

# Preliminary Recommendations

Preliminary recommendations  
for future research needs,  
funding needs and  
CEF/TEN-T guidelines

Deliverables 5.1 and 5.3

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## Abbreviations

ALICE	Alliance for Logistics Innovation through Collaboration in Europe
CEDR	Conference of European Directors of Roads
CEF	Connecting Europe Facility
ECO	Ecorys
ECTP-CEU	European Council of Spatial Planners-Conseil européen des urbanistes
EFSI	European Fund for Strategic Investments
EIM	European Rail and Infrastructure Managers
ERDF	European Regional Development Fund
EU	European Union
EUR	Euro
FP	Framework Programme
FUA	Functional Urban Area
INE	Inland Navigation Europe
O-D	Origin-Destination
OMG	Departement Omgeving Vlaanderen
POLIS	European Cities and regions networking for innovative transport solutions
PPP	Public Private Partnership
RWS	Rijkswaterstaat
STRIA	Strategic Research and Innovation Agenda
SUMP	sustainable urban mobility plan
TEN-T	Trans-European Transport Network
TFK	Trafikverket
UMP	Urban Mobility Package
WP	Work Package



# Executive Summary

## The Vital Nodes project

Urban areas have become an integral part of the development of the TEN-T network, which is reflected in the concept of **urban nodes**. Annex II of the TEN-T Guidelines lists 88 urban nodes of the core TEN-T network, which were identified based on socio-economic criteria, and have played a key role in structuring the TEN-T core network. These urban nodes ensure the connection between the **different transport modes**, as well as the connection between **long-distance and regional, peri-urban and intra-urban freight transport and logistics**. Urban nodes play a key role as centres of **socio-economic, spatial and technological development**.

The **Vital Nodes project** contributes to more effective and sustainable integration of **urban nodes** into **TEN-T corridors** by **innovative solutions for optimising accessibility, liveability and vitality, and to create equal emphasis of development on corridors and nodes**.

## Deliverable 5.1/5.3

One of the objectives of the Vital Nodes project is to deliver **validated recommendations** for a more effective and sustainable integration of the urban nodes into the TEN-T corridors. This deliverable contributes to this objective by providing preliminary recommendations, notably in future research and funding needs (Deliverable 5.1) and related to CEF and TEN-T guidelines (Deliverable 5.3). As these two deliverables are closely related, this has resulted in the integration into one joint deliverable.

In the first ten months of the Vital Nodes project, **workshops** have been carried out with urban node cities across Europe (**the 8+1 urban nodes of tier 1** – see D3.3), forming a strong source of information for the preliminary recommendations included in this deliverable. Additional inputs have come from specific **experts; projects**, notably the MG5.1 Consortia (Clusters 2.0 and LessThanWagonLoad); and the **Advisory Board** of Vital Nodes. The preliminary results will be validated the coming year, which eventually will result in validated recommendations. In this validation process, the ambition is to upscale the recommendations to the urban nodes.

## The preliminary recommendations – future research needs

The following preliminary recommendations on future research needs have been defined:

1. To determine the potential and benefits in terms of finance, environmental impact, mobility, economic, liveability and timing issues of integrated projects, which consists of soft infrastructure, and urban (infrastructure) projects.
2. To design of optimal datasets for traffic flows (passenger and freight), especially at the level of the Functional Urban Area. Data collection and comparability is vital for clear and transparent decisions about multimodal traffic flows, related measures and corresponding funding and to use for the typology of urban nodes.
3. To explore the innovative potential of urban nodes in first and last mile delivery.



4. To explore new forms and innovative types of governance to realize an integrated approach which will contribute to the sustainable integration of urban nodes on the TEN-T network.
5. To further investigate the interrelation between infrastructure, multimodal mobility management and spatial planning on all scale levels (EU, national, local/urban).
6. To explore how to enhance the resilience of the multimodal urban network.
7. To determine the position and linkages between different urban nodes on the TEN-T network.
8. To explore the functioning of the TEN-T network and the role the hubs play in relation with the New Silk Road.
9. To include an Area of Work for Urban Infrastructure in Strategic Research and Innovation Agenda (STRIA)

### **The preliminary recommendations – future funding needs**

The following preliminary recommendations on future funding needs have been defined:

1. Attention to complexity and liveability issues of urban nodes in TEN-T project development.
2. Integrated (metropolitan) governance as key element for successful development of urban nodes.
3. Better integration of different types of EU funding, including CEF grants to create a fundamental shift towards integrated infrastructure and spatial development in practice.

### **The preliminary recommendations – CEF and TEN-T guidelines**

The following preliminary recommendations on CEF and TEN-T guidelines have been defined:

1. More investments to strengthen the connection between TEN-T action for long-distance and last mile, including urban traffic.
2. Address urban infrastructure bottlenecks and missing links within and between transport modes of the TEN-T in these areas.
3. Stimulating the seamless sustainable connection between TEN-T long-distance and urban / regional traffic (e.g. establishing quality standards, integrated planning).
4. Stimulating information and traffic management systems at the interface in support of seamless connection between long-distance and urban/regional traffic for both passengers and freight (e.g. establishing quality standards, integrated planning).
5. Stimulating the early-market introduction of solutions for low-noise and zero-emissions urban freight delivery, including through transshipment facilities between long-distance and urban traffic.
6. Stimulate stronger involvement of the various governmental levels in urban nodes by requiring this in TEN-T funding
7. Starting a discussion on the required functions of a node.





# 1 Introduction

## 1.1 Background

**Transport provides vital functions** to the European Union and their cities, enabling **economic growth and access to jobs and services**. **Urban nodes**<sup>1</sup> are crucial for the effectiveness of the **core network of the TEN-T** (Trans-European Transport Network). Urban nodes are often the origin and/or destination of most long distance transport flows<sup>2</sup>. Urban nodes are the location of major multimodal transport hubs and are crucial regarding the interfaces of long distance and last mile delivery. However, freight transport, spatial planning and urban mobility are still mainly **conventional shaped worlds**, which have not yet been integrated. With an increasing number of inhabitants in combination with ever-growing freight transport volumes, different problems arise in urban nodes, which call for an **integrated and innovative approach**.

## 1.2 The Vital Nodes project

The TEN-T programme is the main action plan for comprehensive transport infrastructure development throughout the European Union<sup>3</sup> and is essential for the ambition to realise a single transport area in Europe<sup>4</sup>. While responding to economic and private users' needs, this infrastructure development must fulfil key societal requirements, such as balanced accessibility and sustainability.

**The Vital Nodes project contributes to more effective and sustainable integration of urban nodes into TEN-T corridors<sup>5</sup> by innovative solutions for optimising accessibility, liveability and vitality, and to create equal emphasis on corridors and nodes.**

Urban areas are key elements of the TEN-T network and must respond to growing mobility needs and increasing freight transport by implementing new logistic concepts, ensuring transport modes' seamless interconnection and accommodate spatial-economic growth and urban expansion (housing, working, facilities). Efficient freight delivery across the nodes into the last-mile is crucial for urban vitality (regarding social, economic and environmental quality of life). Urban areas must also tackle social and environmental issues, such as urban/peri-urban congestion, poor air quality, noise exposure, and road safety. All of this is key to ensuring a more sustainable development of Europe's urban areas and, at the

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<sup>1</sup> Definition 'urban node', EU 1315/2013, Article 3

<sup>2</sup> COM 2011/0650 final, COD 2011/0294

<sup>3</sup> See: [http://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/site/brochures\\_images/b1\\_2013\\_brochure\\_lowres.pdf](http://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/site/brochures_images/b1_2013_brochure_lowres.pdf)

<sup>4</sup> See The Transport White Paper from DG MOVE setting the "new" EU transport policy: COM(2011) 144, White Paper 2011 'Roadmap to a Single Transport Area - Towards a competitive and resource efficient transport system'.

<sup>5</sup> Since 2013, the European Union's trans-European transport network policy disposes of core network corridors – an instrument that combines the benefits of a coherent infrastructure development across national borders and transport modes, of a future-oriented transport policy and of a strong governance structure with each other



same time, ensure that urban areas properly support the construction and intelligent use of the European transport network<sup>6</sup>.

### 1.2.1 The urban nodes

Urban areas have become an integral part of the development of the TEN-T network, which is reflected in the concept of **urban nodes**. Annex II of the TEN-T Guidelines lists **88 urban nodes**<sup>7</sup>, which were identified based on **socio-economic criteria**, and have played a key role in structuring the TEN-T core network. These urban nodes ensure the **connection between the different transport modes**, as well as the **connection between long-distance and regional, peri-urban and intra-urban freight transport and logistics**. With core network corridors acquiring importance as socio-economic environments too<sup>8</sup>, urban nodes play a key role as **centres of socio-economic, spatial and technological development**.

### 1.2.2 The challenges

An effective integration of a node in the TEN-T core network corridors is **complex**. As each urban node has its own specific characteristics and issues, it would be too simplistic to assume that there is a one-size-fits-all solution. Different spatial scales, modalities, sectors and stakeholders are concerned and all have to be taken into account when optimising the integration of solutions for accessibility and profitability of freight logistics on the one hand with vitality and liveability of urban areas becoming increasingly important on the other. As freight transport and urban logistics grow and innovate swiftly, and increasingly impact socio-economic development, as well as accessibility and spatial and environmental quality of urban regions, there is a need for **deliberate, governmental involvement**. In view of these developments, **infrastructure planning, urban planning, and passenger and freight transport must become more integrated** to effectively and sustainably incorporate urban nodes into TEN-T corridors<sup>9</sup>. To this end, actors within various fields, such as **urban planners, infrastructure coordinators and operators, freight and logistic operators and financiers**, need to **collaborate early on in the planning and decision-making process**. This allows for a more **integrated perspective at investments in mobility, infrastructure, passenger transport and freight logistics** from (inter)national (corridor), regional and local perspectives.

<sup>6</sup> See: Arts, J., T. Hanekamp, R. Linssen & J. Snippe (2016), "Benchmarking Integrated Infrastructure Planning Across Europe – Moving Forward to Vital Infrastructure Networks and Urban Regions", *Transportation Research Procedia*, Vol.14 (2016), pp. 303-312.

<sup>7</sup> See: <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32013R1315> Annex II List of Nodes and the Core Comprehensive Networks.

<sup>8</sup> See, e.g.: DG Internal policies (2013), *TEN-T Large Projects – investments and costs*, Policy Department B, Structural and Cohesion Policies, Brussels. [http://www.europarl.europa.eu/RegData/etudes/etudes/etudes/join/2013/495838/IPOL-TRAN\\_ET\(2013\)495838\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/etudes/etudes/join/2013/495838/IPOL-TRAN_ET(2013)495838_EN.pdf); Dijkstra, L. (ed.) (2014), *Sixth Report on economic, social and territorial cohesion*, European Commission, Brussels. [http://ec.europa.eu/regional\\_policy/sources/docoffic/official/reports/cohesion6/6cr\\_en.pdf](http://ec.europa.eu/regional_policy/sources/docoffic/official/reports/cohesion6/6cr_en.pdf); and See Balázs, P., L.J Brinkhorst, P. Cox, M. Grosch, K. Peijs, C. Trautmann, P. Wojciechowski (2016), *TEN-T Corridors: Forerunners of a forward-looking European Transport System*, Issue papers of European coordinators, 12 May 2016, Brussels.

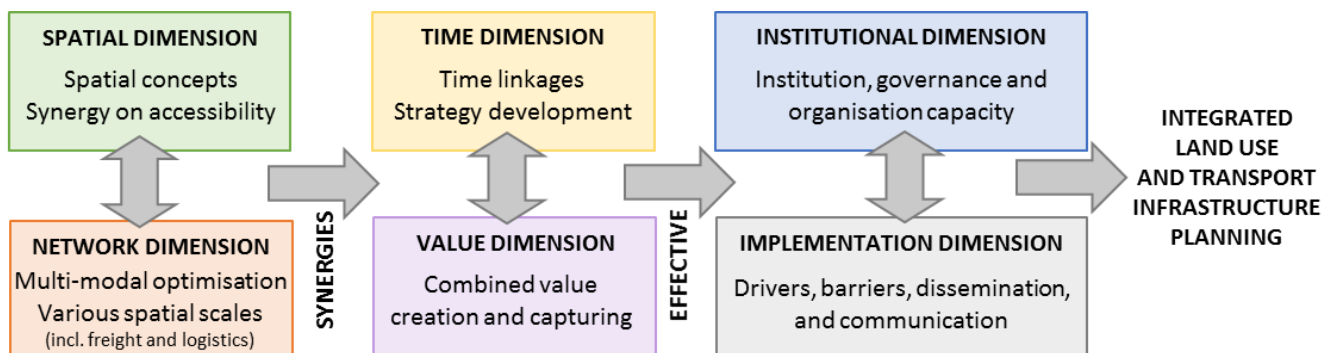
<sup>9</sup> See: Arts, J., T. Hanekamp & A. Dijkstra (2014), "Integrating land-use and transport infrastructure planning: towards adaptive and sustainable transport infrastructure", *Proceedings 5th TRA Conference 14-17 April 2014 Paris*, IFSTARR, Paris.



This means that there is need for a combination of **TEN-T related goals** and the **objectives of sustainable urban mobility plans (SUMPs)**<sup>10</sup>, as promoted by the Commission in the **2013 Urban Mobility Package (UMP)**<sup>11</sup>. Within this framework, these goals open the perspective for forward-looking practices and integrated approaches, which both enhance transport solutions and stimulate synergies with other urban functions<sup>12</sup>. Regarding the complexity of the challenges there is no ‘silver bullet’. A focus on innovative technical solutions and methods will not be enough. There is need for an integrated approach that connects the world of **infrastructure, mobility, freight, and logistics**, such as presently in the MG5.1 project consortia, with the world of **urban and spatial development**. An approach in which there is attention for **soft innovations**, addressing the multiplicity of the challenges by integrating different spatial scales, sectors, modalities, stakeholders and multi-level governance. This need for integration is acknowledged by key stakeholders such as **National and Regional Infrastructure Authorities**<sup>13</sup>, **DG MOVE**<sup>14</sup>, as well as the **Coordinators of the TEN-T corridors**, who stress the importance of integrated strategies, platforms for exchanging experiences and a multi-level governance approach, explicitly referring to the **NUVit initiative**<sup>15</sup>.

The **NUVit initiative** defines six dimensions, as presented in Figure 1.1, resulting in the need for integrated land use and transport infrastructure planning.

**Figure 1.1 Six NUVit dimensions and their linkages**



Source: NUVit

<sup>10</sup> See: <http://www.eltis.org/mobility-plans/sump-concept>

<sup>11</sup> See: [https://ec.europa.eu/transport/sites/transport/files/themes/urban/urban\\_mobility/doc/apum\\_state\\_of\\_play.pdf](https://ec.europa.eu/transport/sites/transport/files/themes/urban/urban_mobility/doc/apum_state_of_play.pdf), and [https://ec.europa.eu/transport/sites/transport/files/themes/urban/urban\\_mobility/doc/2009\\_urban\\_mobility\\_leaflet\\_en.pdf](https://ec.europa.eu/transport/sites/transport/files/themes/urban/urban_mobility/doc/2009_urban_mobility_leaflet_en.pdf)

<sup>12</sup> See Balázs, P., L.J Brinkhorst, P. Cox, M. Grosch, K. Peijs, C. Trautmann, P. Wojciechowski (2016), TEN-T Corridors: Forerunners of a forward-looking European Transport System, Issue papers of European coordinators, 12 May 2016, Brussels

<sup>13</sup> Covering the relevant modes of transport.

<sup>14</sup> See presentations of S. Phillips (SG CEDR), L. Erixon DG Trafiverket - SE), J.H. Dronkers (DG Rijkswaterstaat, NL) and D. Rosca (DG MOVE) given at the EU Conference on “Networking for Urban Vitality, An integrated approach on Infrastructure and Spatial Planning”, EU Symposium – organized as part of the Netherlands’ EU-Presidency – 23 June 2016, Amsterdam – [www.nuvit.eu](http://www.nuvit.eu)

<sup>15</sup> See page 51-52 in Balázs, et al (2016).

Besides the above-mentioned challenges, the urban nodes cope with a variety of challenges (see also Deliverables 2.3 and 3.3), such as:

1. Increasing congestion and costs<sup>16</sup>
2. Increasing climate change impact<sup>17</sup>
3. Increasing health impact related to poor air quality<sup>18</sup>
4. Higher number of road accidents<sup>19</sup>
5. Inefficient use of space<sup>20</sup>.

### 1.2.3 The objectives

Against the above-mentioned challenges, objectives of the Vital Nodes project have been defined, which are two-fold:

1. To deliver **validated recommendations** for a **more effective and sustainable integration of all 88 urban nodes into the TEN-T corridors**, focusing on **freight logistics**;
2. To establish a **long-lasting European expert network**, based on existing (inter)national and regional networks for **safeguarding long-term continuity in knowledge and implementation**.

In relation to the first objective, the Vital Nodes project will contribute with **evidence-based recommendations for the further implementation and deployment of innovative approaches**. These recommendations address a **more (cost-) efficient and sustainable integration of long-distance and last-mile freight delivery and logistics in urban areas**, also taking into account **passenger transport flows**. Vital Nodes will collect **best practices, experiences and opportunities**, as well as deploying novel combinations of existing technologies and services.

A selected group of experts from the **Expert Pool** (WP1), **MG5.1** projects<sup>21</sup> (**CLUSTER2.0** and **LessthanWagonLoad**) and the members of the **Advisory Board** have been consulted on these preliminary recommendations.

The second objective will be worked out in D1.1 (first prove of concept) and will bring existing networks together to create a **network of networks for ensuring long-term engagement and successful implementation**. Creating long-lasting cooperation between these existing networks is central to Vital Nodes. In order to enhance a sustainable legacy, the Vital Nodes network is not replacing existing networks but rather **carefully connecting** them, **enhancing cooperation and knowledge development and exchange**.

<sup>16</sup> COM (2011) 144 final, 13 Increase of 50% of costs by congestion in 2050

<sup>17</sup> See: [https://www.interregeurope.eu/fileadmin/user\\_upload/tx\\_tevprojects/library/file\\_1509035065.pdf](https://www.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1509035065.pdf)

<sup>18</sup> COM (2011) 144 final, 30 Urban transport is responsible for 25% of CO2 emissions.

<sup>19</sup> COM (2011) 144 final, 30 69% of all road accidents occur in cities.

<sup>20</sup> See: [https://www.interregeurope.eu/fileadmin/user\\_upload/tx\\_tevprojects/library/file\\_1509035065.pdf](https://www.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1509035065.pdf)

<sup>21</sup> H2020 call MG-5.1-2016 See: [www.clusters20.eu](http://www.clusters20.eu) and [www.lessthanwagonload.eu](http://www.lessthanwagonload.eu)



A more integrative approach will not be guaranteed by stimulating a smarter multi-level approach only, but also relates to other issues, for example the link between Horizon 2020 and Connecting Europe Facility (CEF). A **better balance between infrastructure and sustainable mobility** on the one hand, and **liveable, economically vital urban regions** on the other, may only be achieved when a **multi-sector approach with corresponding funding and governance mechanisms** is adapted. These mechanisms will be brought together in the recommendations for the future research and funding needs. This task will deliver recommendations in a broader perspective and take also other Commission research and funding programmes into account, for example the European Regional Development Fund (ERDF), as well as multi-donor funding.

### 1.3 Scope of this deliverable

This deliverable contributes to the first of the two above-mentioned objectives of the Vital Nodes project by presenting **preliminary recommendations** to the European Commission to stimulate the sustainable integration of urban nodes in TEN-T and increase the effectiveness of the core network of the TEN-T. As such, this deliverable is an integral part of the delivery of Work Package (WP) 5, aimed at providing validated recommendations on integrating nodes and corridors, on funding needs and instruments, and on future research needs.

The recommendations concentrate on:

1. Future research needs (see Section 2)
2. Future funding needs (see Section 3)
3. CEF and TEN-T guidelines (see Section 4)

This document integrates the deliverables **D5.1** and **D5.3** as these two deliverables are closely related. Recommendations for the new **CEF and TEN-T guidelines**<sup>22</sup> (deliverable D5.3) cannot be seen separately from the recommendations on **funding- and future research needs** (deliverable D5.1) and vice versa.

### 1.4 Process elements

This section presents a number of process related elements, i.e. sources of information (Section 1.4.1), the validation process (Section 1.4.2) and the data needs (Section 1.4.3). By doing so, also the linkages to other WPs are established.

#### 1.4.1 Sources of information

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<sup>22</sup> Also considering the scheduled revisions of the TEN-R Regulation.



In the first ten months of the Vital Nodes project, **workshops** have been carried out with urban node cities across Europe (**the 8+1 urban nodes of tier 1**), as part of WPs 2 and 3, which are closely related to each other. These workshops will be followed up in WP4, with workshops addressing the tier 2 and tier 3 urban nodes. In **deliverable D3.3** the outcomes of the tier 1 workshops are presented in the form of **recommendations to the European Commission**. It should be noted that **deliverable D3.1** was issued earlier and provided the preliminary outcomes for the first urban node workshop in Vienna.

WP2, WP3 and WP4 are closely related, which also makes the deliverables D2.2, D2.3 and D3.3 strongly related. The preliminary recommendations in this deliverable are based on the above-mentioned WP deliverables, as well as on findings from **key events**, as included in WP6<sup>23</sup>.

Furthermore, input from the following organisations and experts has been requested and used in drafting the recommendations:

- European Rail and Infrastructure Managers (**EIM**)                      Monika Heiming
- Conference of European Directors of Roads (**CEDR**)              Steve Phillips
- Inland Navigation Europe (**INE**)                                      Karin De Schepper
- European Cities and regions networking  
for innovative transport solutions (**POLIS**)                      Karin Vancluysen
- **EUROCITIES**    Metodi Avramov
- European Council of Spatial Planners-  
Conseil européen des urbanistes (**ECTP-CEU**)                      Joris Scheers
- Alliance for Logistics Innovation through  
Collaboration in Europe (**ALICE**)                                      Fernando Liesa

Summarising, the preliminary recommendations are based on the following sources:

1. The **workshops of WP3**, in close co-operation with **WP2**
2. The **deliverables of WP2 and WP3**
3. Input from **experts**
4. Input from the **MG5.1 Consortia (Clusters 2.0 and LessThanWagonLoad)**
5. Input from the **CEDR Research Call 2015: Freight and Logistics in a Multimodal Context**<sup>24</sup>
6. Input from the **Advisory Board of Vital Nodes**<sup>25</sup>.

## 1.4.2 Validation process

The Vital Nodes project has a duration of two years and it should be noted that recommendations included in this deliverable are **preliminary**. In November 2018, a process will be started, in which the

<sup>23</sup> Amongst other TRA2018, CIVITAS, POLIS, TRB 2018, TEN-T days 2018

<sup>24</sup> CEDR Research Call Fluxnet, Concept toolbox for Logistics Oriented Development. MUST + TEMAH, October 2017; See also: CEDR Research Call Collaborative Planning of Infrastructure and Spatial Planning (started: September 2018). This research programme focuses on the need for developing a common framework to obtain the synergies from interactive planning of infrastructure and spatial development ('collaborative planning').

<sup>25</sup> In meetings on 7 February 2018 and 12 September 2018, review period of these deliverables (combined D5.1 / D5.3) 3 October 2018 up to 20 October 2018.



current provisional recommendations will be **validated**. By doing so, the ambition is to **upscale the recommendations to all 88 urban nodes**. Validation is based on a number of **predetermined criteria**, which will be determined in an expert meeting. Based on these criteria, the provisional recommendations will be tested in two meetings:

- In the **first meeting**, testing will take place on **future funding needs, funding instruments, future research needs and CEF / TEN-T guidelines**. A mix of funding experts and scientists will be invited to this meeting;
- In the **second meeting**, a number of **WP4 results** will be available, based on which the recommendations on **sustainable integration of urban nodes on the TEN-T network** will be tested.

The planning of the validation process is presented in Table 1.1.

**Table 1.1 Planning of the validation process**

Action	Involved parties	Period
Inventory participants expert meeting	Vital Nodes consortium + Advisory Board + Experts + MG5.1 Consortia + TEN-T coordinators + European Investment Bank (EIB)	<b>M13-M14</b>
Meeting validation criteria	Involved partners WP5 + WP1 + Experts + EIB	<b>M15-M16</b>
Organising expert meeting Brussels (M17)	Vital Nodes consortium + Advisory Board + Experts + MG5.1 Consortia + TEN-T coordinators + European Investment Bank (EIB)	<b>M17</b>
Send minutes and information to all involved partners + process information at preliminary recommendations	Vital Nodes consortium + Advisory Board + Experts + MG5.1 Consortia + TEN-T coordinators + European Investment Bank (EIB)	<b>M17-M18</b>
Organising second expert meeting Brussels (M20)	Involved partners WP5 + WP1 + Experts + EIB	<b>M20</b>
Send minutes and information to all involved partners + process information at preliminary recommendations	Vital Nodes consortium + Advisory Board + Experts + MG5.1 Consortia + TEN-T coordinators + European Investment Bank (EIB)	<b>M20-M21</b>
Send draft validated recommendations towards all involved partners and engage in policy dialogue	Vital Nodes consortium + Advisory Board + Experts + MG5.1 Consortia + TEN-T coordinators + European Investment Bank (EIB)	<b>M22-M23</b>

### 1.4.3 Data needs

As the Vital Nodes project will contribute with **evidence-based recommendations** for the further implementation and deployment of innovative approaches, there is a strong need for **data collection** on urban freight transport. Such data would facilitate analysis related to:

- Having a **base case**, with specific insight in Origin-Destination (**O-D**) **freight and passenger flows across modes**<sup>26</sup>;
- Building a functional and regional **evidence-based strategy on logistics**, including scenarios related to the substantial developments;
- Starting a discussion on the required **functions of a node**. Such discussion would include questions, including: when does a node have added value for the European network? Do the current 88 urban nodes generate added value given the vast changes and developments?

Comparability of data and the absence of data have proven to be key issues, as experienced during the first phase of the Vital Nodes project.

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<sup>26</sup> To start with participating cities and the links with the TEN-t network and the corridors, especially at the Functional Urban Area level (see also D2.3).





## 2 Preliminary recommendations on future research needs

### 2.1 Introduction

As mentioned in Chapter 1, urban nodes are crucial parts of the TEN-T network and to be considered the **'backbone' of Europe's economic activity**. This should also be seen in the light of a **growing population and density**. More than 75% of the European population is living, commuting and working in the urban areas of Europe and this will increase to more than 80% by 2050. Through the **elimination and avoidance of bottlenecks, increasing the seamless (multimodal) connection on the TEN-T network**, as well as the **reduction of negative effects for the population of urban areas by reducing emissions and securing the quality of life**, it is possible to create various **positive effects for the economic development of a region and increase liveability** at the same time.

In order to support the development of urban nodes as part of the TEN-T network, dedicated research is needed. This section presented preliminary recommendations on future research<sup>27</sup>.

### 2.2 Future research needs

Recommended future research needs are presented in Table 2.1 These future research needs are elaborated next.

**Table 2.1 Recommended future research needs**

Recommended future research needs
1. To determine the potential and (objective) benefits in terms of finance, environmental impact, mobility, economic, liveability and timing issues of integrated projects, which consists of soft infrastructure, and urban (infrastructure) projects.
2. Design of optimal datasets for traffic flows (passenger and freight). Data collection and comparability is vital for clear and transparent decisions about multimodal traffic flows, related measures and corresponding funding and to use for the typology of urban nodes.
3. Innovative potential of urban nodes in first and last mile delivery.
4. To explore new forms and innovative types of governance to realize an integrated approach which will contribute to the sustainable integration of urban nodes on the TEN-T network.
5. The interrelation between infrastructure, multimodal mobility management and spatial planning on all scale levels (EU, national, local/urban).
6. Resilience of the multimodal urban network.

<sup>27</sup> In the process of formulating research needs, the research and innovation roadmaps of the transport European Technology Platforms (ETPs) are considered.



7. The position and linkages between different urban nodes on the TEN-T network.
8. The functioning of the TEN-T network and the role the hubs play in relation with the New Silk Road.
9. Include an Area of Work for Urban Infrastructure in Strategic Transport and Research and Innovation Agenda

### 2.2.1 Determine the potential and benefits of integrated solutions

Solving bottlenecks on the TEN-T corridors and urban nodes has always been a **top-down approach**, with a strong focus for a **solution from one modality**. The complexity of urban nodes requires a different approach. At the same time, the TEN-T network is used by different types of traffic flows (freight and passengers), includes multiple modalities (rail, road, waterways and air) and a broad range of authorities and stakeholders, and has to tackle a wide range of problems (e.g. environmental, liveability, congestion). In order to tackle the bottlenecks of today and in the future, a **more integrated (bottom-up) approach** is needed, with a strong focus on **multimodal solutions**.

To improve cross-sectoral and **cross-disciplinary cooperation** between urban planning, infrastructure, mobility and environment, further research is required. Research in combination with the development of **pilot projects/living labs** is necessary to continue the development and improve **an integrated approach of projects regarding the integration of urban node on the TEN-T network**. Effectiveness and development with substantial impact is not only a case of research, but also **implementation**.

Each discipline has its own networks, use its own language and assesses projects against its own criteria. Research is needed on how these different disciplines can more effectively work together in designing and implementing integrated projects.

Research should focus on a broad range of topics, which includes **financial aspects** (instruments, public-public and public-private), **environmental aspects** (e.g. air quality, noise), **mobility** (freight, logistics and passengers), broader socio-economic benefits, including **quality of life**. What are the effects of an integrated approach on these topics? How can non-financial benefits be better taken into account? Does a more integrated approach affect price and realisation time of projects? Will infrastructure projects become more expensive or less? How does it affect the realisation time? Also, does an integrated approach contribute to the sustainable integration of the urban nodes on the TEN-T network?

The Vital Nodes project has been able to identify a number of **good practices**. These good practices and 'take-aways' are included in deliverables **D2.2** and **D3.3** and show that an **integrated approach works** (in comparison to fragmented approaches), but that the **effectiveness is often related to the complexity** of the urban node itself. Therefore, a **tailor-made approach** is needed, tuned to the specific circumstances of the urban node.

In order to disseminate the knowledge about an integrated approach, the Vital Nodes project is creating a **long lasting network (WP1)**, however, further research is also needed to support this knowledge with



**objective information and results.** In relation to the urban nodes involved in Tier 1, there is a great deal of interest in the **added value of this network** as it can contribute to structuring the knowledge and dissemination of the Vital Nodes related topics. The Vital Nodes project focuses on the sustainable integration of urban nodes on the TEN-T network in Europe. In terms of the use of financial instruments, spatial planning, development of sustainable (multimodal) mobility, infrastructure, freight&logistic transport<sup>28</sup> and liveability sharing knowledge with the **United States** and perhaps **China**<sup>29</sup> on research and dissemination, could contribute to enhancing the knowledge of sustainable integration of urban nodes into multimodal freight and logistic networks in Europe and urban nodes as well.

### 2.2.2 Design of optimal datasets for traffic flows

Discussing the challenges in the selected urban nodes of Tier 1 – based upon facts and figures, trends and impacts – stakeholders agree that the **functional urban area** of their urban node is often more extensive and **also includes the region surrounding the urban node**. The current definition of regions (NUTS3) is too small to define the functional urban area of the Tier 1 urban nodes. In some cases, there is also a strong link with other (nearby) urban nodes. This is the case, for example, with Vienna, Strasbourg and Mannheim. For that reason, the functional area should be **tailor-made** with available data or data should become available to be able to profile the functional urban area.

From a European perspective, it may be necessary to structure the **development of the urban node typology** and guide the data and information collection. To achieve this, it is crucial to come to a common understanding and description of an urban node. To **structure data and information collection** and to be able to **compare the different urban nodes among each other**, this definition will be used in the Vital Nodes project. However, in case access to data at European level could be available, this would make it easier and less time-consuming to shape the functional areas.

### 2.2.3 Innovative potential of urban nodes in first and last mile delivery

Urban nodes are not only crucial for the effectiveness of the TEN-T network, but they also have enormous potential as the **main hub for connecting the regions to the core network corridors**, as well as **forerunner for distributing and deploying alternative fuels, sustainable mobility and other innovative technologies**. Urban nodes can facilitate new **inter- and multimodal logistics concepts** along the corridors to increase the sustainable integration on the TEN-T network. **Innovation** within urban nodes is concentrated in three variants:

- The **governance** of the integration of the urban nodes on the TEN-T network – multi-level governance;

<sup>28</sup> United States is out performing EU in the field of logistics. See: Fact-finding studies in support of development of an EU-strategy for freight transport logistics. Lot 1. Analysis of the EU logistics sector. Final report, January 2015. Ecorys, Fraunhofer, Prograns, TCI Röhling, AUEB-RC/TRANSLOG

<sup>29</sup> See: EU-China sustainable urbanization Flagship Initiative-Work programme 2018-2020; which could also be extend with a topic about the sustainable integration cities/urban nodes on multimodal networks.



- The development of **sustainable hubs**, as a seamless connection between long-distance and last mile – this might relate to concepts such as synchronomobility, mobility as a service (MAAS);
- The development of **sustainable and clean mobility** in the urban node for transport in the last mile – this relates to (regional) SUMP.

New forms of sustainable and clean mobility will have a positive effect on **air quality, noise reduction (E-mobility)**. In that regard, it is also important to include the robustness of the network. Even when the **multimodal hubs** are realised, and there is sustainable and clean transport, it is still important that the urban network is **robust**. When bottlenecks exist on the network, there is **congestion**, which will have negative economic and liveability effects.

It is necessary to **develop test cases and living labs** based on local drivers for development to investigate the **effects of different innovations**. The use of **triple helix collaboration** (Knowledge Institutes-Government-Private Parties) has to be stimulated to maximise the results of innovation<sup>30</sup>.

In order to reduce freight transport movements, congestion and increasing the air quality, further **optimisation between long distance and last mile delivery** is needed. Possibilities of **sharing connected hubs** at different levels by users and suppliers, while using **sustainable vehicles** should be explored. More insights is needed in barriers, applicable business models and collaboration mechanisms.

## 2.2.4 Explore new forms and innovative types of governance

An **effective and sustainable integration** of an urban node in the TEN-T core network corridors is complex. The WP3 workshops illustrated that there is a need for **regional collaboration** between **urban nodes and the region**. Each urban node has its own specific characteristics and issues, different spatial scales, economic activities, governance, location on the corridor and so on all have to be taken into account. As freight transport and urban logistics grow, innovate swiftly, and increasingly impact socio-economic development, as well as accessibility and spatial and environmental quality of urban regions, there is need for **deliberate, governmental involvement**, as introduced in the challenges in Chapter 1.

Further research is needed to **explore new forms and types of governance** and how to implement to realise an **integrated approach, which contribute and accelerate the integration of the urban nodes on the TEN-T network**. There is a need to explore which form of governance could support the integrated approach, which could be used by urban nodes. Strong **multi-level governance and coordination** is required (EU, national, regional, local and urban level) not only to foster an integrated approach but also to **minimise administrative burdens and costs**.

<sup>30</sup> See also: Open Innovation 2.0, A new Paradigm, 2013, M. Curley, B. Salmelin and <https://ec.europa.eu/growth/tools-databases/dem/monitor/tags/triple-helix-model>



## 2.2.5 Interrelation between infrastructure/mobility management and spatial planning

One of the conclusions drawn from WP3 is the **lack of attention** to the **interrelation between spatial/land use planning and infrastructure/mobility planning** at all scale levels (EU, national, regional, local, urban). One example is the **'last (and first) mile delivery hubs'**. The design, scale and location of hubs are crucial for the impact on the last mile delivery. If the right scale and location are not applied, more space will be claimed by transporting the same amount of goods. In urban nodes with an already high density, there is a **'challenge of space'**. Multiple ground use and reservation of different areas (for example 'brownfield development') in an urban node is one of the possible solutions. The possibilities, which could be offered by research for 'hub-development' are numerous and ideal to be applied in urban areas. However, such reflexions still appear to be isolated cases and on the various scale level the interrelation between mobility and spatial planning is not sufficiently recognised.

It is important that not only the hub has the right scale, location and design, but also that the transportation from a hub for the last mile delivery will be sustainable (**E-mobility, alternative fuels**).

Moving consolidation centres (hubs) out of the cities could also result in more movements in and out the city. This means improved integrated transport sub-systems and modes, requiring a strengthened role for **multimodal hubs or transshipment points**. Further research is necessary on how to shape multimodal hubs in and around urban nodes and how to implement the multimodal hubs in such a way that it has a positive impact on **environment** (air, noise), **liveability and congestion**. Research is recommended related to the possibilities that hubs offer and in which way the impact can be increased so that the effects are also visible outside the boundaries of the urban nodes on the TEN-T network.

The **link between long distance and last mile** is important because an increase in the modal shift has positive effects on the environmental effects in the urban node, which should also include the effectiveness of hubs (also mid and mini) in the urban nodes. This should also include research to increase the effectiveness of the link between long distance and last mile, including the **modal shift**.

## 2.2.6 Resilience of the multimodal urban network

Many bottlenecks, **congestion**, both on land, water and rail, occur in those places where **long distance turns into a last mile delivery**. Growing cities and an increase of economic activities (including **E-commerce**) also causes a significant increase in last mile delivery freight transport. Following the workshops of WP3, we note that urban nodes are looking for a solution by **creating hubs**. In addition, we note that these are often **small-scale applications** that mostly have effects within the boundaries of the urban nodes.

As mentioned in recommendation 5, not only is the location, scale and design of the hub important, but also the transportation from a hub. Further research is necessary on what forms of mobility should be taken into account, for example on **E-mobility, E-bikes, alternative fuels, refuelling stations serving more modes, at multimodal hubs**. By increasing interlinkages between the various networks of



different modalities, the resilience of the overall urban network will enhance. At this especially the peri-urban infrastructure is important as this is the 'hinge' between long-distance and local urban transport. The increase of sustainable mobility will also have an effect on the spatial dimension of a city (sprawl/compactness, multifunctional areas, design quality), so this element has also been taken into account.

### 2.2.7 Position and linkages between different urban nodes on TEN-T network

The Vital Nodes project shows that urban nodes are an essential part of the TEN-T network. Urban nodes are not always aware of this position. A **further awareness** about this position would in itself be a good investment, because in that case urban nodes will also look at their networks and the effects of their mobility projects in a different way. The WP3 workshops show that a number of urban nodes are aware of their **mutual connection** with other urban nodes. For example, there is a strong connection between **Vienna** and **Bratislava** in terms of freight and logistics. The **Port of Rotterdam** has an important link with **Milan** and **Strasbourg** with the port of **Kehl**. These **cross-border collaborations** have many economic benefits for both cities / urban nodes, but because of differences in legislation, permits, etc., the economic possibilities are often not fully utilised and can be strengthened. Research is needed to determine in which areas cross-border cooperation between urban nodes is most present, which economic potentials this can have and which thresholds must then be removed.

### 2.2.8 Functioning TEN-T network and role of hubs in relation to the New Silk Road

Current discussions about improving rail connections with **China** (the '**New Silk Road**') might have a strong impact, for example on **Vienna** and other urban nodes such as **Bratislava**, **Budapest**, **Mannheim**, **Strasbourg**, **Genova** and **Turku**<sup>31</sup>, also in relation to the European context and the overall TEN-T network. In the future, goods transported via the **New Silk Road** from China to Europe are expected to be delivered in 14 to 18 days instead of the current 40 days. Heavy rail-road infrastructure will be needed to handle these freight flows. At this moment there is not enough capacity to do so, as the rail network in and around the mentioned urban nodes is already quite full and vulnerable.

Plans need to be made – not only at local and national level – to be able to handle these new freight flows and by possibly creating new inland ports. The bigger picture of the **New Silk Road** needs to be linked to the local/regional topics, such as the **vulnerability of the railway network**, for example in and around Vienna and capacity constrains for passengers and freight transport. The freight situation in Central and Eastern Europe might change much as the (proposed) Chinese infrastructure investments in developing this Silk Road are substantial. This is illustrated by the ownership of the Greek Port of Piraeus by a Chinese state-owned company and huge railway investment plans to connect the port and Central Europe.

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<sup>31</sup> Relevant for Turku is a New Silk Road initiative between China and Finland, at the heart of the Northern Growth Zone. Kouvola railroad terminal is the main hub, connecting the Finnish export ports, including the Port of Turku, to the logistics routes between EU and China. More information on: <https://www.youtube.com/watch?v=fXdx5EyNtw>.



Because of these Chinese investments, the TEN-T network might get more entry and exit points in Eastern Europe connecting to the **New Silk Road**. This will potentially alter the function of some urban nodes.

Finally, the organisation of the TEN-T network and the position of the individual urban nodes might also change over time due to internal or external events. There are indications that the Chinese **New Silk Road initiative** is already shifting investments on the network and has the potential to alter considerably the role of certain hubs.

### 2.2.9 Include an 'Area of Work' for Urban Infrastructure in STRIA

To develop research and innovation in key areas for future transport infrastructure policies, a strategic agenda with seven roadmaps is under development at this moment<sup>32</sup>. The **Strategic Research and Innovation Agenda (STRIA)** points 'Infrastructure' as one of the seven priority areas. A good **infrastructure network** is essential for economic growth, especially in urban areas, which are the main drivers of economic growth. As stated in the STRIA, transport infrastructure in the EU faces some key challenges: governance; pricing; taxation and finance; synchronicity, intermodality, interoperability and integration of transport systems: lifecycle optimisation; and infrastructure operation but also should include spatial planning into account. Because sound spatial planning is key to good quality infrastructural projects. From fuel distribution to the development of areas for logistics activities and hubs, **spatial planning** is essential for development and implementation.

Important is also to **connect and integrate** developments and collaboration between related authorities on local, regional and (inter)national level. This requires strategic alignment and regional planning to facilitate linkages between regional, and local level. An integration of the **TEN-T** policies with regional **SUMP** including freight logistics integrated should guide future mobility developments and bridge the gap between local, regional and national authorities and include (inter)national public and private ambitions concerning freight and logistics.

In addition, **stronger governance** is mentioned as an important driver to encourage research into the medium and long-term reduction of emissions via transport infrastructure. Strong governance is an important driver in all types of infrastructural development. Especially at infrastructural works in urban areas and cross border regions. In these preliminary recommendations, some key notes are given about governance issues. As indicated in Section 3.2.2, strong governance depends on the situation and the project. Funding could be a good driver to stimulate good governance, which could include not only public parties but also private parties, for example. transport and logistic companies.

For the overview of the short-term research and innovation actions an important **Area of Work** is missing, i.e. **Urban Infrastructure**. Urban infrastructure deserves full acknowledgment in the research overview of the STRIA. The proposed Area of Work for Urban Infrastructure is presented in Table 2.2.

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<sup>32</sup> SWD (2017) 223 final.



**Table 2.2** Area of Work for Urban Infrastructure

Area of Work	Urban infrastructure	
Target	Facilitate the creation of multimodal infrastructural solutions to connect long distance freight and logistics with last mile delivery.	
Action	Time Horizon	
Develop and testing of large scale multimodal sustainable hubs in urban area's	2020	
Improve the collaboration between urban planners, infrastructure coordinators and operators, freight and logistic operators and financiers early in the planning and decision-making process on different scale levels (local, national, European).	2020	
Develop, test and improve infrastructural connectivity between the modalities to increase the modal shift in urban areas.	2020	
Develop and increase available and useful data regarding traffic flows (passenger, freight and logistics) to substantiate infrastructural investments in urban areas.	2020	
Develop tools and measures to connect liveability issues in infrastructural projects.	2020	

### 2.2.10 Recommendations and workshop urban nodes coverage

Table 2.3 provides an overview of recommendations addressed at the workshops in the urban nodes workshops.







## 3 Preliminary recommendations on future funding needs

### 3.1 Introduction

In order to further improve the sustainable integration of urban nodes at local, national and TEN-T level, we see important **investment needs**, which in turn will contribute to the **EU's overall transport objectives** and the development of **strong economic and sustainable regions**.

The current TEN-T guidelines recognise and formalise the role of urban nodes in these transport networks as important hubs that facilitate the flow of people and goods<sup>33</sup>. In addition, they are related to **freight and passengers transport** being the **major centres for production and consumption**. Maximising the potential of this vital funding stream will ensure urban nodes are able to meet **current and future challenges**, while providing **smart, efficient and sustainable transport** play an important role in facilitating these investments (**Connecting Europe Facility, European Structural and Investment Funds, European Fund for Strategic Investment**) and **private co-funding**.

An integrated approach of projects and governance also requires integrated funding. Integrated projects will generally cover a variety of problems, for example, improvement of the **air quality, economic growth and increasing liveability**, which benefits a growing group of stakeholders. In order to increase this integrated approach, financing from **different European funds** would be very beneficial.

Integrated funding also requires **equal participation rules and funding instruments**. Conditions between the European funds in terms of use and participation should be harmonised. This would also be an opportunity to look at the number of financing instruments.

In order to be able to facilitate an integrated approach, proper use of financial instruments is important. A **sound mix of public and private investors** and **long-term commitment** are critical factors. Long-term commitment is a challenge for both the public and private investors and focus is often on the short and medium term. When using financial instruments for an integrated approach, a wide range of private investors should benefit from the investment. Private investors not only include banks and pension funds, but could also include real estate companies and logistic and transport companies.

For the implementation of transport infrastructure and for cross-cutting issues, different types of EU-funds are available for public and private partners in an urban node: **Connecting Europe Facility (CEF)**, the **Cohesion Fund**, as well as other specific European programmes on regional development (**HORIZON 2020 and INTERREG**). In order to ensure partnership from the different scale levels (European, national, regional, local, urban), funding sources should be coordinated with multi-level-governance structures.

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<sup>33</sup> See: Second Work Plan Rhine-Alpine 2016

The input from the workshops of the Tier 1 urban nodes delivered results that can benefit from establishing future funding needs, as outlined below:

- Focus on measures with a **smaller investment volume** (around EUR 50 million), which can be invested in coherence with other small initiatives and deliver an interesting proposition<sup>3435</sup>;
- High return on investments on the corridor is in the **border areas**. At the same time, investments on the corridor in **urban areas** are high as well;
- There is an added value for European funding for **multi-stakeholder governance**, focused on **mutual interests and reciprocity**;
- Urban nodes should not be considered independent units, but rather should be considered more strongly in their **spatial and functional environment on the entire corridor**.

This section presents recommendations on future funding needs, required to support the further development of urban nodes as part of the TEN-T network.

## 3.2 Future funding needs

Recommended future funding needs are presented in Table 3.1. These future funding needs are elaborated next.

**Table 3.1 Recommended future funding needs**

Recommended future funding needs
1. Attention to complexity and liveability issues of urban nodes in TEN-T project development.
2. Integrated (metropolitan) governance as key element for successful urban nodes.
3. Better integration of different types of EU funding, including CEF grants, to create a fundamental shift towards integrated infrastructure and spatial development in practice.

### 3.2.1 Complexity and liveability issues of urban nodes in TEN-T project development

Urban nodes are the places where many different networks, actors and demands come together and interconnect. One stretch of TEN-T infrastructure might, for example, be used by both passenger and freight transport, for different modalities, for both long- and short distance. For one single type of transport, the network may seem robust, if transport grows at all these types at the same time. However, bottlenecks in the overall transport network, as well as the urban spatial fabric, may quickly occur, as has been observed for Vienna in the (near) future.

<sup>34</sup> Although there is need to consider measures with relatively small investment volumes, support should not be limited or focused only on small-sized projects, as most of the urban nodes are big-sized urban areas, also requiring more substantial investments.

<sup>35</sup> This can also include rehabilitation and regeneration of existing infrastructure. For infrastructure, the Commission focuses on missing links and capacity upgrades of existing infrastructure. Improving the performance is not just about capacity increase, but also about quality improvement, which can establish the link with spatial and functional planning.



This complexity not only occurs on the infrastructure networks. There are also complex interlinkages in urban areas between transport, environmental issues, spatial and socio-economic development, because a wide range of demands come together on a limited land area.

TEN-T policy and investments should be aware of this and take this into consideration. Investments along TEN-T corridors may create (especially) **new bottlenecks in urban nodes**, not only regarding transportation issues, but also **environmental issues, spatial and socio-economic development**. On the other hand, infrastructure investments in urban areas are already very expensive due to land prices and necessary mitigation measures. A radical rethink of the role and use of infrastructure in urban areas might be needed in order to be acceptable for the urban population, as illustrated in the case of Antwerp<sup>36</sup>.

Urban nodes face a wide range of demands alongside transport and logistics on a limited land area. Transport and logistics often have **undesired side effects**, such as **noise pollution** or **deteriorating air quality**, also affecting **spatial and socio-economic vitality**.

In order to realise sustainable integration of the urban nodes on the TEN-T networks and simultaneously increase liveability of these urban nodes, TEN-T policy must consider these **complex environments and environmental challenges** for the success of CEF and TEN-T investments in highly/densely populated cities and regions. Sufficient funding should be set apart for **mitigating measures or even alternative investments**, that might give the same results as the planned TEN-T investment, for example measures to stimulate “environmental-friendly” transport infrastructure or measures to reduce transport needs.

### 3.2.2 Integrated governance as key element for successful urban nodes

Given the complexity in urban nodes, the quality and architecture of **metropolitan governance** has a major impact on the **sustainable development of urban nodes**. Through its funding, the European Commission can stimulate integrated metropolitan governance. In the European **cohesion policy**, budget is reserved for sustainable urban development. Cities can only have access to this funding if they have integrated sustainable urban development strategies in place. Some Member States have added the requirement that such a strategy is designed at the **metropolitan level**. If such a requirement would become European policy, this could be an important **incentive for cooperation at metropolitan scale**.

Since the commencement of the TEN-T programme, the programme has evolved significantly: urban nodes have been recognised as key partners in the legislative framework and the regulation clearly proposes the **involvement of cities in the corridor forums**. In practice, however, urban nodes, regions and cities are often consulted at a **later stage**, when **critical planning decisions have already been taken**. In focussing on the decisions that are to be made on both the (national) corridor scale –

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<sup>36</sup> E.g. Project Oosterweelverbinding Linkeroever Antwerpen



infrastructure development and operation – and at local and regional scale – for example. Spatial planning and socio-economic development planning – investments can only be successful and add value if key stakeholders and key decision makers at the various governance levels are **involved from the beginning** in EU funded projects.

Furthermore, European policy could provide additional means to strengthen metropolitan governance, for example by funding **administrative capacity building** at metropolitan level.

The workshops of WP3 indicate a growing need for **cooperation between municipalities** beyond the administrative boundaries of the cities (see D3.3). Challenging issues in the field of freight and logistics, sustainability, liveability and especially integration of urban nodes in the TEN-T network, requires an integrated policy answer which is broader than only a single urban node. As a consequence, the focus must be on the **Functional Urban Area (FUA)** but taking into consideration the functional transport and economic relations between urban centres and the surrounding urban territories (**Regional SUMP**). This will contribute on how policies (TEN-T and SUMP) will achieve impacts through territorial and economic development related to the integration of urban nodes into the TEN-T network.

**A stronger involvement of the various governmental levels in urban nodes** can significantly improve the coordination, the added value of investments, liveability and development of TEN-T projects, maximising the potential benefits of the projects implemented on the ground.

### 3.2.3 Better integration of different types of EU funding, including CEF grants

**CEF grants** are a vital part in the completion and realisation of the TEN-T networks and the TEN-T objectives, which also includes the **sustainable integration of the urban nodes on the TEN-T networks**. Funding should be brought to an adequate level to allow urban nodes to increase the sustainable integration on the TEN-T networks. While bringing **CEF funding for urban nodes to adequate levels**, added value could be created by an **effective integration of different types of EU-Funding**. Sustainable integration of urban nodes is not only a matter of increasing the capacity of infrastructure, but also a matter of lowering environmental impact of logistics and transport in and around an urban node. Keeping urban nodes both a vital and efficient part of the TEN-T networks is essential. Particularly in densely populated urban nodes, there are important **liveability issues** linked to TEN-T infrastructure. An **integrated approach of spatial and mobility planning** appears to be the only way to make infrastructure investments acceptable to citizens and local authorities as well as capture added value, e.g. for environment, liveability and property. However, such an approach is expensive. In this case, **European funding** can contribute to achieving a **business case** for integrated infrastructure and spatial development. The **European Fund for Strategic Investments (EFSI)** offers alternative means and instruments to invest in high risk infrastructure projects. While national, regional and city authorities recognise and make use of the potential of **Public Private Partnerships (PPPs)** to support many essential urban transport projects, there are fundamental infrastructure projects that are relevant to the overall transport network structure but that cannot attract private finance because of their low financial



returns. Nevertheless, these projects have a high European added value and a wide socio-economic return, bringing benefit to overall society.

In general, funding for integrating urban nodes on TEN-T corridors is financially more challenging due to the **complex nature** as it regards: **multiple transport modes, multiple and connected infrastructure networks, multiple sectors, multiple geographical scales and multiple governance layers** – see also the points listed above. Therefore, due to this multiplicity nature, a first step at **least 20%** of the different funding sources (e.g. CEF, EFSI, ERDF, Horizon 2020 and in the near future FP9), should be combined in order to create a **fundamental shift** towards integrated infrastructure and spatial development in practice. Regarding the absolute magnitude of funding needs: a comparable amount of budgets (as the current funds) are needed.

The **fundamental policy shift** we propose is that **at least 20% of these budgets** is combined and devoted for **integrated development** – only proposals that address integrated development are eligible for this. In a stepwise approach, the percentage of funds devoted to integrated development can be raised (for example **50% in the subsequent period**)<sup>37</sup>.

The overall position from the Vital Nodes project is that **20% of CEF-funding** should be reserved for investments in infrastructure, mobility, spatial and environmental measures enhancing the integration of urban nodes on the TEN-T network; investments that focus on the peri-urban networks (where long-distance inter-urban and short-distance intra-urban mobility meet), on intra-urban networks in economic core areas (strengthen agglomeration effects, conform 'borrowed size') and on coordination with spatial development in order to strengthen the socio-economic benefits (creation of multiplier effects) of EU funding investments that enhance integrated spatial and multimodal transport development and that increase coherent development of innovation, sustainability and liveability.

An integrated approach to these challenges also needs integrated funding. Given that European funds are very much thematically organised, it should be made easier and stimulated to use multiple funding sources to tackle the challenges in an integrated way. A non-exhaustive list of European funding that could play a role in the integration of urban nodes on the TEN-T corridors are CEF, EFSI, ERDF, Horizon2020 (and in the near future FP9), LIFE). The ESI funds should be used more the funding of integrated packages of measures where urban nodes have developed an integrated local transport plan (e.g. Sustainable Urban Mobility Plan)<sup>38</sup>.

On the basis of earlier experiences with integrated planning, the effects of investments in urban nodes and the peri-urban networks in economic core areas are estimated to lead to **lesser costs of planning processes** (approximately **20%** - as development is directly coordinated between governance levels), **less costs of mitigation and compensation measures (up to 50%**, because of integrated spatial and

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<sup>37</sup> In various Member States (such as the Netherlands), infrastructure and spatial development funding has already been combined over the last years (currently, in the Netherlands national infrastructure funding is in effect for some 80% devoted to integrated infrastructural and spatial development).

<sup>38</sup> See also: COM (2013) 913 final



environmental design) and **less societal costs related to noise, air pollution (health effects) and safety** (because of combined planning of (multimodal) infrastructure and spatial development.

### 3.2.4 Recommendations and workshop urban nodes coverage

Table 3.2 provides an overview of recommendations addressed at the workshops in the urban nodes workshops.

**Table 3.2 Recommendations future funding covered in urban nodes workshops**

Urban Node	Complexity and liveability issues urban nodes in TEN-T project development (1)	Integrated governance as key element (2)	Better integration of different types of EU funding (3)
Vienna	x	x	x
Gothenburg	x		x
Rotterdam	x		x
Budapest	x		
Hamburg	x		x
Genova	x		
Turku		x	x
Strasbourg	x	x	x
Mannheim	x		x



# 4 Preliminary recommendations on CEF and TEN-T guidelines

## 4.1 Introduction

The **Trans-European Networks** in Transport, Energy and Telecommunications have been a vital part of EU infrastructure policy since 1993. The ultimate aim of the TENs is to **interconnect national infrastructure networks and ensure their interoperability, setting standards for the removal of technical barriers.**

In **1996**, the **first guidelines** for the transport sector were adopted by the European Parliament and Council. The adoption of **new EU guidelines in 2013 for the development of the Trans-European Transport Network**, outlined plans for the **nine strategically important corridors of the Core Network** and targets for the implementation of a **Comprehensive Network**, accessible to citizens and businesses across Europe in no more than 30 minutes travel time.

Key to the development of the TEN-T policy are:

- The **Union guidelines**, outlining objectives, priorities, and measures for the establishment of frameworks for the continued identification of projects of common interest.
- The **Connecting Europe Facility (CEF)**, as an EU funding instrument devised to facilitate the realisation of European transport infrastructure policy, focused on projects of common interest that aim at removing bottlenecks and bridging missing links in the Core and Comprehensive Networks and Horizontal Priorities. Article 30 of the TEN-T guidelines sets out the areas of action in urban nodes which directly contribute to enhancing transport flows along European or inter-urban connections, this includes freight and logistics together with passengers as well. Within the TEN-T framework, this priority aims at promoting action along the multi-modal core network corridors – coordinated amongst relevant players – which makes vital contributions to the achievement of the overall corridor objectives. Such action may, for example, lead to a better sustainable integration of urban nodes on the TEN-T corridor, increasing liveability, improving air quality and noise reduction (with urban areas standing for a major share of the overall emissions from transport) or enhancing service quality levels (travelling time, travelling comfort, safety, etc.).

**Interconnecting** the intermodal points in urban areas is a priority in order to ensure smooth last mile connections. The structures of Urban Nodes are **polycentric** and not defined by administrative borders. Instead, they are **functional areas**, including the hinterland of a city and the peri-urban-areas with flexible borders depending on **local, regional** and **European** developments. Any transport infrastructure, enterprise, labour and administrative level therein are part of the node.

**Urban Nodes** have great potential as main **hub** for connecting the regions to the core network corridors, as well as forerunner for **distributing and deploying alternative fuels and other innovative technologies**. They can be centres for new inter- and multimodal logistics concepts and structures





along the corridors. Special attention is paid to the fostering of connections in **public and freight transport**, the elimination and avoidance of **bottlenecks**, as well as the reduction of harmful effects for urban areas by **reducing emissions and securing the quality of life**. It is possible to create various positive effects for the **economic development** of a region.

The current guidelines concentrate mostly on the links between the nodes. Most of the infrastructure projects funded by CEF are based on **grants**. The Vital Nodes projects shows, through workshops and contacts with several nodes and regions, that the TEN-T and the corridors can benefit from a much **closer collaboration with the nodes** in the network. Solving bottlenecks and enhancing transport for both freight and passengers will result in better functioning TEN-T. Furthermore, closer collaboration with the municipalities is expected to result in a **stronger trademark** of CEF and TEN-T.

## 4.2 CEF and TEN-T guidelines

Recommendations on CEF and TEN-T funding are presented in Table 4.1. These recommendations are elaborated next.

**Table 4.1 Recommendations on CEF and TEN-T guidelines**

Recommendations on CEF and TEN-T guidelines
1. More investments to strengthen the connection between TEN-T action for long-distance and last mile, including urban traffic.
2. Address urban infrastructure bottlenecks and missing links within and between transport modes of the TEN-T in these areas.
3. Stimulating the seamless sustainable connection between TEN-T long-distance and urban / regional traffic (e.g. establishing quality standards, integrated planning).
4. Stimulating information and traffic management systems at the interface in support of seamless connection between long-distance and urban/regional traffic for both passengers and freight (e.g. establishing quality standards, integrated planning).
5. Stimulating the early-market introduction of solutions for low-noise and zero-emissions urban freight delivery, including through transshipment facilities between long-distance and urban traffic.
6. Stimulate stronger involvement of the various governmental levels in urban nodes by requiring this in CEF/TEN-T funding.
7. Starting a discussion on the required functions of a node

### 4.2.1 Strengthen the connection between long-distance and last-mile transportation



The TEN-T guidelines focus on the development of a robust **European multimodal transport network**. However, experiences from workshops in for example Rotterdam, Genova and Vienna show that these networks can only function if you consider both the **importance of the urban area**, and the **corresponding node**. At this moment, the urban areas are mainly identified as a place where possible negative exposure of transportation should be mitigated. With regards to the EU's ambition for sustainable urban mobility, and the urban area as the prime place for freight delivery, it is important to further focus on how **long-distance transportation** impacts **last-mile delivery**. The consortium recommends EU to emphasise the importance of this topic in the guidelines.

#### 4.2.2 Address urban infrastructure bottlenecks and missing links

The TEN-T guidelines focus on the **removal of bottlenecks**<sup>39</sup>, and the **bridging of missing links**, within the national networks and, on connecting the different Member States<sup>40</sup>. These international network connections are vital for the economic development in Europe. However, bottlenecks in **metropolitan regions** could hamper these (inter)national networks as well. Experience from the workshop in Vienna shows increasing transportation in urban areas, and possible economic loss, by strengthening the international network. When planning to mitigate present bottlenecks, careful consideration is needed for the possible impact on urban mobility. This also relates to the impact on **changing transport modes**, both from an (inter)national and regional perspective.

#### 4.2.3 Stimulate the seamless sustainable connection long-distance - urban traffic

While the **seamless connection** between infrastructure between the comprehensive and regional networks are mentioned in the guidelines<sup>41</sup>, more emphasis can be placed on **stimulating sustainable seamless connections**. This in line with the EU's plan on developing **sustainable urban regions**. Through the establishment of **quality standards** and **collaboration mechanisms** between involved planning parties, the seamless sustainable connection between multimodal networks could be improved. This could also benefit the collaboration between actors, such as road owners, inland shipping, rail infrastructure managers, municipalities and transport operators.

#### 4.2.4 Stimulate the use of information and integration of telematics applications

**Traffic management** is a strong tool for mitigating bottlenecks on regional and national transport networks. Through **smart information**, traffic streams could be analysed and traffic flows influenced. The information and the systems that gather relevant information streams, are largely **decentralised**. Integrating of **telematics applications** between national and regional network could be a strong tool to mitigate traffic interdependencies between the two network levels. This to support the **seamless**

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<sup>39</sup> As illustrated for example in Article 4.

<sup>40</sup> Also here, the rehabilitation and regeneration of existing infrastructure and the link to planning is relevant, as indicated in the introduction of Section 3.

<sup>41</sup> As illustrated for example in Article 30.



**connection** between long-distance and urban traffic for passengers and freight. While seamless connections by telematics applications is mentioned in the guidelines<sup>42</sup>, the **need for collaboration and information use of different stakeholders** has not been included. The consortium recommends **additional guidelines on telematics applications** at the interface between long-distance and last-mile transportation.

#### 4.2.5 Stimulate early market introduction of low-noise and zero-emissions solutions

The TEN-T guidelines describe the promotion of **efficient low-noise and zero-emissions** urban freight delivery<sup>43</sup>. CEF funding measures could incorporate these guidelines, by supporting research and development of these solutions for freight delivery. The consortium sees a strong increase in **liveability indicators** when a **fast-pace transition** will take place. Therefore, the consortium recommends using CEF to support **early market introduction** of these solutions and strengthen present guidelines, from promotion oriented guidelines to **guidelines that stipulate the development of a sustainable urban freight delivery system**.

#### 4.2.6 Stimulate stronger involvement of the various governmental levels by requiring this in CEF/TEN-T funding

Given the complexity in urban nodes, the quality and architecture of metropolitan governance has a major impact on the sustainable development of urban nodes. **Through its funding**, the European Commission has a **leverage to stimulate integrated metropolitan governance**. In the European Cohesion policy a certain budget is reserved for sustainable urban development. Cities can only have access to this funding if they have integrated sustainable urban development strategies in place. Some Member States have added the requirement for their cities that such a strategy is designed at metropolitan level.

If such a requirement would become European policy, this could be an **important incentive for cooperation at metropolitan scale**. Since the beginning of the TEN-T programme, the programme has evolved significantly: Urban nodes have been recognized as key partners in the legislative framework and the regulation clearly proposes the involvement of cities in the corridor forums. In practice, however, urban nodes (regions and cities are often consulted at a late stage, when critical planning decisions have already been taken. Looking at the decisions that are to be made on both the (national) corridor scale – infra development and operation – and at local and regional scale – e.g. spatial planning and socio-economic development planning – investments can only be successful and add value if key stakeholders and key decision makers at the various governance levels are involved from the beginning in EU funded projects.

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<sup>42</sup> As illustrated for example in Article 31.

<sup>43</sup> As illustrated for example in Article 30.



A stronger involvement of the various governmental levels in urban nodes can significantly improve the coordination, the added value of investments, liveability and development of TEN-T projects, maximizing the potential benefits of the projects implemented on the ground.

#### 4.2.7 Starting a discussion on the required functions of node

To enhance the return on investments of CEF/TEN-T funding, it is important to have a clear picture of (required) **functions of a node**. Such discussion would include questions, including: when does a node have added value for the European network? What is the position of an urban node in the corridor(s) of the TEN-T network? Do the current 88 urban nodes generate added value given the vast changes and developments?

Here there seems to be potential for linking with the developments regarding SUMP. The development of regional SUMP to clarify the role, function and position of urban nodes could be helpful in decision-making about CEF/TEN-T funding regarding the integration of urban nodes in TEN-T corridors.

#### 4.2.8 Recommendations and workshop urban nodes coverage

Table 4.2 provides an overview of recommendations addressed at the workshops in the urban nodes workshops.



**Table 4.2** Recommendations CEF and TEN-T guidelines covered in urban nodes workshops

Urban Node	More investments to strengthen the connection between TEN-T action for long-distance and last mile (1)	Address urban infrastructure bottlenecks and missing links within and between transport modes of the TEN-T in these areas (2)	Stimulating the seamless sustainable connection between TEN-T long-distance and urban / regional traffic (3)	Stimulating information and traffic management systems at the interface in support of seamless connection (4)	Stimulating the early-market introduction of solutions for low-noise and zero-emissions urban freight delivery (5)	Stimulating stronger involvement of various governmental levels by requiring this in CEF/TEN-T funding (6)	Starting discussion on required functions of node (7)
Vienna	x	x	x	x	x	x	x
Gothenburg	x	x		x	x		x
Rotterdam			x	x	x	x	x
Budapest	x	x	x		x		x
Hamburg		x	x		x		x
Genova	x	x	x		x	x	x
Turku			x	x		x	x
Strasbourg	x	x	x	x	x	x	x
Mannheim	x	x	x	x	x		x

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