on the principle of optimizing terminals.

4.3.1 ELP project, 'Espace Logistique Proximité' (Strasbourg)

Solutions name	ELP project, 'Espace Logistique Proximité'.																																																				
Type of solution	Optimize terminal																																																				
Node	Strasbourg																																																				
Link or contact	n.a.																																																				
Investment costs	n.a.																																																				
Description	<p>A private initiative that will start in October 2018: the ELP project, 'Espace Logistique Proximité'. Four light vehicles will cover the Strasbourg region and the initiative is hosted in a space in the rue des Orphelins in Strasbourg city center, as a micro hub. A cargo bike will be used to carry goods up to 400 kg, with electric assistance and including a coolbox to carry cooled goods. Overall, this initiative is expected to offer a sustainable alternative for 40-45 classical trucks per day in the city center. Besides the new service will offer a flow optimization and new services to shops and inhabitants of Strasbourg (delivery at home). Strasbourg joins some other French cities (as Bordeaux, Nantes and Rennes) where this initiative already functions.</p> <p>Cohabitation of cargobikes and pedestrians will be guaranteed as cargobike drivers need to sign a specific paper on respecting safety and security in the streets. When successful, no big hubs will be introduced but several more small (micro) hubs might be opened. However it is not easy to find additional micro hubs, and in the continuation this might be needed to become agile. For cargobike drivers the incentive is "the more you deliver, the more you get payed".</p>																																																				
Impact overview																																																					
Impact criteria	<table> <thead> <tr> <th>Questions</th><th>Answer</th></tr> </thead> <tbody> <tr> <td>The solution impacts the chosen modality of the flows</td><td>2</td></tr> <tr> <td>The solution impacts the route of the flows</td><td>1</td></tr> <tr> <td>The solution impacts the volume of the flows</td><td>0</td></tr> <tr> <td>The solution impacts the timing of the flows</td><td>0</td></tr> <tr> <td>The solution impacts the available infrastructure capacity</td><td>1</td></tr> <tr> <td>The solution impacts the number of pedestrian casualties</td><td>0</td></tr> <tr> <td>The solution impacts the number of cyclist casualties</td><td>0</td></tr> <tr> <td>The solution impacts the number of motorised vehicle casualties</td><td>0</td></tr> <tr> <td>The solution impacts the external safety of dangerous goods transport</td><td>0</td></tr> <tr> <td>The solution impacts the external safety of warehousing operations</td><td>0</td></tr> <tr> <td>The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capturing)</td><td>0</td></tr> <tr> <td>The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investments (value capturing)</td><td>1</td></tr> <tr> <td>The solution impacts the price of living in urban areas (socio economic)</td><td>0</td></tr> <tr> <td>The solution impacts synergies with other sectors</td><td>0</td></tr> <tr> <td>The solution impacts the GDP</td><td>0</td></tr> <tr> <td>The solution impacts the air quality</td><td>1</td></tr> <tr> <td>The solution impacts the noise levels</td><td>-1</td></tr> <tr> <td>The solution impacts health of citizens</td><td>1</td></tr> <tr> <td>The solution impacts the ease of moving in the city for citizens</td><td>0</td></tr> <tr> <td>The solution impacts the quality of living</td><td>1</td></tr> <tr> <td>The solution impacts the connection between the city and the functional urban area from a mobility perspective</td><td>1</td></tr> <tr> <td>The solution impacts the connection between the city and the functional area from a logistics perspective</td><td>1</td></tr> <tr> <td>The solution impacts the connection with other Nodes on the Corridor</td><td>0</td></tr> <tr> <td>The solution impacts the connection with other TEN-T Corridors</td><td>0</td></tr> <tr> <td>The solution impacts the connection with the comprehensive network</td><td>0</td></tr> </tbody> </table>	Questions	Answer	The solution impacts the chosen modality of the flows	2	The solution impacts the route of the flows	1	The solution impacts the volume of the flows	0	The solution impacts the timing of the flows	0	The solution impacts the available infrastructure capacity	1	The solution impacts the number of pedestrian casualties	0	The solution impacts the number of cyclist casualties	0	The solution impacts the number of motorised vehicle casualties	0	The solution impacts the external safety of dangerous goods transport	0	The solution impacts the external safety of warehousing operations	0	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capturing)	0	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investments (value capturing)	1	The solution impacts the price of living in urban areas (socio economic)	0	The solution impacts synergies with other sectors	0	The solution impacts the GDP	0	The solution impacts the air quality	1	The solution impacts the noise levels	-1	The solution impacts health of citizens	1	The solution impacts the ease of moving in the city for citizens	0	The solution impacts the quality of living	1	The solution impacts the connection between the city and the functional urban area from a mobility perspective	1	The solution impacts the connection between the city and the functional area from a logistics perspective	1	The solution impacts the connection with other Nodes on the Corridor	0	The solution impacts the connection with other TEN-T Corridors	0	The solution impacts the connection with the comprehensive network	0
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The solution impacts the connection with the comprehensive network	0																																																				

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

4.3.2 Micro hub (Gothenburg)

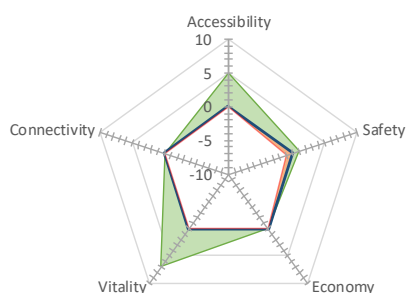
Solutions name	Micro hub last mile deliveries
Type of solution	Optimizing a terminal
Node	Gothenborg
Link or contact	n.a.
Investment costs	n.a.
Description	A good practice of a parcel collection point is the ElectriCity project in Gothenburg. At the end/starting stop of the bus route 55 in the port area of Gothenburg a parcel collection point is realised. This is a solution for the last-mile transport of parcels since commuters (for example port employees) can pick up their parcels on a central point along their route and take the bus, reducing the amount of trips for parcel delivery in the city. The Volvo Group takes part of the ElectriCity partnership. This partnership consists of partners from the industry, academia and society. It is about developing and testing solutions that will open new opportunities for public transport and urban development in the future. ElectriCity uses electric buses to develop solutions for attractive public transport and urban development. One of the projects is route 55 in Gothenburg. On this route the vehicles used are electric hybrid buses supplied by Volvo. On this route the buses are more comfortable for travellers. Besides, five bus stops are modified. On this stops more comfort is created by using innovative technology, for example screens with live information and a sheltered stop is built against the weather conditions using new noise insulation technology to test. Also the final stop is an indoor stop in an annex to an existing building including a café and a parcel collection point.
Impact overview	

Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	1
	The solution impacts the route of the flows	0
	The solution impacts the volume of the flows	1
	The solution impacts the timing of the flows	0
	The solution impacts the available infrastructure capacity	1
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	0
	The solution impacts the number of motorised vehicle casualties	-1
	The solution impacts the external safety of dangerous goods transport	0
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value captur	1
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investmen	1
	The solution impacts the price of living in urban areas (socio economic)	0
	The solution impacts synergies with other sectors	1
	The solution impacts the GDP	0
D Vitality	The solution impacts the air quality	1
	The solution impacts the noise levels	1
	The solution impacts health of citizens	0
	The solution impacts the ease of moving in the city for citizens	1
	The solution impacts the quality of living	2
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility p	1
	The solution impacts the connection between the city and the functional area from a logistics perspec	1
	The solution impacts the connection with other Nodes on the Corridor	0
	The solution impacts the connection with other TEN-T Corridors	0
	The solution impacts the connection with the comprehensive network	0

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

D2.2 – Overview of solutions and their (potential) impact

4.3.3 Micro consolidation centre (Budapest)

Solutions name	Micro consolidation centres (Low-emission last mile delivery)	
Type of solution	Optimizing a terminal	
Node example	Budapest	
Link or contact	Dipl.-Ing. KILIÁN, Zsolt // zsolt.kilian@gmail.com // +36 30 348 6266	
Investment costs	Investment costs: less than 50k / yearly revenues between 20-30k / financially sustainable (creates profit)	
Description	Last mile delivery solution that shifts the parcels from diesel vans to cargo bicycles, tricycles & electric vehicles. In order to keep the distance minimal there must have been a 'Micro Consolidation Centre' opened close to the historical city centre. All parcels are transported from the main HUB to the MCC early morning before rush hour, therefore it can be said that we could eliminate a tiny piece of traffic on a critical section of the network.	
Impact overview	 <p>The radar chart displays the impact of the solution across five categories. The scale ranges from -10 to 10. Accessibility, Safety, and Vitality show positive impacts (green area), while Economy and Connectivity show negative impacts (red area).</p>	
Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	1
	The solution impacts the route of the flows	1
	The solution impacts the volume of the flows	1
	The solution impacts the timing of the flows	1
	The solution impacts the available infrastructure capacity	1
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	-1
	The solution impacts the number of motorised vehicle casualties	1
	The solution impacts the external safety of dangerous goods transport	0
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capture)	0
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment	0
	The solution impacts the price of living in urban areas (socio economic)	0
	The solution impacts synergies with other sectors	0
	The solution impacts the GDP	0
D Vitality	The solution impacts the air quality	2
	The solution impacts the visual quality of the environment	1
	The solution impacts the level of noise pollution	1
	The solution impacts the ease of moving in the city for citizens	2
	The solution impacts the quality of living	1
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility perspective	0
	The solution impacts the connection between the city and the functional area from a logistics perspective	0
	The solution impacts the connection with other Nodes on the Corridor	0
	The solution impacts the connection with other TEN-T Corridors	0
	The solution impacts the connection with the comprehensive network	0

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

D2.2 – Overview of solutions and their (potential) impact

4.3.4 Micro and midi terminals (Vienna)

Solutions name	Micro and midi hubs last mile deliveries	
Type of solution	Optimizing a terminal	
Node example	Vienna	
Link or contact	n.a.	
Investment costs	n.a.	
Description	Vienna is looking for possibilities to develop micro hubs (100 – 150 m ²) and midi hubs (1,000 m ²) in the city. Perhaps Vienna's main terminals Wien-Süd and Hafen Freudenau offer opportunities for connecting long-distance and last-mile freight logistics. At the moment it is easier to find locations for the smaller micro hubs than for midi hubs, as empty shop space can be transformed into micro hubs. Rail access to midi hubs is much more difficult and expensive to realize so the choice was made for trucks delivery in order to get a realistic business case. Besides, in brownfield development a combination of housing, work and micro/midi hubs will	
Impact overview		
Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	1
	The solution impacts the route of the flows	1
	The solution impacts the volume of the flows	1
	The solution impacts the timing of the flows	2
	The solution impacts the available infrastructure capacity	2
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	0
	The solution impacts the number of motorised vehicle casualties	0
	The solution impacts the external safety of dangerous goods transport	0
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value captur	2
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment:	2
	The solution impacts the price of living in urban areas (socio economic)	1
	The solution impacts synergies with other sectors	1
	The solution impacts the GDP	1
D Vitality	The solution impacts the air quality	2
	The solution impacts the noise levels	2
	The solution impacts health of citizens	2
	The solution impacts the ease of moving in the city for citizens	2
	The solution impacts the quality of living	2
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility p	1
	The solution impacts the connection between the city and the functional area from a logistics perspec	1
	The solution impacts the connection with other Nodes on the Corridor	0
	The solution impacts the connection with other TEN-T Corridors	0
	The solution impacts the connection with the comprehensive network	0

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

4.4 Solutions and their (potential) impact: main category adding terminals

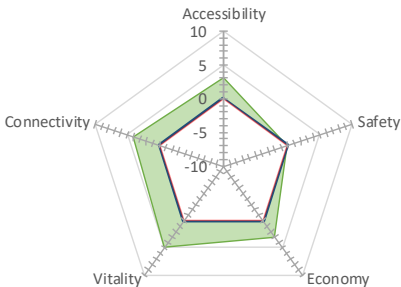
This section presents solutions and their (potential) impact on the principle of adding terminals.

4.4.1 Wien Süd Cargo terminal (Vienna)

Solutions name	Wien Süd Cargo terminal																																																														
Type of solution	Adding a terminal																																																														
Node example	Vienna																																																														
Link or contact	http://www.intermodal-terminals.eu/database/terminal/view/id/362																																																														
Investment costs	n.a.																																																														
Description	Considering the concentration of intermodal goods traffic in and around Vienna a multifunctional cargo terminal, the RRT Wien Süd, has been built at the southern city border of Vienna - at the interface of a rail line and the S1 highway. The cargo center is jointly developed by Vienna, Lower Austria and the Chamber of Commerce. The RRT Wien Süd serves as a major freight hub in the region. The terminal's capacity might experience a further stage of expansion in a second step.																																																														
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The solution impacts the connection with other Nodes on the Corridor	0																																																														
The solution impacts the connection with other TEN-T Corridors	0																																																														
The solution impacts the connection with the comprehensive network	0																																																														

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

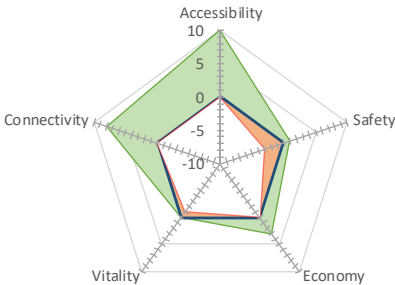
4.4.2 Micro hub green logistics park (Mannheim)

Solutions name	Green Logistics Park	
Type of solution	Adding a terminal	
Node	Mannheim	
Link or contact	n.a.	
Investment costs	n.a.	
Description	The concept of the logistic park is to create a terminal system to consolidate all goods at one point. The size of the terminal depends on the number of companies and numbers of goods and is flexible. In the surrounding of Mannheim there are some US military bases that could be used for such developments. One of these bases (Coleman barracks) is located around the A6 in the north of Mannheim, close to the A67. Via road goods can be transported to the terminal with the current large trucks, which forms a transshipment location to factories and costumers in Mannheim. Shipping the goods to the factories is planned to be done by a combined (electric) shuttle in the future. In this way the number of (large) trucks crossing the city will be reduced. Besides, the exhaust of emission will be reduced as electric trucks/shuttles will connect the city centre and factories with the logistic-hub. Although the concept is good, the intended location is not available (yet).	
Impact overview		
Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	1
	The solution impacts the route of the flows	1
	The solution impacts the volume of the flows	0
	The solution impacts the timing of the flows	0
	The solution impacts the available infrastructure capacity	1
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	0
	The solution impacts the number of motorised vehicle casualties	0
	The solution impacts the external safety of dangerous goods transport	0
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capture)	1
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment	1
	The solution impacts the price of living in urban areas (socio economic)	0
	The solution impacts synergies with other sectors	1
	The solution impacts the GDP	0
D Vitality	The solution impacts the air quality	1
	The solution impacts the noise levels	1
	The solution impacts health of citizens	1
	The solution impacts the ease of moving in the city for citizens	1
	The solution impacts the quality of living	1
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility perspective	1
	The solution impacts the connection between the city and the functional area from a logistics perspective	1
	The solution impacts the connection with other Nodes on the Corridor	0
	The solution impacts the connection with other TEN-T Corridors	1
	The solution impacts the connection with the comprehensive network	1

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

D2.2 – Overview of solutions and their (potential) impact

4.4.3 Port de Lauterbourg (Strasbourg)

Solutions name	Port de Lauterbourg - R3FLEX by Port of Strasbourg	
Type of solution	adding a terminal	
Node	Strasbourg	
Link or contact	https://ec.europa.eu/inea/en/connecting-europe-facility/cef-transport/2014-fr-tm-0260-w	
Investment costs	n.a.	
Description	The port of Strasbourg is located on the Rhine-Alpine Corridor in France. It is the second French inland waterway port and has 2 major sites: Strasbourg and Lauterbourg. The Action is part of a Global project aiming to further develop nine ports in the Upper Rhine. It is a necessary step for improving the accessibility and the capacity of a multimodal platform at Strasbourg/Lauterbourg port to absorb the expected traffic growth. It is part of a Master plan concerning nine ports on the Upper Rhine. The Action will develop the port of Strasbourg by building a new multimodal terminal in Lauterbourg. The new terminal will provide a trimodal installation with rail tracks, an embankment and materials' handling equipment. The Action will eliminate a bottleneck identified within the port network and contribute to the better performance of the port as gateway of the corridor. It will contribute to the better use of inland navigation as a	
Impact overview		
Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	2
	The solution impacts the route of the flows	2
	The solution impacts the volume of the flows	2
	The solution impacts the timing of the flows	2
	The solution impacts the available infrastructure capacity	2
B Safety	The solution impacts the number of pedestrian casualties	-1
	The solution impacts the number of cyclist casualties	-1
	The solution impacts the number of motorised vehicle casualties	-1
	The solution impacts the external safety of dangerous goods transport	1
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capturing)	1
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investments (va	1
	The solution impacts the price of living in urban areas (socio economic)	0
	The solution impacts synergies with other sectors	0
	The solution impacts the GDP	1
D Vitality	The solution impacts the air quality	0
	The solution impacts the noise levels	0
	The solution impacts health of citizens	-1
	The solution impacts the ease of moving in the city for citizens	0
	The solution impacts the quality of living	0
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility persp	0
	The solution impacts the connection between the city and the functional area from a logistics perspective	2
	The solution impacts the connection with other Nodes on the Corridor	2
	The solution impacts the connection with other TEN-T Corridors	2
	The solution impacts the connection with the comprehensive network	2

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

4.5 Infrastructure

An important note on adding or optimizing infrastructure is that the impact on the longer term is depending on the developments. Most practices are focussed on the current network on the three scale levels. A tangible example is that current asset management is focussed on waterways, or bridges or roads, and national or regional. The changing practice should be cross-asset management. Corridor management with an urban nodes working groups is a good example of the current situation.

Optimizing infra in the means of unbundling transit and other streams as an entry to the city might be a good practice, related to changing functions of terminals in the logistics functional urban areas. This might be a changing practice of last mile.

Where CAAS in Turku is a good first step practice, Nodes as a service might be a next step.



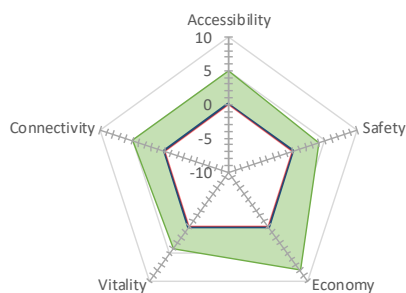
4.6 Solutions and their (potential) impact: main category optimizing infrastructure

This paragraph presents solutions and their (potential) impact on the principle of optimizing infrastructure. Examples include overcoming physical obstacles, use of networks for freight transport in peak-off hours and dedicated lanes (separating freight and cargo transport within existing infrastructure). The case of Turku also shows that the concept of CaaS might optimize infrastructure by adding services.



D2.2 – Overview of solutions and their (potential) impact

4.6.1 CaaS – Corridor as a Service (Turku)

Solutions name	CaaS - Corridor as a Service	
Type of solution	Optimizing infrastructure	
Node example	Turku	
Link or contact	Marjo Uotila http://erticonetwork.com/corridor-as-a-service-is-about-smart-logistics/	
Investment costs	n.a.	
Description	<p>The aim of Corridor as a Service is to achieve more efficient and safer logistics. That may be reached through digital services and digitalization of the logistics chain, multimodal goods transport and new innovations in the vehicle or at infrastructure focusing on how to serve international logistics more effectively. These new value adding services may improve logistics especially from a Scandinavian point of view, but also international commerce in the larger scale. While CaaS development is driven by companies, the public sector enables the development. For customers CaaS aims to provide new value adding logistics services, which will improve the efficiency and productivity of the services. These services focus on transparency and tracking of logistics chains, privilege driving in certain points such as customs and safety and security issues of logistic. It is being estimated that CaaS may bring at least 10 % productivity improvements and significant fuel savings. In the future, CaaS services will be additionally with the artificial intelligence capabilities.</p>	
Impact overview		
Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	1
	The solution impacts the route of the flows	1
	The solution impacts the volume of the flows	1
	The solution impacts the timing of the flows	1
	The solution impacts the available infrastructure capacity	1
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	0
	The solution impacts the number of motorised vehicle casualties	0
	The solution impacts the external safety of dangerous goods transport	2
	The solution impacts the external safety of warehousing operations	2
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value captur	2
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investmen	2
	The solution impacts the price of living in urban areas (socio economic)	0
	The solution impacts synergies with other sectors	2
	The solution impacts the GDP	2
D Vitality	The solution impacts the air quality	1
	The solution impacts the noise levels	1
	The solution impacts health of citizens	1
	The solution impacts the ease of moving in the city for citizens	1
	The solution impacts the quality of living	0
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility p	0
	The solution impacts the connection between the city and the functional area from a logistics perspec	2
	The solution impacts the connection with other Nodes on the Corridor	1
	The solution impacts the connection with other TEN-T Corridors	1
	The solution impacts the connection with the comprehensive network	1

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

D2.2 – Overview of solutions and their (potential) impact

4.6.2 Theemsweg track for railfreight (Rotterdam)

Solutions name	Theemsweg Trace for railfreight		
Type of solution	Optimizing infrastructure		
Node	Rotterdam		
Link or contact	https://www.portofrotterdam.com/en/our-port/port-development/from-calandbrug-to-theemswegtrace		
Investment costs	n.a.		
Description	The Action is part of a Global Project aiming to remove the bottleneck in the rail freight access of main port Rotterdam connecting three core network corridors (Rhine Alpine, North Sea-Mediterranean and North Sea-Baltic), by upgrading the infrastructural node at Caland Bridge and rerouting rail freight transport via an alternative route: The Theemsweg railway section. The Action's main objective is to carry out the civil infrastructure works to create the alternative route to avoid the Caland Bridge, consisting of the double track Theemsweg railway section of an approximate length of 4.5 km.		
Impact overview			
Impact criteria	Questions	Answer	
A Accessibility	The solution impacts the chosen modality of the flows	1	
	The solution impacts the route of the flows	1	
	The solution impacts the volume of the flows	1	
	The solution impacts the timing of the flows	1	
	The solution impacts the available infrastructure capacity	1	
B Safety	The solution impacts the number of pedestrian casualties	0	
	The solution impacts the number of cyclist casualties	0	
	The solution impacts the number of motorised vehicle casualties	0	
	The solution impacts the external safety of dangerous goods transport	0	
	The solution impacts the external safety of warehousing operations	0	
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capture)	0	
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment	0	
	The solution impacts the price of living in urban areas (socio economic)	0	
	The solution impacts synergies with other sectors	0	
	The solution impacts the GDP	0	
D Vitality	The solution impacts the air quality	1	
	The solution impacts the noise levels	-1	
	The solution impacts health of citizens	0	
	The solution impacts the ease of moving in the city for citizens	1	
	The solution impacts the quality of living	0	
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility perspective	0	
	The solution impacts the connection between the city and the functional area from a logistics perspective	2	
	The solution impacts the connection with other Nodes on the Corridor	2	
	The solution impacts the connection with other TEN-T Corridors	2	
	The solution impacts the connection with the comprehensive network	2	

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

D2.2 – Overview of solutions and their (potential) impact

4.6.3 BASF factory Logistics (Mannheim)

Solutions name	BASF factory logistics around Ludwigshafen/Mannheim	
Type of solution	Optimizing infrastructure	
Node	Mannheim	
Link or contact	https://www.basf.com/de/de/company/about-us/sites/ludwigshafen/the-site/news-and-media/news-releases/2017/05/p-17-183	
Investment costs	n.a.	
Description	BASF operates a major site in Ludwigshafen (adjacent Mannheim). This facility generates major economic spinoff for the wider region but also major traffic flows. Although already 70% of all volumes on the Ludwigshafen site is transported via Rail and IWT further improvements are made by BASF. Currently 2100 trucks visit the factory site each day. Both night deliveries from a consolidation hub to the factory site are researched as well as improvements on site. Among the major innovations is a special BASF intermodal tankcontainer BT-C with a 66 tonnes capacity to replace the current tank cars and special AGV's to more efficiently transport these containers within the factory.	
Impact overview		
Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	2
	The solution impacts the route of the flows	2
	The solution impacts the volume of the flows	2
	The solution impacts the timing of the flows	2
	The solution impacts the available infrastructure capacity	2
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	0
	The solution impacts the number of motorised vehicle casualties	0
	The solution impacts the external safety of dangerous goods transport	2
	The solution impacts the external safety of warehousing operations	1
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capture)	0
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment	0
	The solution impacts the price of living in urban areas (socio economic)	0
	The solution impacts synergies with other sectors	1
	The solution impacts the GDP	1
D Vitality	The solution impacts the air quality	0
	The solution impacts the noise levels	0
	The solution impacts health of citizens	1
	The solution impacts the ease of moving in the city for citizens	1
	The solution impacts the quality of living	0
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility perspective	0
	The solution impacts the connection between the city and the functional area from a logistics perspective	2
	The solution impacts the connection with other Nodes on the Corridor	2
	The solution impacts the connection with other TEN-T Corridors	2
	The solution impacts the connection with the comprehensive network	2

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

4.7 Solutions and their (potential) impact: main category adding infrastructure

This paragraph presents solutions and their (potential) impact on the principle of adding infrastructure.

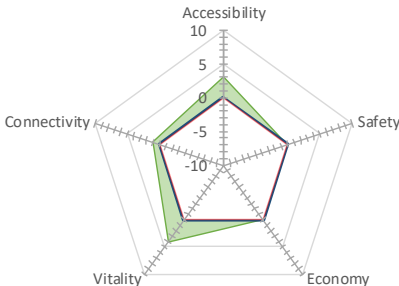


4.7.1 Erasmus Bridge (Rotterdam)

Solutions name	Building of the Erasmus Bridge	
Type of solution	Adding infrastructure	
Node	Rotterdam	
Link or contact	igor.heller@rws.nl	
Investment costs	165 Mil. EUR	
Description	<p>The Erasmus bridge was built as a new connection between the Rotterdam city centre and the Kop van Zuid area south of the river. The bridge was part of the large scale restructuring of older harbour areas no longer used as a harbour into a high density urban area. The bridge can be used by cars, trams, cyclists and pedestrians. The bridge does not have a very high flow of traffic (the underground Metro opened in 1968 on the same place is used by about half of the people crossing the river), but in a very short time it has become the main landmark of the city of Rotterdam, known all over the world. It changed the image of Rotterdam from an old industrial (and dirty) harbour into a modern attractive Western city. How much investments in the city this image generated cannot be said, but it will be a very large amount.</p>	
Impact overview		
Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	0
	The solution impacts the route of the flows	1
	The solution impacts the volume of the flows	0
	The solution impacts the timing of the flows	0
	The solution impacts the available infrastructure capacity	1
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	0
	The solution impacts the number of motorised vehicle casualties	0
	The solution impacts the external safety of dangerous goods transport	0
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capture)	1
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment	1
	The solution impacts the price of living in urban areas (socio economic)	1
	The solution impacts synergies with other sectors	1
	The solution impacts the GDP	0
D Vitality	The solution impacts the air quality	-1
	The solution impacts the noise levels	-1
	The solution impacts health of citizens	0
	The solution impacts the ease of moving in the city for citizens	2
	The solution impacts the quality of living	1
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility perspective	1
	The solution impacts the connection between the city and the functional area from a logistics perspective	1
	The solution impacts the connection with other Nodes on the Corridor	0
	The solution impacts the connection with other TEN-T Corridors	0
	The solution impacts the connection with the comprehensive network	1

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

4.7.2 Bicycle highway (Mannheim)

Solutions name	Bicycle highway	
Type of solution	Adding infrastructure	
Node	Mannheim	
Link or contact	n.a.	
Investment costs	n.a.	
Description	A solution to improve air quality and connectivity and to contribute to the capacity problems on the roads and in the public transport, is the plan for a bicycle highway between Mannheim and Heidelberg. This highway will be one of the first ones for bicycles in Baden-Württemberg. In the core area of the Rhein-Neckar region it is a major challenge for the infrastructure to transport all commuters. The aim of the bicycle highway is to reduce the traffic intensity on the main transport routes. It is seen as an innovative traffic concept. Identical to this idea is the already existing bicycle highway between Arnhem and Nijmegen in the Netherlands. Aim of this highway was also to give a fast, healthy, alternative to connecting in the traffic jams.	
Impact overview		
Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	1
	The solution impacts the route of the flows	0
	The solution impacts the volume of the flows	1
	The solution impacts the timing of the flows	0
	The solution impacts the available infrastructure capacity	1
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	0
	The solution impacts the number of motorised vehicle casualties	0
	The solution impacts the external safety of dangerous goods transport	0
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value captur	0
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment:	0
	The solution impacts the price of living in urban areas (socio economic)	0
	The solution impacts synergies with other sectors	0
	The solution impacts the GDP	0
D Vitality	The solution impacts the air quality	1
	The solution impacts the noise levels	0
	The solution impacts health of citizens	1
	The solution impacts the ease of moving in the city for citizens	1
	The solution impacts the quality of living	1
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility p	1
	The solution impacts the connection between the city and the functional area from a logistics perspec	0
	The solution impacts the connection with other Nodes on the Corridor	0
	The solution impacts the connection with other TEN-T Corridors	0
	The solution impacts the connection with the comprehensive network	0

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

D2.2 – Overview of solutions and their (potential) impact

4.7.3 Railway Track (Strasbourg)

Solutions name	Additional Railway Track North of Strasbourg		
Type of solution	adding infrastructure		
Node	Strasbourg		
Link or contact	https://www.sncf-reseau.fr/fr/projets-chantiers-ferroviaires/modernisation/creation-dune-4eme-voie-entre-strasbourg-et-vendenheim		
Investment costs	n.a.		
Description	The Strasbourg node, more particularly the Strasbourg-Vendenheim section, is the most frequented in Alsace. No further development of regional, high speed and freight trains will be possible as from 2017 and in 2020-2025 the line will be saturated. The Action aims to remove a major bottleneck at this section and to improve the capacity of the node by guaranteeing its reliability for high speed, regional and freight traffic. The Action is part of the Global Project to improve passenger and freight traffic along the North Sea-Mediterranean, Atlantic and Rhine-Danube Core Network Corridors.		
Impact overview			
Impact criteria	Questions	Answer	
A Accessibility	The solution impacts the chosen modality of the flows	1	
	The solution impacts the route of the flows	1	
	The solution impacts the volume of the flows	1	
	The solution impacts the timing of the flows	2	
	The solution impacts the available infrastructure capacity	2	
B Safety	The solution impacts the number of pedestrian casualties	0	
	The solution impacts the number of cyclist casualties	0	
	The solution impacts the number of motorised vehicle casualties	0	
	The solution impacts the external safety of dangerous goods transport	1	
	The solution impacts the external safety of warehousing operations	0	
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capturing)	1	
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investments (value capturing)	1	
	The solution impacts the price of living in urban areas (socio economic)	1	
	The solution impacts synergies with other sectors	1	
	The solution impacts the GDP	1	
D Vitality	The solution impacts the air quality	1	
	The solution impacts the noise levels	0	
	The solution impacts health of citizens	0	
	The solution impacts the ease of moving in the city for citizens	0	
	The solution impacts the quality of living	-1	
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility perspective	0	
	The solution impacts the connection between the city and the functional area from a logistics perspective	2	
	The solution impacts the connection with other Nodes on the Corridor	1	
	The solution impacts the connection with other TEN-T Corridors	1	
	The solution impacts the connection with the comprehensive network	1	

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

4.8 Modes

An important note on adding or optimizing modes is that the impact on the longer term is depending on the developments. Huge developments are synchro modality in relation to digitization. In logistics there is a supply chain driven modal shift. Meaning that these chains should be understood, but also might change fast. Developments are platforms for the use of modes (e.g. intermodal links) but also platforms within modes (e.g. SIMPLE). These synchro modality / supply chain driven modal shift might have huge impacts on the robustness of networks.

For the addition of innovative modes, such as cable car or hyperloop, the technology road map and business model is unclear. This means that it is uncertain if these kind of solutions might be marked as good practices for the future. It is evident that implementing innovations on huge scale makes chaos to the existing systems.

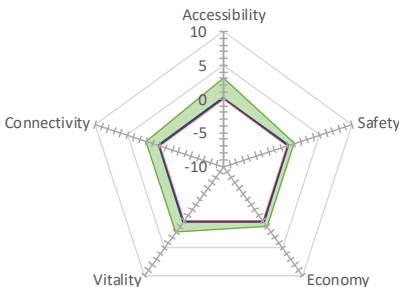
In addition to corridors as a service, we might think of nodes as a service of functional areas as a service.

4.9 Solutions and their (potential) impact: main category optimizing a mode

This paragraph presents solutions and their (potential) impact on the principle of optimizing a mode.



4.9.1 Ferrobonus (Genova)

Solutions name	Ferrobonus
Type of solution	Optimizing a mode
Node	Genova
Link or contact	https://www.onthemosway.eu/wp-content/uploads/2015/09/PRESENTATION-6-The-Ecobonus-and-Ferrobonus-Experiences-and-their-contribution-to-the-TEN-T-Networks.pdf
Investment costs	n.a.
Description	<p>Ferrobonus (modal shift incentive stimulation) is the incentive provided by the Government, by Stability Law for the 2016-2018 three-year period to support combined transport and trans-shipment on rail.</p> <p>The aim of this instrument is to shift the traffic of goods from the road to the rail network through an incentive for the use of intermodal transport and trans-shipment transport to and from Italian logistics hubs and freight villages.</p> <p>The beneficiaries of the incentive are users of intermodal and / or trans-shipment railway transport services and combined transport operators (MTOs) who commission complete trains to railway companies and undertake to maintain train traffic volumes in terms of train*kilometer and increase them during the incentive period.</p> <p>Ferrobonus provides for the provision of a fairly modest contribution calculated on the basis of "train-kilometer": to make this measure more attractive, the three Northwest Regions (Piedmont, Lombardy e Liguria) are jointly evaluating the adoption of an additional contribution, a sort of regional Ferrobonus, to be calculated on the portion of the route that interests the three regions, which aims to enhance the use of railways for the exchange of goods between the Ligurian ports and the Piedmontese and</p>
Impact overview	

Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	1
	The solution impacts the route of the flows	1
	The solution impacts the volume of the flows	0
	The solution impacts the timing of the flows	0
	The solution impacts the available infrastructure capacity	1
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	0
	The solution impacts the number of motorised vehicle casualties	0
	The solution impacts the external safety of dangerous goods transport	1
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value captured)	0
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment	1
	The solution impacts the price of living in urban areas (socio economic)	0
	The solution impacts synergies with other sectors	0
	The solution impacts the GDP	0
D Vitality	The solution impacts the air quality	1
	The solution impacts the visual quality of the environment	0
	The solution impacts the level of noise pollution	0
	The solution impacts the ease of moving in the city for citizens	0
	The solution impacts the quality of living	1
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility perspective	0
	The solution impacts the connection between the city and the functional area from a logistics perspective	1
	The solution impacts the connection with other Nodes on the Corridor	0
	The solution impacts the connection with other TEN-T Corridors	0
	The solution impacts the connection with the comprehensive network	1

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

4.10 Solutions and their (potential) impact: main category adding a mode

This paragraph presents solutions and their (potential) impact on the principle of adding a mode.



D2.2 – Overview of solutions and their (potential) impact

4.10.1 Railport Scandinavia (Gothenburg)

Solutions name	Railport Scandinavia: Short distance intermodal shuttles	
Type of solution	Adding a mode	
Node	Gothenburg	
Link or contact	https://www.portofgothenburg.com/transport/railway/	
Investment costs	n.a	
Description	Using freight rail shuttles to/from the Port of Gothenburg to/from the hinterland is another good practice from the port. Although the conventional wisdom of rail shuttles is they should operate on distances larger than 500 km, they are of poor quality and have high lead times, the Railport Scandinavia proves the opposite. Railport operates on distances smaller than 150 km, is of high quality, punctual and prevents congestion to occur. Investments on the rail track in time to secure the capacity will help to improve the transport of freight by rail. The critical success factors for Railport Scandinavia are the collaboration on different scales (aligning long-term plans/strategies on local, regional, national and European level) based on market knowledge and long-term political goals, predictability and intermodality (shipping, rail and trucks). Besides, using rail shuttles reduce the environmental impact in the city of Gothenburg. Collaboration and alignment on different institutional scales is important.	
Impact overview		
Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	2
	The solution impacts the route of the flows	1
	The solution impacts the volume of the flows	1
	The solution impacts the timing of the flows	2
	The solution impacts the available infrastructure capacity	0
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	0
	The solution impacts the number of motorised vehicle casualties	1
	The solution impacts the external safety of dangerous goods transport	0
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capture)	0
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment	0
	The solution impacts the price of living in urban areas (socio economic)	0
	The solution impacts synergies with other sectors	0
	The solution impacts the GDP	0
D Vitality	The solution impacts the air quality	1
	The solution impacts the noise levels	0
	The solution impacts health of citizens	0
	The solution impacts the ease of moving in the city for citizens	1
	The solution impacts the quality of living	1
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility perspective	0
	The solution impacts the connection between the city and the functional area from a logistics perspective	2
	The solution impacts the connection with other Nodes on the Corridor	2
	The solution impacts the connection with other TEN-T Corridors	1
	The solution impacts the connection with the comprehensive network	2

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

D2.2 – Overview of solutions and their (potential) impact

4.10.2 Autonomous shipping (Turku)

Solutions name	Autonomous shipping	
Type of solution	Adding a mode	
Node	Turku	
Link or contact		
Investment costs		
Description	<p>In order to stimulate value capturing and attracting a growing amount of high tech companies a R&D test center has been opened by Rolls Royce on 25 January 2018 with state-of-the-art research facilities in Turku. This center aims to develop technologies required to shape the future of an increasingly more autonomous global shipping industry (R&D center for Autonomous Ships). By the opening of this R&D center the innovative focus of the Turku regions is stimulated. Examples of innovations that has been executed already are the two separate cases (1) Pilot area for Smart shipping and (2) Rotor sail technology.</p> <p>Viking Line's flagship cruise liner 'Grace' is the first passenger liner in the world to use the rotor sail technology developed by the Finnish firm NorsePower. Expected to reduce carbon emissions by up to 900 tons per year. Fueled with LNG (liquid natural gas). Also promoting the well-begun of the Sea.</p>	
Impact overview		
Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	0
	The solution impacts the route of the flows	0
	The solution impacts the volume of the flows	0
	The solution impacts the timing of the flows	0
	The solution impacts the available infrastructure capacity	0
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	0
	The solution impacts the number of motorised vehicle casualties	0
	The solution impacts the external safety of dangerous goods transport	0
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value captur	2
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investmen	2
	The solution impacts the price of living in urban areas (socio economic)	1
	The solution impacts synergies with other sectors	2
	The solution impacts the GDP	1
D Vitality	The solution impacts the air quality	1
	The solution impacts the noise levels	1
	The solution impacts health of citizens	0
	The solution impacts the ease of moving in the city for citizens	0
	The solution impacts the quality of living	1
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility p	0
	The solution impacts the connection between the city and the functional area from a logistics perspec	0
	The solution impacts the connection with other Nodes on the Corridor	0
	The solution impacts the connection with other TEN-T Corridors	0
	The solution impacts the connection with the comprehensive network	0

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

D2.2 – Overview of solutions and their (potential) impact

4.10.3 Cable car (Gothenburg)

Solutions name	Cable car
Type of solution	Adding a mode
Node	Gothenborg
Description	An example of a successful project framing of this relation linking city, region, national and EU level is the planned Gondola Project covering the construction of a cable car in the city of Gothenburg crossing the Göta älv river. The current public transport system is very radial, like spokes in a wheel passing one narrow hub in the centre near the central station. To connect the northern and southern part of the city, separated by the crossing Göta älv river, all public transport (trams, buses) cross the river at the Göta Älv bridge. To get a better and faster connection, without creating new barriers between the northern and southern part as higher bridges for shipping do, the cable car is developed. This cable car connects Järntorget on the southern river bank with Lindholmen, Västra Ramberget and Wieseigrensplatsen on the northern part. The new cable car will be fully integrated in Gothenburg's public transport system and thereby unburden the hub. It will connect the northern and southern part of the city, overcome the river barrier, and giving more and faster options to travel by public transport. Public transport may become more attractive for commuters compared by using roads, having also impact on the road use. So this project will achieve several local, regional, national and EU targets and applied for funding from the CEF Blending Call.
Impact overview	<p>The radar chart displays the impact scores for the Cable car solution across five criteria. The scale ranges from -10 to 10. The scores are: Accessibility (1), Safety (0), Economy (1), Vitality (1), and Connectivity (0). The chart is a five-pointed star with a green fill and a purple outline.</p>

Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	1
	The solution impacts the route of the flows	1
	The solution impacts the volume of the flows	1
	The solution impacts the timing of the flows	0
	The solution impacts the available infrastructure capacity	1
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	0
	The solution impacts the number of motorised vehicle casualties	0
	The solution impacts the external safety of dangerous goods transport	0
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value captur	2
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investmen	1
	The solution impacts the price of living in urban areas (socio economic)	1
	The solution impacts synergies with other sectors	1
	The solution impacts the GDP	1
D Vitality	The solution impacts the air quality	2
	The solution impacts the noise levels	0
	The solution impacts health of citizens	1
	The solution impacts the ease of moving in the city for citizens	2
	The solution impacts the quality of living	1
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility p	2
	The solution impacts the connection between the city and the functional area from a logistics perspec	0
	The solution impacts the connection with other Nodes on the Corridor	0
	The solution impacts the connection with other TEN-T Corridors	0
	The solution impacts the connection with the comprehensive network	0

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

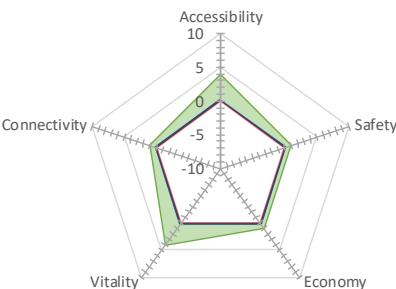
4.10.4 Cable car BASF (Mannheim)

Solutions name	BASF cable car
Type of solution	Adding a mode
Node	Mannheim
Link or contact	
Investment costs	n.a.
Description	BASF, one of the biggest chemical producing companies of the world, is located on the western riverbank of the Rhine in Ludwigshafen. However, it has also a plant on the eastern side of the river, next to the port area of Mannheim. To reduce their transport to the port by trucks crossing the Rhine via the current bridges, they thought about an innovative transport solution: connecting their plants by a cable car. There are some issues for doing this: freight crosses the Rhine while ships are passing through the Rhine, meaning safety related issues. Although they are now looking at other alternatives, the idea of shifting from conventional transports by many trucks to other modes, reducing traffic on roads, is perceived interesting. One of the ideas that was put forward was to build a cable car from the Gartenschau location to the city centre of Mannheim and possibly further crossing
Impact overview	

Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	1
	The solution impacts the route of the flows	1
	The solution impacts the volume of the flows	1
	The solution impacts the timing of the flows	0
	The solution impacts the available infrastructure capacity	1
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	0
	The solution impacts the number of motorised vehicle casualties	0
	The solution impacts the external safety of dangerous goods transport	0
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capture)	1
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment	1
	The solution impacts the price of living in urban areas (socio economic)	0
	The solution impacts synergies with other sectors	0
	The solution impacts the GDP	0
D Vitality	The solution impacts the air quality	2
	The solution impacts the noise levels	0
	The solution impacts health of citizens	1
	The solution impacts the ease of moving in the city for citizens	0
	The solution impacts the quality of living	0
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility perspective	0
	The solution impacts the connection between the city and the functional area from a logistics perspective	2
	The solution impacts the connection with other Nodes on the Corridor	0
	The solution impacts the connection with other TEN-T Corridors	0
	The solution impacts the connection with the comprehensive network	0

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

4.10.5 Cable car Gate project (Genova)

Solutions name	Cable Car (GATE project)
Type of solution	Adding a mode
Node example	Genova
Link or contact	http://www.genovameravigliosa.com/sites/default/files/GATE_.pdf
Investment costs	
Description	<p>GATE is a project aiming to realize the intermodal connection from the international airport “Cristoforo Colombo”, located in the west side of the city of Genova, to train and public transport networks. GATE project consists of two distinct subprojects: the new Erzelli / Airport railway stop, located on the Genova Ventimiglia line between Sestri Ponente and Cornigliano stations, and the plant of a cableway link between the new stop and the airport passenger terminal. The solution chosen by the technicians for the cable-link system is that of a gondola with a capacity of 600 - 700 people per hour. A stop of the cabins at the station is foreseen, to allow easy access to the transport system.</p> <p>A further development of GATE project relates to the prosecution of the cableway to Erzelli area, a hill overlooking the city where an important high-technology park, GREAT CAMPUS, is rapidly growing. Erzelli is located on a hill, physically very close the railway and the airport but difficult to be reached due to size and slope of access roads: the realisation of the cableway seems the best solution to ensure an efficient mass transport system for employees, students and citizens, and at the same time provides a very rapid connection between the Erzelli park and the airport.</p>
Impact overview	

Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	1
	The solution impacts the route of the flows	1
	The solution impacts the volume of the flows	0
	The solution impacts the timing of the flows	1
	The solution impacts the available infrastructure capacity	1
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	0
	The solution impacts the number of motorised vehicle casualties	1
	The solution impacts the external safety of dangerous goods transport	0
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capture)	1
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment	0
	The solution impacts the price of living in urban areas (socio economic)	0
	The solution impacts synergies with other sectors	0
	The solution impacts the GDP	0
D Vitality	The solution impacts the air quality	1
	The solution impacts the visual quality of the environment	0
	The solution impacts the level of noise pollution	1
	The solution impacts the ease of moving in the city for citizens	2
	The solution impacts the quality of living	0
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility perspective	1
	The solution impacts the connection between the city and the functional area from a logistics perspective	0
	The solution impacts the connection with other Nodes on the Corridor	0
	The solution impacts the connection with other TEN-T Corridors	0
	The solution impacts the connection with the comprehensive network	0

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

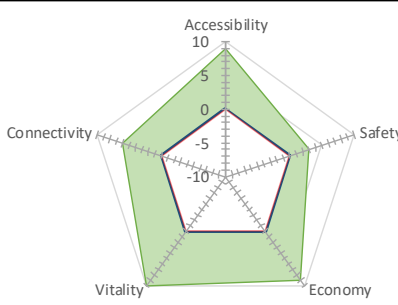
4.11 Solutions and their (potential) impact: main category spatial planning

An important note on spatial planning are the current developments with huge impact, such as XXL warehouses (e.g. Amazone) and logistics sprawl. Regulation or good co-operation on functional urban area level should be a good practice. But also developments or changing practices within Inco terms might be needed, e.g. delivery at terminal for small deliveries.



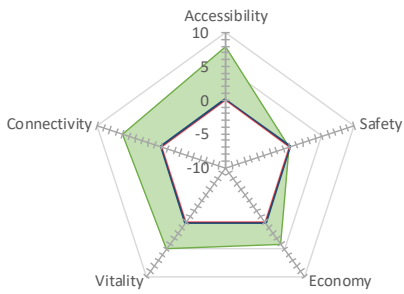
D2.2 – Overview of solutions and their (potential) impact

4.11.1 Ringland (Antwerp)

Solutions name	Ringland		
Type of solution	Spatial planning		
Node example	Antwerp		
Description	<p>A practice in which different scale and governance levels come together is 'Ringland' Antwerp. The city of Antwerp (522,000 inhabitants) is also an urban node at the TEN-T network and is confronted with important and increasing road transport, linked to this function. In order to deal with this increase, the initial idea was to complete the ring with new and classical road infrastructure. Even though all environmental impact assessments procedures were followed, the projects became legally and politically blocked due to important and well organized citizens' protest. A solution was found through the appointment of an independent expert (the 'intendant') who managed to bring parties together and devise solutions. The new projects link the infrastructure needs with spatial planning opportunities with important gains for the quality of life of the inhabitants. Major parts of the ring road will be covered, hereby overcoming the barrier effect of the highway, linking neighborhoods, green areas and creating opportunities for last mile delivery hubs. Important investments in multimodality and separating long and short distance traffic will reduce the overall traffic intensity. Through research by design, exploring land value capturing and multi-level governance the new approach is found to have benefits for the city, the region and its residents.</p>		
Impact overview			
Impact criteria	Questions	Answer	
A Accessibility	The solution impacts the chosen modality of the flows	1	
	The solution impacts the route of the flows	2	
	The solution impacts the volume of the flows	2	
	The solution impacts the timing of the flows	2	
	The solution impacts the available infrastructure capacity	2	
B Safety	The solution impacts the number of pedestrian casualties	1	
	The solution impacts the number of cyclist casualties	1	
	The solution impacts the number of motorised vehicle casualties	1	
	The solution impacts the external safety of dangerous goods transport	0	
	The solution impacts the external safety of warehousing operations	0	
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capture)	2	
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investments	2	
	The solution impacts the price of living in urban areas (socio economic)	1	
	The solution impacts synergies with other sectors	2	
	The solution impacts the GDP	2	
D Vitality	The solution impacts the air quality	2	
	The solution impacts the visual quality of the environment	2	
	The solution impacts the level of noise pollution	2	
	The solution impacts the ease of moving in the city for citizens	2	
	The solution impacts the quality of living	2	
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility perspective	2	
	The solution impacts the connection between the city and the functional area from a logistics perspective	2	
	The solution impacts the connection with other Nodes on the Corridor	1	
	The solution impacts the connection with other TEN-T Corridors	0	
	The solution impacts the connection with the comprehensive network	1	

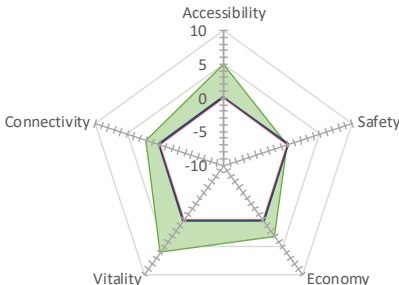
2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

4.11.2 Vienna productive city (Vienna)

Solutions name	Vienna Productive City	
Type of solution	Spatial planning	
Node	Vienna	
Description	<p>From a spatial planning perspective the city, together with other stakeholders, thought about the claim of space this good handling would need, already in an earlier phase. In the 'Productive City' (Produktive Stadt), started in November 2017, the city is prominently mentioning the big need for space to handle goods. This is another initiative of Vienna and Lower Austria combining several other stakeholders at city and regional level. This approach should offer solutions for finding space for 'new' industrial functions in the city of the future. As freight operators and national road and rail operators are not among the stakeholders (yet), the outcomes are expected to stay mostly within the silo of the own planners and business community.</p>	
Impact overview		
Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	2
	The solution impacts the route of the flows	1
	The solution impacts the volume of the flows	2
	The solution impacts the timing of the flows	2
	The solution impacts the available infrastructure capacity	1
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	0
	The solution impacts the number of motorised vehicle casualties	0
	The solution impacts the external safety of dangerous goods transport	0
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value captur	1
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investmen	1
	The solution impacts the price of living in urban areas (socio economic)	0
	The solution impacts synergies with other sectors	1
	The solution impacts the GDP	1
D Vitality	The solution impacts the air quality	1
	The solution impacts the noise levels	1
	The solution impacts health of citizens	1
	The solution impacts the ease of moving in the city for citizens	1
	The solution impacts the quality of living	1
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility p	2
	The solution impacts the connection between the city and the functional area from a logistics perspec	2
	The solution impacts the connection with other Nodes on the Corridor	1
	The solution impacts the connection with other TEN-T Corridors	0
	The solution impacts the connection with the comprehensive network	1

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

4.11.3 Blue Village Franklin (Mannheim)

Solutions name	Spatial concept Blue village Franklin
Type of solution	Spatial planning
Node	Mannheim
Link or contact	n.a.
Investment costs	n.a.
Description	<p>In the surrounding of Mannheim different US Army areas are located. Mannheim has different plans for these areas. For the Benjamin Franklin area a housing area is foreseen. It is called the 'Blue Village Franklin' and forms a 'model project' for sustainable spatial planning and mobility. The area is parallel to the B38, connecting to the highways A6 and A659. For this area spatial planning and mobility go hand in hand. The mobility plan is based on three pillars:</p> <ul style="list-style-type: none">- An access and road network which deals with various mobility modes and treats equal (focus on people);- Well-organized public transport (low-emission);- Additional a sharing system for bicycles and cars, autonomous driving and attractive services. One of these services is the mobility-app to make a multimodal transport approachable. This app shows personal mobility advices and for the inhabitants of this area mobility offers are available. This idea has some concepts of Mobility as a Service.
Impact overview	

Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	1
	The solution impacts the route of the flows	1
	The solution impacts the volume of the flows	1
	The solution impacts the timing of the flows	1
	The solution impacts the available infrastructure capacity	1
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	0
	The solution impacts the number of motorised vehicle casualties	0
	The solution impacts the external safety of dangerous goods transport	0
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value captur	1
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investmen	0
	The solution impacts the price of living in urban areas (socio economic)	0
	The solution impacts synergies with other sectors	2
	The solution impacts the GDP	0
D Vitality	The solution impacts the air quality	1
	The solution impacts the noise levels	1
	The solution impacts health of citizens	1
	The solution impacts the ease of moving in the city for citizens	2
	The solution impacts the quality of living	1
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility p	2
	The solution impacts the connection between the city and the functional area from a logistics perspec	0
	The solution impacts the connection with other Nodes on the Corridor	0
	The solution impacts the connection with other TEN-T Corridors	0
	The solution impacts the connection with the comprehensive network	0

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

D2.2 – Overview of solutions and their (potential) impact

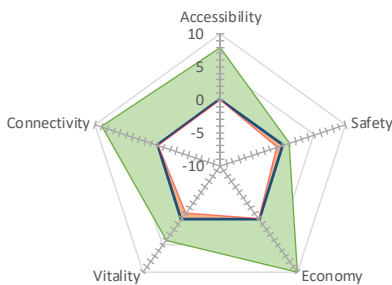
4.11.4 Waal – Eemhaven (Rotterdam)

Solutions name	Waal Eemhaven																																																														
Type of solution	Spatial planning																																																														
Node example	Rotterdam																																																														
Link or contact																																																															
Investment costs																																																															
Description	<p>The municipality of Rotterdam together with the Port of Rotterdam (port authority) wish to develop the Waal-Eemhaven in Rotterdam from a deep sea terminal to a short-sea container terminal with a higher amount of freight transport via road. This development has impact on the freight flows to and from the Rotterdam port area, but also could have mayor impact on the connection with Rotterdam South. Traditionally Rotterdam South has many low educated inhabitants in the neighbourhoods Maashaven and Tarwewijk (directly surrounding the Waal-Eemhaven area). Further development of the port can open up new job opportunities for these inhabitants and a new future via this port area, that is located on short distance from the city centre. The development of the Waal-Eemhaven area to a housing area means that lots of people that are currently working in Waalhaven East and South would need to travel much further to get to their work in the future, which would increase traffic flows. Mixing the functions of the Waal-Eemhaven area is therefore seen as an option in order to stimulate using bike and public transport to travel over shorter distances to work. On the other hand, the development of housing would mean turning down the environmental contour that is labelled to the area. Preserving this environmental contour for possible future developments and need for industrial areas is preserved. For example petrochemical industry and the conservation of this in order to have the port area remain interesting and relevant for the future and of added value for the Netherlands. As there are not so much big industrial areas left with a big environmental contour. The development of the Waal-Eemhaven, although it is still in process, could be seen as an example in which investments in the city take into account liveability, accessibility and safety issues as well as infrastructure, logistic and spatial planning aspects.</p>																																																														
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Impact criteria	<table> <thead> <tr> <th>Questions</th><th>Answer</th></tr> </thead> <tbody> <tr> <td>A Accessibility</td><td></td></tr> <tr> <td>The solution impacts the chosen modality of the flows</td><td>1</td></tr> <tr> <td>The solution impacts the route of the flows</td><td>2</td></tr> <tr> <td>The solution impacts the volume of the flows</td><td>1</td></tr> <tr> <td>The solution impacts the timing of the flows</td><td>1</td></tr> <tr> <td>The solution impacts the available infrastructure capacity</td><td>1</td></tr> <tr> <td>B Safety</td><td></td></tr> <tr> <td>The solution impacts the number of pedestrian casualties</td><td>0</td></tr> <tr> <td>The solution impacts the number of cyclist casualties</td><td>0</td></tr> <tr> <td>The solution impacts the number of motorised vehicle casualties</td><td>0</td></tr> <tr> <td>The solution impacts the external safety of dangerous goods transport</td><td>1</td></tr> <tr> <td>The solution impacts the external safety of warehousing operations</td><td>0</td></tr> <tr> <td>C Economy</td><td></td></tr> <tr> <td>The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capture)</td><td>2</td></tr> <tr> <td>The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment</td><td>2</td></tr> <tr> <td>The solution impacts the price of living in urban areas (socio economic)</td><td>0</td></tr> <tr> <td>The solution impacts synergies with other sectors</td><td>2</td></tr> <tr> <td>The solution impacts the GDP</td><td>2</td></tr> <tr> <td>D Vitality</td><td></td></tr> <tr> <td>The solution impacts the air quality</td><td>-1</td></tr> <tr> <td>The solution impacts the noise levels</td><td>-1</td></tr> <tr> <td>The solution impacts health of citizens</td><td>0</td></tr> <tr> <td>The solution impacts the ease of moving in the city for citizens</td><td>0</td></tr> <tr> <td>The solution impacts the quality of living</td><td>2</td></tr> <tr> <td>E Connectivity</td><td></td></tr> <tr> <td>The solution impacts the connection between the city and the functional urban area from a mobility perspective</td><td>1</td></tr> <tr> <td>The solution impacts the connection between the city and the functional area from a logistics perspective</td><td>1</td></tr> <tr> <td>The solution impacts the connection with other Nodes on the Corridor</td><td>0</td></tr> <tr> <td>The solution impacts the connection with other TEN-T Corridors</td><td>0</td></tr> <tr> <td>The solution impacts the connection with the comprehensive network</td><td>0</td></tr> </tbody> </table>	Questions	Answer	A Accessibility		The solution impacts the chosen modality of the flows	1	The solution impacts the route of the flows	2	The solution impacts the volume of the flows	1	The solution impacts the timing of the flows	1	The solution impacts the available infrastructure capacity	1	B Safety		The solution impacts the number of pedestrian casualties	0	The solution impacts the number of cyclist casualties	0	The solution impacts the number of motorised vehicle casualties	0	The solution impacts the external safety of dangerous goods transport	1	The solution impacts the external safety of warehousing operations	0	C Economy		The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capture)	2	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment	2	The solution impacts the price of living in urban areas (socio economic)	0	The solution impacts synergies with other sectors	2	The solution impacts the GDP	2	D Vitality		The solution impacts the air quality	-1	The solution impacts the noise levels	-1	The solution impacts health of citizens	0	The solution impacts the ease of moving in the city for citizens	0	The solution impacts the quality of living	2	E Connectivity		The solution impacts the connection between the city and the functional urban area from a mobility perspective	1	The solution impacts the connection between the city and the functional area from a logistics perspective	1	The solution impacts the connection with other Nodes on the Corridor	0	The solution impacts the connection with other TEN-T Corridors	0	The solution impacts the connection with the comprehensive network	0
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D Vitality																																																															
The solution impacts the air quality	-1																																																														
The solution impacts the noise levels	-1																																																														
The solution impacts health of citizens	0																																																														
The solution impacts the ease of moving in the city for citizens	0																																																														
The solution impacts the quality of living	2																																																														
E Connectivity																																																															
The solution impacts the connection between the city and the functional urban area from a mobility perspective	1																																																														
The solution impacts the connection between the city and the functional area from a logistics perspective	1																																																														
The solution impacts the connection with other Nodes on the Corridor	0																																																														
The solution impacts the connection with other TEN-T Corridors	0																																																														
The solution impacts the connection with the comprehensive network	0																																																														

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

D2.2 – Overview of solutions and their (potential) impact

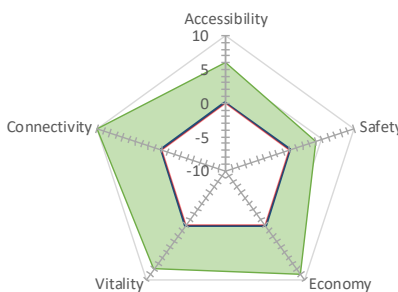
4.11.5 Harbour Island (Norrköping)

Solutions name	Harbor Island (Next Norrköping)
Type of solution	Spatial planning
Node	No node. Example comes from Norrköping, Sweden
Link or contact	https://next.norrkoping.se/in-english/ https://www.kombiconsult.eu/neptun/neptun.php/oktopus/download/287
Investment costs	
Description	<p>The development in the Swedish city of Norrköping (130.000 inhabitants) might be inspiring. The city is situated 165 km southwest of Stockholm and is transforming fast due to the building of a new high-speed rail line linking the Swedish capital with Gothenburg and Malmö including a new railway station in Norrköping. At this moment the existing rail link is heavily used by both passenger and freight transport.</p> <p>The new high-speed railway connection will create conditions for improving freight transport and activities at both the corridor and the local level. At corridor level the new high-speed rail link will leave extra capacity at the existing rail link for freight trains (also causing less mixing of freight and passengers traffic). At local level, harbor and logistics activities will be concentrated on a 'Harbor Island' that will be developed North of the city at the former harbor area, while a new harbor extension is created to the east in seaward direction. Several smaller distribution centers that are currently scattered in the city and thereby disturbing the city life will be relocated to the Harbor Island. A new, consolidated logistic center will be developed in the new harbor area as well.</p>
Impact overview	 <p>The radar chart displays the impact of the Harbor Island solution across five categories. The scale ranges from -10 to 10. Accessibility, Safety, and Economy show positive impacts (around 5-7), while Vitality and Connectivity show negative impacts (around -5 to -7).</p>

Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	2
	The solution impacts the route of the flows	2
	The solution impacts the volume of the flows	1
	The solution impacts the timing of the flows	1
	The solution impacts the available infrastructure capacity	2
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	-1
	The solution impacts the number of motorised vehicle casualties	0
	The solution impacts the external safety of dangerous goods transport	1
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capture)	2
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment	2
	The solution impacts the price of living in urban areas (socio economic)	2
	The solution impacts synergies with other sectors	2
	The solution impacts the GDP	2
D Vitality	The solution impacts the air quality	2
	The solution impacts the noise levels	1
	The solution impacts health of citizens	-1
	The solution impacts the ease of moving in the city for citizens	0
	The solution impacts the quality of living	1
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility p	2
	The solution impacts the connection between the city and the functional area from a logistics perspec	2
	The solution impacts the connection with other Nodes on the Corridor	2
	The solution impacts the connection with other TEN-T Corridors	1
	The solution impacts the connection with the comprehensive network	2

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

4.11.6 Turku Science Park (Turku)

Solutions name	Turku Science Park (spearhead project, including Master Plan)	
Type of solution	Spatial planning (Brownfield development, improved connectivity between nodes (rail))	
Node	Turku	
Link or contact	Mrs Marjo Uotila http://www.turku.fi/en/turku-science-park	
Description	<p>Over a million squares of new construction, investments of several billions, over 10 000 new jobs and apartments for 20 000 new Turku residents with one hour distance away from the capital region.</p> <p>The Turku Science Park spearhead project is one of the city's three spearhead projects and an important component in developing the appeal and competitiveness of Turku. The objective is to use new networked operating models to create an internationally attractive and boldly experimental cluster of expertise with ver-satile functions and logistic appeal.</p> <p>Reaching from the university campus to the Kupittaa business cluster and further to Itäharju, this area is the city's most significant growth centre of know-how and high technology jobs. Seamlessly connected to the city centre, it is attractive because of its diverse network of operators and know-how and logistically excel-lent location. The One Hour Train initiative will connect the area also with the capital region's commuter belt in the future.</p>	
Impact overview		
Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	1
	The solution impacts the route of the flows	2
	The solution impacts the volume of the flows	1
	The solution impacts the timing of the flows	1
	The solution impacts the available infrastructure capacity	1
B Safety	The solution impacts the number of pedestrian casualties	1
	The solution impacts the number of cyclist casualties	1
	The solution impacts the number of motorised vehicle casualties	1
	The solution impacts the external safety of dangerous goods transport	1
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value captur	2
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investmen	2
	The solution impacts the price of living in urban areas (socio economic)	1
	The solution impacts synergies with other sectors	2
	The solution impacts the GDP	2
D Vitality	The solution impacts the air quality	1
	The solution impacts the noise levels	1
	The solution impacts health of citizens	2
	The solution impacts the ease of moving in the city for citizens	2
	The solution impacts the quality of living	2
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility p	2
	The solution impacts the connection between the city and the functional area from a logistics perspec	2
	The solution impacts the connection with other Nodes on the Corridor	2
	The solution impacts the connection with other TEN-T Corridors	2
	The solution impacts the connection with the comprehensive network	2

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

4.12 Solutions and their (potential) impact: main category governance / institutional

An important note on governance / institutional: it is of huge importance to manage over jurisdictions. We do not mean regulated metropolitan regions, but we want to mention good practices on governance structures on a voluntary base, driven by the function in a logistics FUA. Examples include Region Drehtsteden and Euregion Venlo/Venray in the Netherlands.

This relates to the next step: node governance, for those nodes with a specified function with added value for TEN-T.

D2.2 – Overview of solutions and their (potential) impact

4.12.1 Northern Growth Zone (Turku)

Solutions name	Northern Growth Zone	
Type of solution	Governance	
Node	Turku	
Link or contact	Mrs. Marjo Uotila – Northern Growth Zone	
Description	<p>Northern Growth Zone collaboration</p> <p>Facilitating collaboration between the state and 14 municipalities and 6 regional councils, the Northern Growth Zone provides a semi-polycentric platform with 5 sub-regions, bringing together an economic area of 333 billion euros. Dealing with challenges on the (Northern) Scandinavian-Mediterranean TEN-T core network Corridor in South West Finland and connections to Stockholm in the West, Tallinn in the South and St. Petersburg in the East.</p> <p>Within the Northern Growth Zone a LHT (Land Use Housing Transport) agreement (the 2nd) is made to implement the Structural Modal for 2035 which has been an interaction between land-use, territorial/urban planning and traffic for dense and human scale cities based on common objectives for future growth and developments. This modal agreement is not legally binding, but adopted by the councils. The city of Turku is leading the network collaboration of the Northern Growth Zone, and as a member of the Scandria Alliance (representing the northern part of the Scandinavian-Mediterranean TEN-T core network Corridor) the city of Turku will also represent the Regional Council of Southwest Finland, as well as the other Northern Growth Zone partners.</p>	
Impact overview		
Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	1
	The solution impacts the route of the flows	2
	The solution impacts the volume of the flows	2
	The solution impacts the timing of the flows	2
	The solution impacts the available infrastructure capacity	2
B Safety	The solution impacts the number of pedestrian casualties	1
	The solution impacts the number of cyclist casualties	1
	The solution impacts the number of motorised vehicle casualties	1
	The solution impacts the external safety of dangerous goods transport	1
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capture)	2
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment	2
	The solution impacts the price of living in urban areas (socio economic)	1
	The solution impacts synergies with other sectors	1
	The solution impacts the GDP	2
D Vitality	The solution impacts the air quality	2
	The solution impacts the visual quality of the environment	1
	The solution impacts the level of noise pollution	1
	The solution impacts the ease of moving in the city for citizens	2
E Connectivity	The solution impacts the quality of living	1
	The solution impacts the connection between the city and the functional urban area from a mobility perspective	1
	The solution impacts the connection between the city and the functional area from a logistics perspective	2
	The solution impacts the connection with other Nodes on the Corridor	2
	The solution impacts the connection with other TEN-T Corridors	2
	The solution impacts the connection with the comprehensive network	1

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

4.12.2 Cooperation between the port of Genova and Savona (Genova)

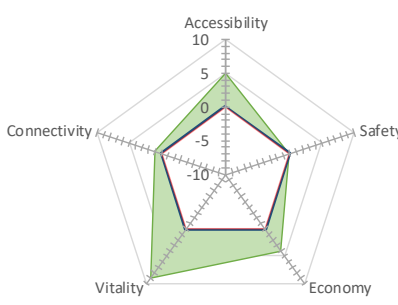
Solutions name	Cooperation between the port of Genova and Savona	
Type of solution	institutional / governance	
Node	Genova	
Description	<p>The ports of Genova and Savona are working together and this is not due only to the recent fusion between the two Port Authorities, but there are many common intents. The ports capacity expansion has limitations due to its location within the proximity of urban areas. Like most of the other Mediterranean seaports, but unlike leading Northern European hubs, land morphology forced ports and cities into a difficult coexistence; throughout its history Genova has painfully conquered this thin strip of land, however, the lack of large areas, particularly suited to accommodate manufacturing plants, forced the Genoese to spread out toward the sea, nestled between land and water. Currently, although territorial conditions are still the same, cities and ports have completely changed their attitude targeting the more complicated and multifaceted port-city design and focusing on a mutual development plan. Municipality and Port Authority are required to draw up their respective Masterplans simultaneously and to agree the terms and conditions of certain issues, namely those which focused on city-port relations: Urban Plan and Port</p>	
Impact overview		
Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	2
	The solution impacts the route of the flows	2
	The solution impacts the volume of the flows	2
	The solution impacts the timing of the flows	1
	The solution impacts the available infrastructure capacity	1
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	0
	The solution impacts the number of motorised vehicle casualties	0
	The solution impacts the external safety of dangerous goods transport	-1
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capture)	1
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment	2
	The solution impacts the price of living in urban areas (socio economic)	0
	The solution impacts synergies with other sectors	1
	The solution impacts the GDP	1
D Vitality	The solution impacts the air quality	0
	The solution impacts the noise pollution	0
	The solution impacts the health of citizens	0
	The solution impacts the ease of moving for citizens	0
	The solution impacts the quality of living	0
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility perspective	0
	The solution impacts the connection between the city and the functional area from a logistics perspective	1
	The solution impacts the connection with other Nodes on the Corridor	0
	The solution impacts the connection with other TEN-T Corridors	0
	The solution impacts the connection with the comprehensive network	1

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

4.12.3 Living lab for city logistics (Rotterdam)

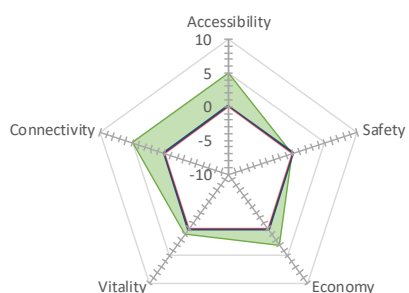


D2.2 – Overview of solutions and their (potential) impact

Solutions name	Living lab for city logistics		
Type of solution	Governance		
Node	Rotterdam		
Link or contact	https://greendealzes.connekt.nl/en/living-labs/living-lab-rotterdam/		
Investment costs			
Description	<p>Since 2014 Rotterdam uses a 'Living Lab' approach in city logistics in which the city works together with partners on technical, logistic, behavioural, law, policy and communication aspects. In the previous years the city has acknowledged Ecostars as a system for transport companies, introduced a environmental protection zone in the city centre, and on national level, made appointments between stakeholders about a green deal zero emission city logistics. In order to achieve the goals of the Living Lab approach, knowledge exchange and communication are key elements. The focus within the approach is on transporters and shippers, but more and more attention is given to the buyers as well, due to their impact on the zero emission goals. Within logistics, companies are supported through the Beter Benutten programme, decoupling and bundling points and smart procurement. The pilots that are being carried out provide opportunities to experiment with future solutions, which is necessary because achieving the goals of the zero emission policy involves a lot of aspects which transport companies do not want to take care of themselves. Together with partners, it is nevertheless possible to achieve certain goals by asking the question what one can do to strengthen the total. For example the port is not only a gateway to Europe, but also creates value. One concrete example of an outcome is the company of Breytner as the first complete electric transport company for urban delivery of goods and services.</p>		
Impact overview			
Impact criteria	Questions	Answer	
A Accessibility	The solution impacts the chosen modality of the flows	1	
	The solution impacts the route of the flows	1	
	The solution impacts the volume of the flows	1	
	The solution impacts the timing of the flows	1	
	The solution impacts the available infrastructure capacity	1	
B Safety	The solution impacts the number of pedestrian casualties	0	
	The solution impacts the number of cyclist casualties	0	
	The solution impacts the number of motorised vehicle casualties	0	
	The solution impacts the external safety of dangerous goods transport	0	
	The solution impacts the external safety of warehousing operations	0	
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capture)	1	
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment	1	
	The solution impacts the price of living in urban areas (socio economic)	0	
	The solution impacts synergies with other sectors	1	
D Vitality	The solution impacts the GDP	1	
	The solution impacts the air quality	2	
	The solution impacts the noise levels	2	
	The solution impacts health of citizens	1	
	The solution impacts the ease of moving in the city for citizens	2	
E Connectivity	The solution impacts the quality of living	2	
	The solution impacts the connection between the city and the functional urban area from a mobility p	1	
	The solution impacts the connection between the city and the functional area from a logistics perspec	0	
	The solution impacts the connection with other Nodes on the Corridor	0	
	The solution impacts the connection with other TEN-T Corridors	0	
	The solution impacts the connection with the comprehensive network	0	

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

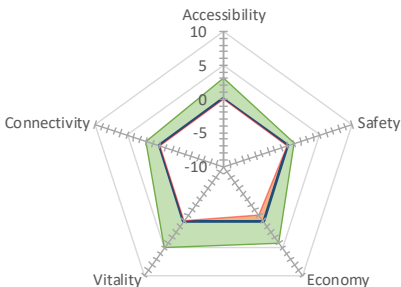
4.12.4 Utilization of road network (Rotterdam)

Solutions name	Utilisation Road Network Rotterdam (not existing title for a group of smaller and larger programs between 1995 and 2025)	
Type of solution	Governance	
Node	Rotterdam	
Link or contact	igor.heller@rws.nl	
Investment costs		
Description	The Bereik! organisation is a cooperation of national, regional and local infrastructure authorities whose mainwork is to develop a network wide traffic management strategy that keeps the Metropolitan Area of Rotterdam / The Hague moving. The organisation is responsible for traffic and transport management. The participating authorities also invest in several projects for improving accessibility and connectivity.	
Impact overview		
Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	1
	The solution impacts the route of the flows	2
	The solution impacts the volume of the flows	0
	The solution impacts the timing of the flows	1
	The solution impacts the available infrastructure capacity	1
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	0
	The solution impacts the number of motorised vehicle casualties	0
	The solution impacts the external safety of dangerous goods transport	0
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capture)	1
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment	1
	The solution impacts the price of living in urban areas (socio economic)	0
	The solution impacts synergies with other sectors	0
	The solution impacts the GDP	1
D Vitality	The solution impacts the air quality	0
	The solution impacts the noise levels	0
	The solution impacts health of citizens	0
	The solution impacts the ease of moving in the city for citizens	0
	The solution impacts the quality of living	1
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility perspective	1
	The solution impacts the connection between the city and the functional area from a logistics perspective	1
	The solution impacts the connection with other Nodes on the Corridor	1
	The solution impacts the connection with other TEN-T Corridors	1
	The solution impacts the connection with the comprehensive network	1

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

D2.2 – Overview of solutions and their (potential) impact

4.12.5 West Sweden Agreement (Gothenburg)

Solutions name	West Sweden Agreement
Type of solution	Governance
Node	Gothenburg
Link or contact	http://www.vastsvenskapaketet.se/english/
Investment costs	SEK 20 billion
Description	The West Sweden Agreement is of major importance and has enormous impact on the City of Gothenburg. It consists of different public transport plans and the construction of a new bridge (Hisingsbron) in the city centre, reducing the feeling there is a barrier between two parts of the city. It might be useful to collaborate more between the different institutional levels, linking future plans and visions. According to this it might be really useful to enlarge plans like the West Sweden Agreement, combining future investments in infrastructure and spatial development.
Impact overview	

Impact criteria	Questions	Answer
A Accessibility	The solution impacts the chosen modality of the flows	1
	The solution impacts the route of the flows	1
	The solution impacts the volume of the flows	0
	The solution impacts the timing of the flows	0
	The solution impacts the available infrastructure capacity	1
B Safety	The solution impacts the number of pedestrian casualties	0
	The solution impacts the number of cyclist casualties	1
	The solution impacts the number of motorised vehicle casualties	0
	The solution impacts the external safety of dangerous goods transport	0
	The solution impacts the external safety of warehousing operations	0
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value capture)	2
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investment	1
	The solution impacts the price of living in urban areas (socio economic)	-1
	The solution impacts synergies with other sectors	0
	The solution impacts the GDP	1
D Vitality	The solution impacts the air quality	1
	The solution impacts the visual quality of the environment	0
	The solution impacts the level of noise pollution	1
	The solution impacts the ease of moving in the city for citizens	2
	The solution impacts the quality of living	1
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility perspective	1
	The solution impacts the connection between the city and the functional area from a logistics perspective	0
	The solution impacts the connection with other Nodes on the Corridor	0
	The solution impacts the connection with other TEN-T Corridors	0
	The solution impacts the connection with the comprehensive network	1

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

4.13 Solutions and their (potential) impact: main category business casing

An important note on business casing: due to the fast developments new business models occur. These are generated by the private sector within the regulations.

A good practice on a new concept of sustainable urban logistics is found on <http://www.fmlogistic.com/eng-gb/Our-business/Supply-Chain-Optimisation/Citylogin>.

It is however required that cities also have a data-based strategy on logistics: where are the consumption points, where are the warehouses, et cetera. This leads to a better usage of infrastructure and required impacts. This might also lead to multi-functional freight contracting in urban logistics: why garbage cars and parcels are not in one contract, to reach an efficient and sustainable planning / flows?

The case of Rotterdam is presented, because Rotterdam has a data-based freight strategy.

4.13.1 Focus on type of urban logistics in relation to CO₂ emission (Rotterdam)

Solutions name	Focus on type of urban logistics in relation to emissions		
Type of solution	Business casing base		
Node	Rotterdam		
Link or contact	Mr. Richard van der Wulp - municipality of Rotterdam		
Investment costs			
Description	The municipality of Rotterdam argues initiatives on logistics in the Maas-city are part of a wider package to form local climate policy and to improve air quality. The city is working on city logistics for ten years, since environmental zones was set up. Based on CO ₂ emissions parcel deliveries only account for 4% and if the share of parcel deliveries will double, it will still be the smallest category. Based on CO ₂ emissions building logistics account for 30% Therefore, the main focus is on building logistics.		
Impact overview			
Impact criteria	Questions	Answer	
A Accessibility	The solution impacts the chosen modality of the flows	1	
	The solution impacts the route of the flows	1	
	The solution impacts the volume of the flows	1	
	The solution impacts the timing of the flows	2	
	The solution impacts the available infrastructure capacity	1	
B Safety	The solution impacts the number of pedestrian casualties	0	
	The solution impacts the number of cyclist casualties	0	
	The solution impacts the number of motorised vehicle casualties	0	
	The solution impacts the external safety of dangerous goods transport	0	
	The solution impacts the external safety of warehousing operations	0	
C Economy	The solution impacts the attractiveness of the local scale (city) of the Node for investments (value captur	0	
	The solution impacts the attractiveness of the FUA from logistics perspective of the Node for investmen	0	
	The solution impacts the price of living in urban areas (socio economic)	0	
	The solution impacts synergies with other sectors	1	
	The solution impacts the GDP	0	
D Vitality	The solution impacts the air quality	2	
	The solution impacts the visual quality of the environment	1	
	The solution impacts the level of noise pollution	1	
	The solution impacts the ease of moving in the city for citizens	1	
	The solution impacts the quality of living	1	
E Connectivity	The solution impacts the connection between the city and the functional urban area from a mobility p	1	
	The solution impacts the connection between the city and the functional area from a logistics perspec	2	
	The solution impacts the connection with other Nodes on the Corridor	1	
	The solution impacts the connection with other TEN-T Corridors	0	
	The solution impacts the connection with the comprehensive network	1	

2 strong positive impact 1 Positive impact 0 No substantial impact -1 Negative impact -2 strong negative impact

5 Conclusions

There is a requirement for data collection on urban freight (local / city level). This makes it possible to:

- Have a base case (specific insight in flows)
- Build a data based strategy on logistics (including scenario's related to the huge developments)
- Discuss / negotiate effective contracts with suppliers (societal business model)

There is a huge requirement for (harmonized) data collection on freight on the Functional Urban Area level. This makes it possible to:

- Have a base case (specific insight in flows)
- Build a Functional / Regional data based strategy on logistics (including scenario's related to the huge developments)
- Start a discussion about the required function of a node. When does a node have added value for the European network? Does the current chosen 88 urban nodes generate added value given the huge changes and developments?

Lack of data means for this report:

- The (potential) impact of solutions in this report is based on expert judgement;
- The (potential) impact is not in absolute terms: therefore the presented impact of solutions might not be used as a benchmark between solutions;
- This also the reason that solutions have not been categorized via the policy dimension of impact.

Attachment 1 - Overview of CEF Funded projects per node

Budapest

Air/Rail freight terminal

- The Action aims at connecting the freight handling areas of Budapest airport to the main Budapest-Arad railway line. The Action is located on the pre-identified Budapest-Arad-Timisoara-Calafat section of the Orient/East-Med Corridor.
 - o The Action consists of 2 activities:
 - The upgrading by 4.4 km and extension by 1.7 km of the existing single track railway link from the main line R100A Budapest-Arad to a new rail transshipment area of Budapest Airport
 - The re-routing and partial extension of the service road connecting the logistics areas with one another and with the passenger terminal.
 - o In the long term, the Action will stimulate local growth and shift traffic from road to rail, thus reducing traffic on regional roads and the impact of the airport on the environment.

Genova

Waste Management in the Port of Genova

- The environmental performance of maritime ports is particularly important in the context of the Port of Genova, located very close to urban areas. The Action aims at the improvement of waste management efficiency as well as the reduction of air pollutants and noise, which will also satisfy urban communities. The Port of Genova is part of the Rhine-Alpine Corridor. The Action is part of a Global Project to improve the environmental performance of the Port of Genova. The Action consists of three activities: the implementation of a new and improved facility for port oil and waste reception, treatment and disposal, the realisation of a shore-side electricity facility in the Voltri port basin, and ex-post climate change impact assessment.

Motorway of the Sea

- The overall objective of this Action is to contribute to the further policy development of the MoS. The specific objective of this Action is to design a new effective and sustainable incentive Scheme (ECOBONUS) which aims to support intermodal freight transportation via the increase of demand for MoS and is aligned with the framework and new priorities of the TENT-T policy.
- MedTIS II will implement ITS on the TEN-T Mediterranean corridor on a continuous stretch of 8,600 km motorways embedding various typologies of traffic (daily recurrent, seasonal peak migrations, heavy goods vehicle long distance routes), 13 TEN-T Urban Nodes, 5 cross-border



areas and more than 40 bottlenecks. MedTIS II will deliver Traffic Management Services (TMS) and travel information across the Corridor. Deployment of TMS provides road operators with tools to optimise the use of the TEN-T network infrastructure when saturation or events are occurring.

GATE project

GATE is a project aiming to realize the intermodal connection from the international airport “Cristoforo Colombo”, located in the west side of the city of Genova, to train and public transport networks.

The design, developed by a consortium of local stakeholders (Regione Liguria, Comune di Genova and Aeroporto di Genova), was funded by the EU Commission within CEF program and has been completed; presently some initiatives are carried out to identify further funding possibilities, to start the works.

GATE project consists of two distinct subprojects: the new Erzelli / Airport railway stop, located on the Genova Ventimiglia line between Sestri Ponente and Cornigliano stations, and the plant of a cableway link between the new stop and the airport passenger terminal. The solution chosen by the technicians for the cable-link system is that of a gondola with a capacity of 600 - 700 people per hour. A stop of the cabins at the station is foreseen, to allow easy access to the transport system.

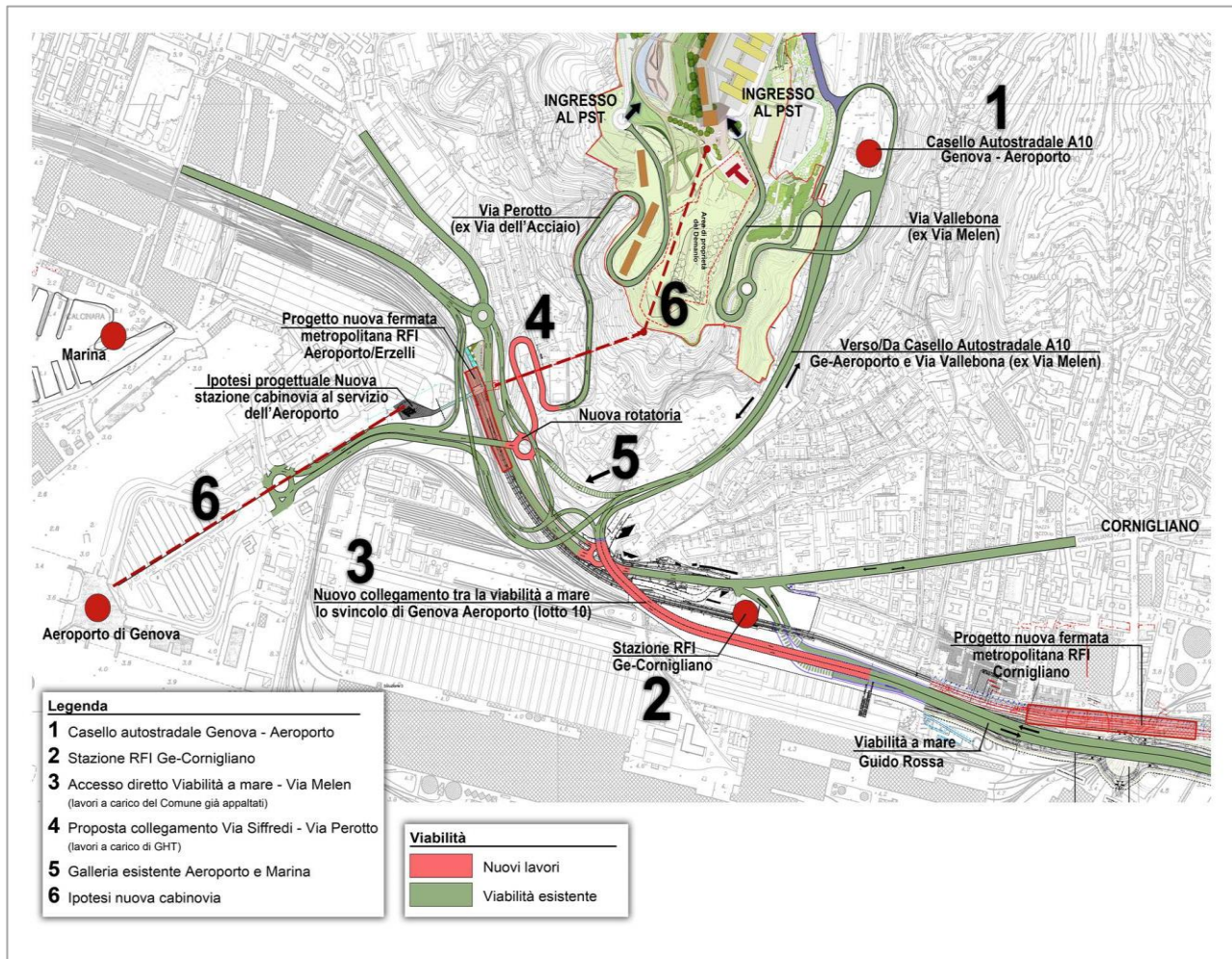
A further development of GATE project relates to the prosecution of the cableway to Erzelli area, a hill overlooking the city where an important high-technology park, GREAT CAMPUS, is rapidly growing. Many companies have already moved their headquarters to Erzelli (Siemens, Ericsson, Liguria Digitale, a department of IIT) and other companies are expected to join in the near future. Very recently the moving of Genova Polytechnic School from the city-centre to Erzelli has been stated, for which new buildings for laboratories and classrooms will be built. To complete Erzelli area development, a new hospital is planned to be built there.

Erzelli is located on a hill, physically very close the railway and the airport but difficult to be reached due to size and slope of access roads: the realisation of the cableway seems the best solution to ensure an efficient mass transport system for employees, students and citizens, and at the same time provides a very rapid connection between the Erzelli park and the airport.

In the following figure the first part of the red dashed line indicates the section from the airport to the train/bus station, while the second part indicates the section to Erzelli Park.



D2.2 – Overview of solutions and their (potential) impact



Source: GREAT CAMPUS

While discussing this project, the following aspects have been mentioned;

- GREAT CAMPUS project establishes a 400000 sqm, the largest science park in Italy, 220000 sqm of green park designed for events and exhibitions and 60000 sqm of university campus. In GREAT CAMPUS project laboratories and modern work spaces, comfortable residences, commercial services for families, cultural event spaces and sport and free-time facilities are all conceived in a shared and harmonious design for a project that works seven days a week and is integrated with the surrounding area. The GREAT CAMPUS is a strategic challenge for Genova's future development, and a strong action to push the initiative is necessary both from the Authorities and from private investors;
- The aspect of an easy and sustainable access to the hill is considered as a prerequisite for integrated development of the city of Genova with public and private parties. Economically focused, connectivity and related to available land/circumstances taking current lack of parking in consideration while planning for an easy and sustainable alternative. While at the moment the percentage of private car ownership is huge.

Göteborg

ATM Management

- Göteborg Landvetter Airport suffers today from capacity constraints due to its old ATM system. This action aims at eliminating this bottleneck by upgrading the entire airport's ATM system.

LNG

- The objective of this Action is to carry out a study aimed at creating a pilot deployment of a motorway of the sea link between a small scale LNG-to-container transshipment facility in Zeebrugge (BE) and a ship bunkering facility in Gothenburg (SE). Gothenburg is a port on the TEN-T Corridor Scandinavia-Mediterranean and Zeebrugge is part of the TEN-T Corridor Rhine-Alps. The Action also contributes to the implementation of the PCI 8.6 Gothenburg LNG terminal in Sweden. This Action will contribute to make the Port of Gothenburg a major regional hub, by feeding LNG into the grid and offering refueling options for ships and road vehicles. The Action fits the objectives of the CEF policy in terms of decarbonisation, transition to innovative low-carbon and energy efficient transport system and fuel security.

Road Transport Hydrogen/CNG/LPG/Charging Infrastructure

- The Action is part of a Global project aiming to ensure volume introduction of alternative fuel infrastructure and vehicles, decarbonisation of the transport fleet and transition away from fossil fuels. In the long term, the Action will provide experience and policy tools on cleaner transportation. The action consists of a study with pilot aiming to deploy roughly 70 triple standard quick chargers and three LNG/CNG stations, over more than 900 km of the Scandinavian-Mediterranean Corridor and the core road network (in Germany, Sweden and Denmark). The exact locations of the stations will be defined during the action

Hamburg

New Kattwyk Railway Bridge

- The construction of the New Kattwyk Railway Bridge will eliminate the existing bottleneck on the Kattwyk Bridge, where road and rail traffic currently share a lane. A new Elbe crossing will be built and used by railway only, while the existing Kattwyk Bridge will then exclusively be used by road traffic. This separation of rail and road traffic will significantly enhance traffic safety and improve the flow of traffic in the Port of Hamburg, situated on the Scandinavian–Mediterranean Core network, Hamburg/Bremen-Hannover section. The Action consists of the following activities: Landside connection of the railway lift bridge on the eastern banks of the Süderelbe; landside connection of the railway lift bridge on the western banks of the Süderelbe; construction of the new Moorburger Weide leading light; overarching construction works; project management/communication and public relations/supporting engineer services.

Fehmarnbelt

- This Action is part of a Global project focused on establishing an efficient transport system across the Scandinavian – Mediterranean Core Network Corridor. The aim of the present Action is to build the fixed rail link across the Fehmarnbelt between Puttgarden (Germany) and Rødbyhavn (Denmark). The Action encompasses the dredging of the seabed, the start of constructing a



tunnel including the installation of the technical infrastructure and systems necessary for its construction and operation. Overall, the Action will result in a significant reduction of the travel time between Copenhagen and Hamburg.

Road Traffic Hydrogen/LPG/Charging Infrastructure

- The Action is part of a Global project aiming to ensure volume introduction of alternative fuel infrastructure and vehicles, decarbonisation of the transport fleet and transition away from fossil fuels. In the long term, the Action will provide experience and policy tools on cleaner transportation. The action consists of a study with pilot aiming to deploy roughly 70 triple standard quick chargers and three LNG/CNG stations, over more than 900 km of the Scandinavian-Mediterranean Corridor and the core road network (in Germany, Sweden and Denmark). The exact locations of the stations will be defined during the action
- A number of European countries have developed plans for a roll-out of hydrogen refuelling stations (HRS) for Fuel Cell Electric Vehicles (FCEV) customers. The urban nodes where the HRSs are deployed need to be linked by “connecting stations”. The Action aims to study in a pilot trial, deployment of 20 connecting HRS along the main TEN-T Core Network Corridors in Austria and Germany in order to understand the business case, network planning implications and the customer interface with these stations. It is a part of a Global Project on HRS roll-out plans part of the national hydrogen mobility activities in Austria and Germany
- While surrounding countries such as The Netherlands, Denmark, France, and Austria are developing electric vehicle (EV) markets, the markets in Germany and Belgium are lagging behind. This Action will conduct a study with integrated pilot, in view of future roll-out. It will deploy 241 multi-standard fast chargers in Germany and 37 in Belgium. This represents less than 3% of the estimated needed infrastructure by 2020, in Germany. The Action is located on several TEN-T corridors (North Sea-Mediterranean, Orient-East Med, Scandinavian-Mediterranean, Rhine-Alpine, North Sea-Baltic corridors, etc).

Traffic Management RIS, ECTS, ATM, C-ITS

- NEXT-ITS 2 aims at improving the efficiency, safety and security of the Northern part of the Scandinavian-Mediterranean CEF corridor from Oslo and the Finnish-Russian border via Copenhagen, Hamburg and Bremen to Hanover in Germany. Continuity of ITS services will be achieved through coordinated deployment of Traffic Management Services, upgrade of Traffic Management Centres, development and implementation of Traffic Management Plans and harmonisation of control and management strategies. NEXT-ITS 2 also addresses the provision of EU-wide traffic and travel information services, including cross border services for seamless door-to-door mobility.

Railway Noise reduction

- The Action is part of the Global project of Deutsche Bahn Schenker Rail AG to retrofit freight wagons with low-noise low-friction brake blocks that are running along densely populated TEN-T Core Network Corridors in Germany. The Action covers the retrofit of 16,000 freight wagons with types of 'silent' LL brake blocks, which have been approved by the European Railway Agency. The Action foresees the retrofitting of mainly wagons with four axles with either 16 or 32 LL brake block units per wagon.

Rotterdam



Hinterland Access to the Port

- The Action is part of a Global Project aiming to remove the bottleneck in the rail freight access of main port Rotterdam connecting three core network corridors (Rhine Alpine, North Sea-Mediterranean and North Sea-Baltic), by upgrading the infrastructural node at Caland Bridge and rerouting rail freight transport via an alternative route: The Theemsweg railway section. The Action's main objective is to carry out the civil infrastructure works to create the alternative route to avoid the Caland Bridge, consisting of the double track Theemsweg railway section of an approximate length of 4.5 km.

Maritime Air Pollution

- Closed loop scrubbers will be installed on two ships sailing on the short sea shipping routes between Harwich (UK)-Rotterdam/Hoek van Holland terminal (NL), to upgrade an important maritime link on the TEN-T core network. Furthermore, the two scrubbers will be fitted with a measuring device for continuous follow-up of cleaning system efficiency.

C-ITS/ITS/ ERFLS

- InterCor will focus on the deployment of "Day-1" services as recommended by EC "C-ITS platform" such as Road works warning, Green Light Optimized Speed Advisory, In vehicle signage and Probe vehicle data.
- The Action focuses on the deployment of road ITS Services on the Arc Atlantique Corridor which incorporates the North Sea-Mediterranean and Atlantic CEF Core Network Corridors. It will positively impact efficiency, safety and environment through removal of bottlenecks, improving the reliability of the corridor network and reducing congestion.
- The Action includes partners from The Netherlands, Germany and Italy to launch an innovative European Rail Freight Line System (ERFLS) in combined rail-freight traffic on the Rhine-Alpine Corridor. This Global Project is building further on the results of previous EU funded project CODE 24. The ERFLS system will connect the different regions along the Rhine-Alpine Corridor with regular rail freight line services in combined traffic through a system of "smart hubs" for freight transport.

Frigorail - Refrigerated rail transport between Spain and the Netherlands using TEN-T corridors

- The objective of this Action is to create a new regular railway service for Reefer freight between Silla on the Mediterranean Sea and Rotterdam on the North Sea, through the Mediterranean Corridor, as a modal shift from road to rail.

Strasbourg

Additional Railway Track North of Strasbourg

- The Strasbourg node, more particularly the Strasbourg-Vendenheim section, is the most frequented in Alsace. No further development of regional, high speed and freight trains will be possible as from 2017 and in 2020-2025 the line will be saturated. The Action aims to remove a major bottleneck at this section and to improve the capacity of the node by guaranteeing its

reliability for high speed, regional and freight traffic. Activities include studies and works to construct the 4th track north of Strasbourg. The Action will contribute to improve services and modality in the Basin, as well as at regional and international levels (hosting the new East European High-Speed Services).

New port terminal in Lauterbourg

- The port of Strasbourg is located on the Rhine-Alpine Corridor in France. It is the second French inland waterway port and has 2 major sites: Strasbourg and Lauterbourg. The Action is part of a Global project aiming to further develop nine ports in the Upper Rhine. It is a necessary step for improving the accessibility and the capacity of a multimodal platform at Strasbourg/Lauterbourg port to absorb the expected traffic growth. It is part of a Master plan concerning nine ports on the Upper Rhine. The Action will develop the port of Strasbourg by building a new multimodal terminal in Lauterbourg. The new terminal will provide a trimodal installation with rail tracks, an embankment and materials' handling equipment. The Action will eliminate a bottleneck identified within the port network and contribute to the better performance of the port as gateway of the corridor. It will contribute to the better use of inland navigation as a lesser environmental footprint mode.

Traffic Management RIS, ECTS, ATM, C-ITS

- The Action, involving two Member States and a neighbouring country, aims at implementing an innovative ICT traffic management platform for inland waterway transport. The studies will improve the overall logistic processes in 9 inland ports on the Rhine-Alpine Core Network Corridor. The Action includes pilot deployment: an ICT traffic management platform at three ports in France, Germany and Switzerland; the feasibility study for the roll-out of the ICT traffic management platform at six other ports along the Upper Rhine and the conceptual design for the functional and geographical extension of the platform to non-containerised cargo, rail and truck hinterland traffic.
- This Action aims at improving and promoting Rail Freight Corridor North Sea–Mediterranean (RFC North Sea-Med). It is part of a Global Project covering the overall development of the RFC North Sea–Med. The overall objective is to increase modal shift from road to rail by deployment of competitive rail freight transport. The Action consists of:
 - capacity, traffic and performance management as well as studies for the deployment of interoperable systems;
 - updates and harmonisation of the GIS and the Corridor Information Document (CID) and update of the transport market study;
 - coordination of the corridor's further developments and communication towards its customers and other stakeholders;

Turku

Motorway of the Sea

- The MoS service between the Core ports of Rostock-Luebeck-Travemuende, Turku and Kotka, comprehensive port of Rauma and port of Uusikaupunki is a vital link connecting Germany and Finland along three Core Network Corridors. In line with the Global Project's objectives, this action has two objectives. On one hand, to increase the productivity and capacity of the MoS link and service related terminal operations and on the other hand, to reduce the environmental



impact of the ship operations. To achieve these aims the maritime operator will upgrade three existing very modern and large freight RoRo ships deployed on the maritime link – namely “Finnbreeze”, “Finnsea” and “Finnsky”. Each vessel will be equipped with a wet-type open-loop hybrid ready emission abatement technology. In addition, energy efficiency measures will be installed on the same vessels for optimizing bunker consumption and minimizing the emission of green-house gases from ship operations. Quality, efficiency, capacity and safety increasing measures will be implemented in two of the ports regularly called, namely the TEN-T core port of Rostock (Germany) and the TEN-T comprehensive port of Rauma (Finland)

- The Action is part of a Global project whose objective is to create accessibility to the northern European markets and to create an effective, smooth and sustainable connection between sea and land transport in the Finnish and Swedish ports. The overall objective of the Action is to improve energy-efficiency in port operations and shipping, provide onshore power and reception of ship waste and waste water. This will contribute to the development of sustainable, more environmental friendly Motorways of the Sea services between Sweden and Finland. The Action will provide high-level environmental services, according to the requirements of the MARPOL Annex VI. The energy-efficient services support the aims of low carbon transport. The Action will develop port services that help reducing the environmental impact of shipping and facilitating for shipping to comply with the new environmental requirements and goals primarily regarding sulphur oxides, waste management and carbon emissions. These port services include onshore power supply, reception facilities for sewage and scrubber waste.

C-iTS

- NordicWay is a pre-deployment pilot of Cooperative ITS (CITS) services in four countries (Finland, Sweden, Norway and Denmark) which will be followed by wide-scale deployment and in Europe. The project has the potential to improve safety, efficiency and comfort of mobility and connect road transport with other modes. NordicWay is the first large-scale pilot using cellular communication (3G and LTE/4G) for C-ITS. It offers continuous interoperable services to the users with roaming between different mobile networks and cross-border, offering C-ITS services across all participating countries. NordicWay puts emphasis on building a sustainable business model on the large investment of the public sector on the priority services of the ITS Directive. The project is fully based on European standards and will act as the last mile between C-ITS research and development and wide-scale deployment

Vienna

Rail-Road Terminal Connection

- The rail-road terminal Wels is situated on the Rhine-Danube core network corridor and constitutes one of the largest transshipment nodes on Austrian territory. It is an essential European transfer site for goods for combined freight transport.
- The terminal's handling tracks for unaccompanied combined freight transport are only unilaterally connected. The Action addresses this problem by planning a second connection of the terminal to the East. The activities foresee obtaining the environmental permits for a new rail-road-terminal access infrastructure and for the interconnecting rail infrastructure towards Linz as well as tendering for the subsequent construction works.
- Building a second connection of the Wels freight terminal to the East
- Expansion of safe & secure truck parking spaces and truck parking information systems on the TEN-T core network in Austria and Germany



C_ITS

- The Austrian C-ITS pilot includes test sites in the Vienna area, the motorway section from Vienna to Salzburg, as well as around Innsbruck and the greater Graz area.
- CROCODILE 2 involves public authorities, road administrations and traffic information service providers to ensure coordinated traffic management and control resulting in high quality traveller information services. Partners from Austria, Bulgaria, Croatia, Cyprus, Czech Republic, Germany, Greece, Hungary, Italy, Poland, Romania, Slovakia and Slovenia are working together to improve cross-border traffic and transport through implementing harmonised and synchronised ITS applications
- The aim of the Action is to elaborate studies enhancing the attractiveness of Baltic-Adriatic Rail Freight Corridor. Activities of the Action include:
 - o Monitoring the performance of the Corridor
 - o Customer information system and running of a 'one stop shop'
 - o Corridor capacity improvement studies

