VITAL NODES

Synthesis document for nodes 1 + 8 including grouping of solutions

Deliverable 2.3

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Executive summary

An effective integration of an urban node in the TEN-T network is complex. Complexities arise from different scales of transport services (local and long distance transport), different types of stakes and stakeholder involved, different spatial scales of the networks and different planning and governance approaches (local till EU approaches).

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. In Deliverable D2.2 the outcomes of the tier 1 workshops are discussed in the form of recommendations to the EC. In this Deliverable an overview of good practices and their (potential) impacts is given – which could be coined as a 'catalogue' of solutions and their impacts . These practices are based upon desk research, elaboration and validation before – in and after workshops in the first 8+1 nodes (tier 1) as well as on Polis and Eurocities conferences / focus groups.

This deliverable builds further on the analysis of challenges on solutions. Therefore, for fully understanding the analysis, it is advised to consult Deliverable D 2.2 first.

This Deliverable D 2.3 aims to group the solutions captured in the research phase regarding the tier 1 urban nodes. The solutions, described in D2.2, have very different origins and scope. Therefore, a methodology for grouping is developed. The grouping criteria are based on the synthesis of challenges they jointly tackle but also on the (potential) impacts of these solutions. We have applied these criteria – as a typology – on the Tier 1 nodes and proposed Tier 2 nodes. This grouping will enable to provide communalities between solutions, and to derive therefrom good practices and advice.

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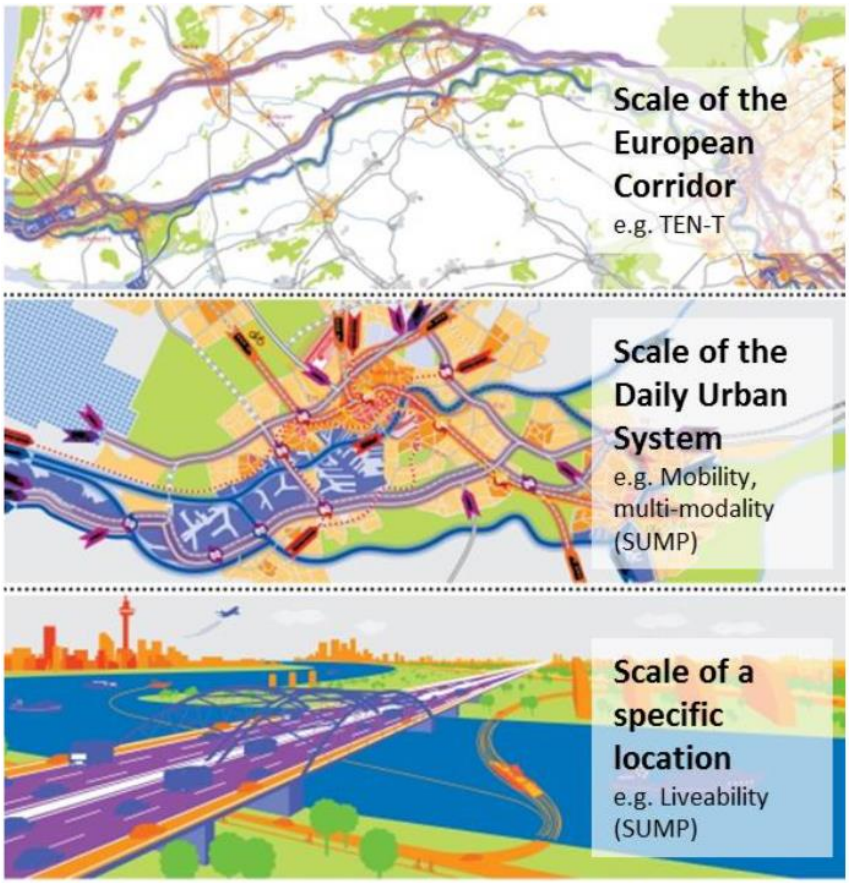
1 Introduction

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 stakeholder 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 is addressing specifically the planning perspectives on three different freight transport scales (TEN-T, functional urban area/Daily Urban System and local scale). This is shown in the figure below.

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



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1.1 General trends and challenges

A selection of the general trends at these three levels is 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 (transhipment, 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.

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- 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 (SUMPs), 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.

Vital Nodes

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.

1.2 Scope of this report

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). In deliverable D2.2 an overview of good practices and their (potential) impacts is given – which could be coined as a '*catalogue' of solutions and their impacts* . These practices are based upon desk research, elaboration and validation before – in and after workshops in the first 8+1 nodes (tier 1) as well as on Polis and Eurocities conferences / focus groups. The current report, deliverable D2.3, provides a synthesis.

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This deliverable D2.3 aims to group the solutions captured in the research phase regarding the tier 1 urban nodes. This grouping will enable to provide communalities between solutions, and to derive therefrom good practices and advice.

The workpackages 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. In order to understand D2.3 it is therefore seen necessary to include the draft version of D2.2 including the challenges/info graphics containing information on the WP3 workshops as appendix to this D2.3.

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2 Synthesis

The grouping criteria are based on the synthesis of communalities between:

- the **challenges** they tackle
- and the (potential) **impacts** of these solutions.

An important conclusion is that an urban node has a wide functional (urban) area when it comes to logistics.

2.1.1 Challenges

Between urban nodes, challenges might vary. In some cases, the environmental (e.g. air quality) norms are not met, meaning that there is a vast and urgent challenge. Where in other cases ambitions for the environmental performance (e.g. emission targets) are set meaning there is a local positive driver behind the challenge. A challenge might derive from an urgent issue, others from an ambition.

Similarities in challenges between urban nodes are distilled from analyses and based on the tier 1 workshops (see also D3.3 and D2.2). Challenges vary with the type of urban node:

- A cross-border node is confronted with additional difficulties related to institutional and governance aspects in comparison to a national node;
- A poly-centric node (e.g. linking more urban centres to one urban node) has additional difficulties related to governance and investment aspects in comparison to a centric node (e.g. linking one urban area to one node);
- A node which has implemented solutions on the different scales and/or practices integrated spatial planning concepts differs in impact from a node that has implemented standalone solutions (without an inter-relation between scales and / or without the inter-relation with spatial planning and transport);
- A node which has – from a logistics perspective - an inbound or local consumption function in relation to the corridor, has different challenges than a node which has an outbound / production/transit function. The latter has different impacts on for example value capturing.

The common challenges of urban nodes to which the solutions mapped in D2.2 are connected/related are as follows:

The definition of TEN-T corridors is narrow, function of urban nodes unclear
The narrow definition of TEN-T corridors does not fully reflect the importance and challenges of regional or local freight transport networks. The corridors only relate to long-distance transport services having diverting challenges than urbanized areas. Infrastructure provision is only a minor aspect of the solutions in urbanized areas. The management, optimization and curbing of flows is of great importance. The bottlenecks are seen in the cities, e.g. a congested ring road, while the solution might be found on the corridor (e.g. stimulating multi-modality) or vice versa.

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Data collection on urban aspects is a challenge
The collection of basic and advanced data on urbanized areas is a challenge. It is difficult to gain insight in the local service networks and intensity of transport of regional and urban logistics. When data is available, it is often only proxy data and comparability between urbanized regions is uncertain. The Daily Urban System (DUS) and Functional Urban Area (FUA) both do not reflect data on NUTS levels, among others because they do not match the exact same area.

Limited alignment of regulations
The local curbing of mobility and transport, e.g. via low emission zones or (differentiated) access restrictions, is not harmonized within Member States or across the EU. The coordination of constructions along the corridors, impacting the urban nodes, (e.g. maintenance) has to be optimized.E.g. there is a difference between Rhine and Danube. For the Rhine the Rhine Commission does much coordinative work, for the Danube this is lacking; limiting transportation via the river.

Robustness of the network (in urban nodes) depends on solutions elsewhere
There is a need for regional collaboration on urban node-specific issues related to freight transport. The regional aspect of challenges complicates the implementation of successful solutions. In addition, this also works the other way around. Improvements in the network at the corridor may cause extra traffic, which may result in new bottlenecks within urban nodes

Innovation in solutions and in implementing changes is a challenge
Implementing solutions or pilot projects proves to be difficult. This may benefit from triple helix (university – industry – government) collaborations. Piloting innovations in field labs/living labs (based on local drivers for development) is proven to be successful in many urban areas. Key is the involvement of private logistic agents.

Growing cities and scarcities of space
Almost all solutions are challenged by a lack of (urban) space. The majority of urban areas see an increase in number of residents and economic activity. As a consequence, space is scarce, and is often used to accommodate demand for more housing first. Many urban areas redevelop former logistics areas into residential areas, further pressuring availability of urban space for logistics and mobility. While especially the implementation of larger solutions, e.g. Urban Consolidation Centers (UCCs), multi modal terminals or brownfield re-developments demand considerable amount of space. Implementing these solutions have to take scarcity of space into account as a complicating factor. However, planning and governance, e.g. the stimulation of multiple use of terrains and the reservation of areas within the city for logistic activities, can stimulate innovative approaches (see also D3.1).

Social acceptance and inclusion is a challenge
The awareness raising (e.g. being an urban node and the impact and necessity of logistics activities) is of importance to create acceptance for the implementation of solutions. It is a challenge to convince locals to be open to logistic sites close to or in urbanized areas, especially when not having a direct link to urban logistic demand.

The effects of transport flows on vitality /liveability and social economic consequences is not only negative. The presence of dense and well-developed networks of freight transport offer opportunities too for enhancing vitality and social inclusion of deprived neighbourhoods. Distribution of freight locally is profiting of scale advantages, the activities themselves provide labour market demand and the building of sites too.

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Improvement of knowledge exchange
The sharing of good practices and open discussion on comparable issues can be improved. The challenges of urbanized areas are quite alike. The solutions, tested or implemented, differ quite a lot. A regular exchange of the challenges of urban nodes on the TEN-T network, e.g. in a setting where comparable cities meet, could lead to efficiency and creativity in finding and implementing solutions.

Attention needed for logistics oriented development
Cities and regional governments need to have attention for logistics in spatial development(s) too. Some developed and implemented freight transport measures. Many implement mobility measures, only indirectly influencing freight transport. Stimulating explicit attention for freight and logistics in SUMPs and other local policies is vital. Especially when developing residential areas or brownfields.

Challenge of funding more integrated solutions
Funding by a single party of more integrated solutions (either public or private) proves to be limited. There are possibilities for multi-donor funding and a combination of smaller projects in one investment. The increased complexity makes probability of failures larger.

2.1.2 Grouping of Solutions

The solutions, described in D2.2, 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. The clustering of solutions on common aspects will allow to come up with good practices and lessons learned.

Considering the complexity of the challenges there is no silver 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 need for an integrated approach that connects the world of infrastructure, mobility, freight, logistics with the world of urban and spatial development. This has been confirmed in the tier 1 workshops (see D3.3). 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 liveability), 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 Vital Nodes urban node workshops. 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;

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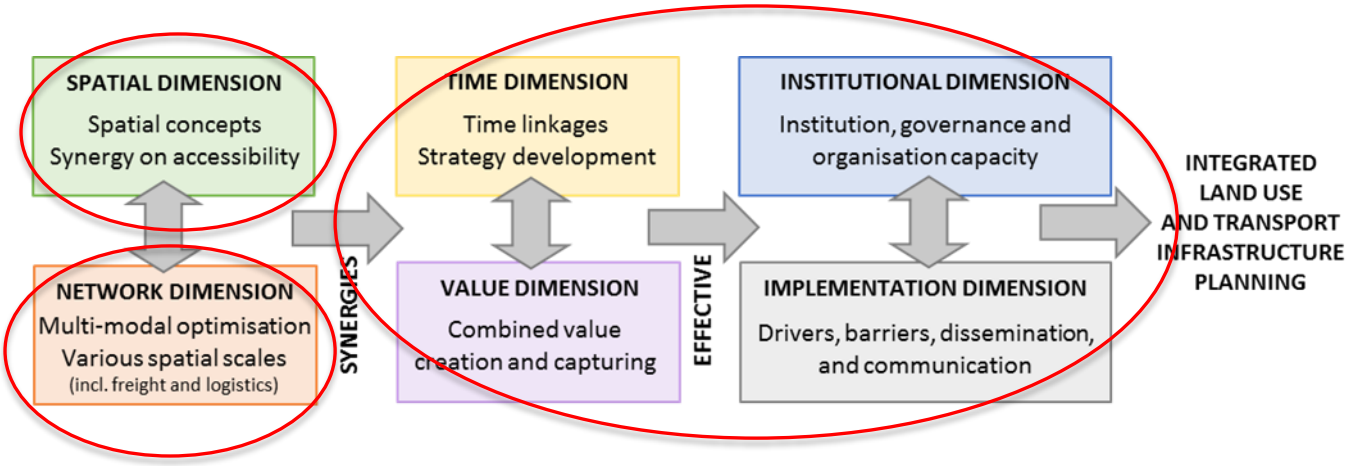
- Implementation dimension, regarding drivers, barriers, dissemination and communication.

Figure 2. 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 that have to be considered at which the time and value dimensions are relevant. 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 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 principles as described in the FLUXNET study[1], 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 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.

[1] More information might be found at the CEDR website *www.cedr.eu*

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- *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, also categories are distinguished related to:

- *Spatial development and 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).

As a result a grouping of 8 solutions is proposed:

- *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*

This methodology can be elaborated and enriched in the Tier 2 workshops.

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2.1.3 Towards a Typology for urban Nodes

Vital nodes has formulated pre-defined criteria which reflect the relevance of the solutions for specific types of nodes. We have applied these criteria – as a typology – on the Tier 1 nodes and proposed Tier 2 nodes. This typology will help to identify and to cluster challenges and potential solutions in dialogue with urban nodes more effectively and efficiently – as will be done in work package 4 in relation to the tier 2 and tier 3 urban nodes.

The criteria are:

- **Cross border function**
  Yes / No. If it is a cross border node, is it multi-modal (M) or uni-modal (U)?
- **Sea port:**
  Yes / No. If it is a sea port node is it a gateway)(G) or a regional hub (R)?
- **Inland function**
  Yes / No. If the node is inland, is it a small (S) or big (B) node (threshold is 1 million inhabitants or more)?
- **Relation of the node (logistics FUA) and the Corridor**
  U = Urban: inbound focused on local consumption versus
  T = Transit: outbound focused on production and transit of goods
- **Is the node located in a developed (D) or in a cohesion (C) region?**
- **Is the node centric (C) or poly-centric (Pc)?**
  Does the note serve multiple or only one urban area?

The application of the criteria on the Tier 1 nodes is shown in the table below.

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Table 1. Criteria applied on the Tier 1 nodes

	Cross – border: multi or unimodal	Sea: Gateway / regional hub	inland: size: small / big (1 mln or more)	Relation of the node (logistics FUA) and the Corridor (U: inbound / consumption versus T: outbound / production and transit)	Developed / cohesion region	Centric versus poly centric
Vienna	M		B	U	D	C
Rotterdam		G		T	D	Pc
Gothenburg		R		T	D	C
Hamburg		G		u/t	D	C
Budapest			B	U	C	C
Genova		R		T	D	C
Turku		R		T	D	C
Strasbourg	M		S	t/u	D	C
Mannheim			S	T	D	Pc

Note: Empty cell = not applicable

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The application of the criteria on the Tier 2 nodes is shown in the table below.

Table 2. Criteria applied on the Tier 2 nodes

	Cross – border: multi or unimodal	Sea: Gateway / regional hub	inland: size: small / big (1 mln or more)	Relation of the node (logistics FUA) and the Corridor (U: inbound / consumption versus T: outbound / production and transit)	Developed / cohesion region	Centric versus poly centric
Piraeus		G		T	C	C
Bratislava	mm		S	T	C	C
Sofia			B	U	C	C
Copenhagen	Mm	R		U	D	C
Tallinn	Um	R		U	C	C
Gdansk / Gdynia		G		T	C	Pc
Valencia		G		T	D	C
Antwerp		G		T	D	Pc
Duisburg / Venlo	Mm		S	T	D	Pc

Note: Empty cell = not applicable

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