



# Innovative approaches for integrating urban nodes in the TEN-T core network corridors.

Results and tools from the  
Vital Nodes project



# What is Vital Nodes

The objective of Vital Nodes is to **improve European interconnection while developing sustainable mobility** within the urban nodes<sup>1</sup> of the Trans-European Transport Network (TEN-T).

Vital Nodes delivers evidence-based recommendations for effective and sustainable integration of the nodes into the TEN-T network corridors. It addresses specifically the **multi- and intermodal connection between long-distance and last-mile freight logistics**, considering the interaction with passenger transport. It also supports the deployment of innovative measures in the urban nodes while establishing a long-lasting European expert network.

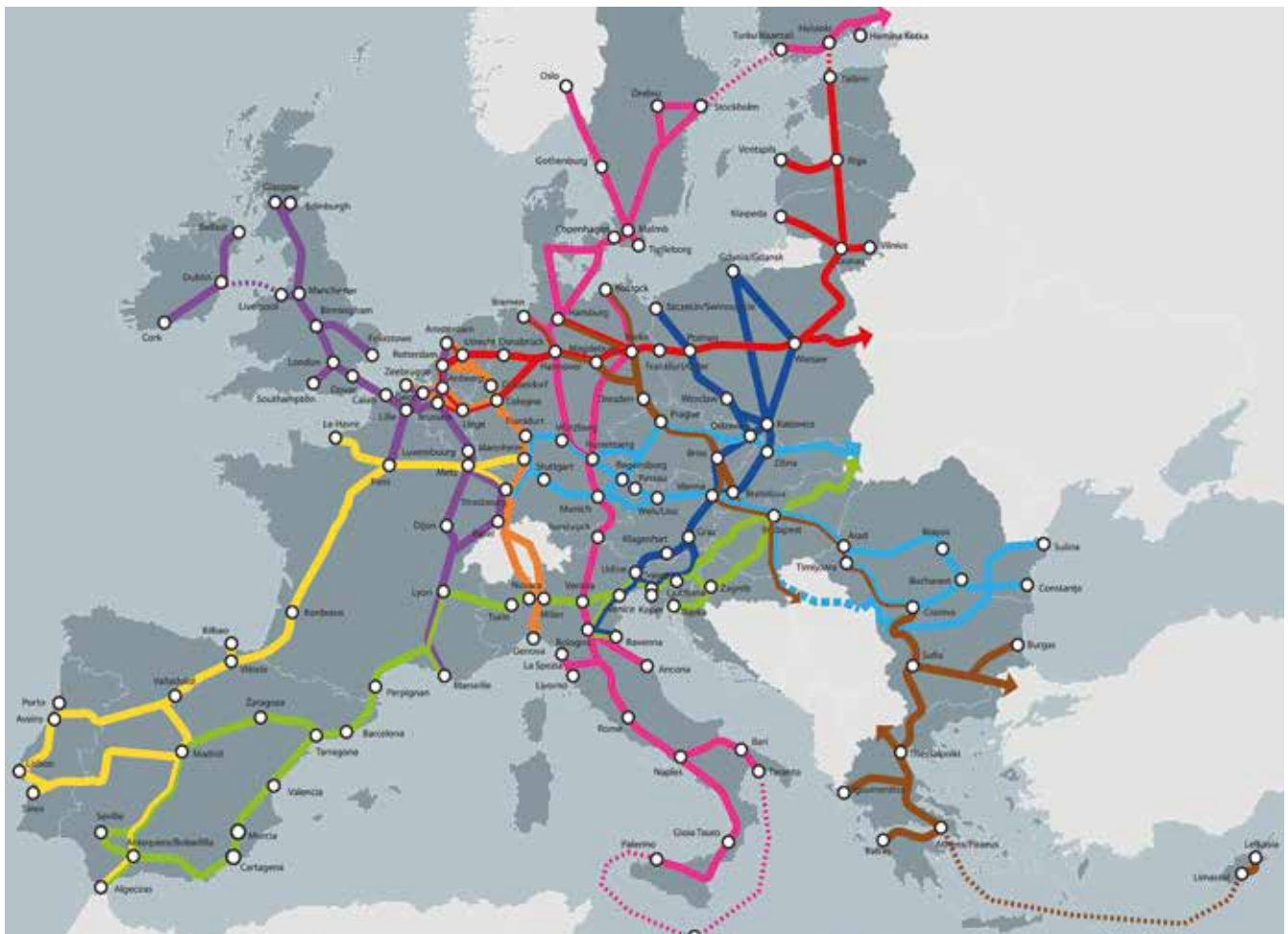
## Vital Nodes main objectives

Vital Nodes was designed to meet the following main objectives:

- ✓ 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.
- ✓ to address network issues of the (freight logistic) transport and mobility system but also spatial issues related to urban vitality: socio-economic development, spatial and environmental quality and liveability.
- ✓ 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 this brochure you will find all the information on how Vital Nodes has achieved these results.

Figure 1 - The 88 Urban Nodes along TEN-T Corridors



<sup>1</sup> See definition on the next page



# TEN-T and the Urban Nodes

**Urban Nodes** are a constitutive element of the **Trans-European Transport Network (TEN-T)**<sup>2</sup> and foster the integration of the network into urban circumstances like spatial structure, economy and regional development. According to the EU regulation<sup>3</sup> *“urban node means an urban area where the transport infrastructure of the trans-European transport network, such as ports including passenger terminals, airports, railway stations, logistic platforms and freight terminals located in and around an urban area, is connected with other parts of that infrastructure and with the infrastructure for regional and local traffic”*. Therefore, cities and regions are at the core of the TEN-T Network which aims to improve goods flow across Europe. However, at the urban nodes of the network, increasing freight traffic can lead to congestion, poor air quality, noise, and road safety risks.

Cities and regions need to develop sustainable freight transport systems, mitigating the negative consequences of traffic in order to benefit from the improved European interconnection. Planning such a system requires the

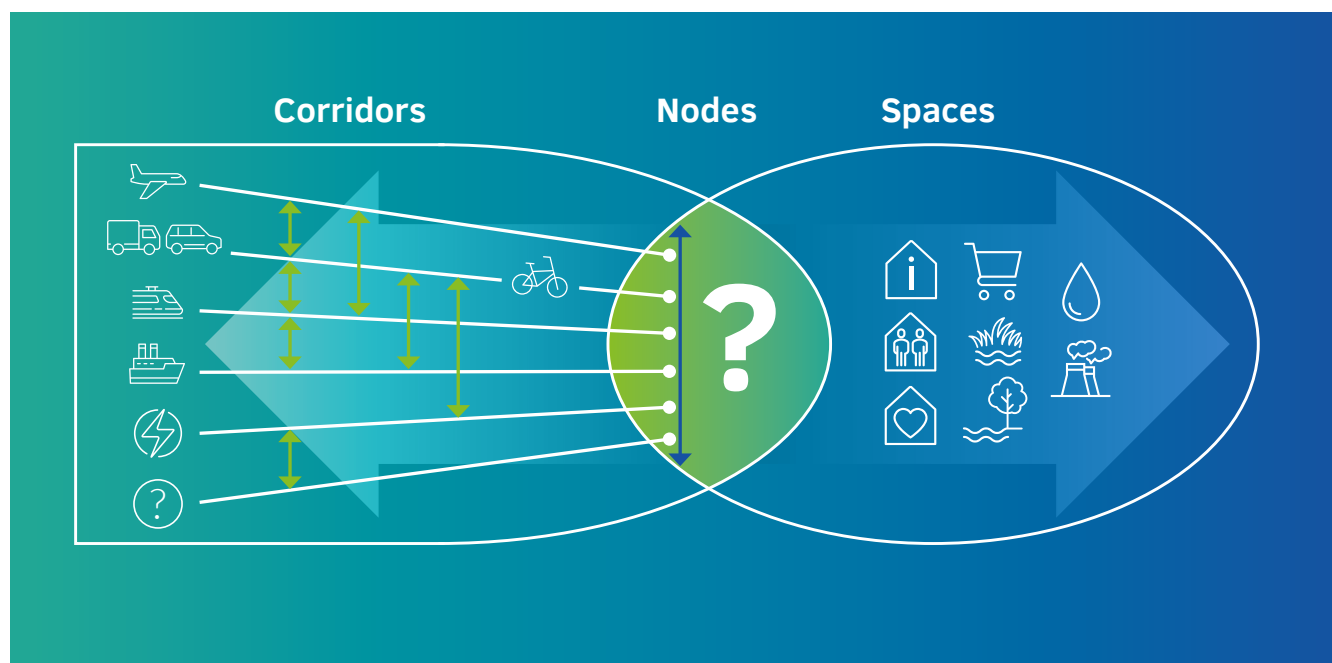
**integration of different levels, such as the European, regional and urban scale.** It also requires the involvement of all stakeholders – such as freight carriers and infrastructure providers – to enable sustainable policymaking.

## The Vital Nodes approach

The Vital Nodes approach builds upon the proven Networking for Urban Vitality (NUVit)<sup>4</sup>, a successful approach for addressing transport challenges through spatial and infrastructure integration.

Challenges in integrating freight logistics of urban nodes into network corridors have a multi-dimensional character. Not only network issues of the (freight and logistics) 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.

Figure 2 - Connecting different words: addressing transport challenges through spatial and infrastructure integration



<sup>2</sup> <https://www.scandria-corridor.eu/index.php/en/home/ten-t>

<sup>3</sup> Article 3 (p) of Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013 on Union guidelines for the development of the trans-European transport network

<sup>4</sup> <https://www.nuvit.eu/>

So far, **freight and logistics have been underexposed among urban and regional planners**. Investments in freight logistics are mainly privately driven, whereas investments in passengers transport (roads, public transport, bicycle routes, etc.) are public. Within urban areas people and freight often share the same road and rail infrastructure, often resulting in bottlenecks e.g. at river crossings and urban ring roads. All activities compete for the same space, but planning, development

and management is organized in silos: this is the so-called 'tragedy of the commons'. When focusing on the spatial and network implications for freight flows, **stakeholders need to look at a different spatial scale, beyond administrative boundaries: the functional urban area (FUA)**, composed "of a densely inhabited city and of a surrounding area (commuting zone) whose labour market is highly integrated with the city"<sup>5</sup>.

## Dimensions

The Vital Nodes approach integrates six dimensions of mobility, land-use and infrastructure planning to exploit synergy effects.



### Spatial Dimension

Spatial concepts with synergetic effects on accessibility



### Network Dimension

Multimodal network optimisation at various spatial scales



### Time Dimension

Time linkages and shift to strategy driven planning



### Value Dimension

Combined value creation and capturing



### Institutional Dimension

Organisational empowerment for integrated planning



### Implementation Dimension

Implementation drivers for integrated planning

## VN Spatial Scales

The Vital Nodes approach focuses on integrating land-use and infrastructure planning, as both planning sectors can have a considerable impact on each other. It approaches them on three geographical scales (levels):



### Local

Intra-urban locations



### Urban-regions

Level of the Daily Urban System, peri-urban and regional level



### International

(TEN-T) corridors

<sup>5</sup> OECD 2013. Definition of Functional Urban Areas (FUA) for the OECD metropolitan database. <http://www.oecd.org/cfe/regional-policy/Definition-of-Functional-Urban-Areas-for-the-OECD-metropolitan-database.pdf>

# Typology of urban nodes

Vital Nodes has formulated a **typology to identify and to cluster challenges and potential solutions** in dialogue with urban nodes. This typology helps define the function of an area considering the TEN-T, and vice versa: how does TEN-T influence the functional area?

Criteria to define the Vital Nodes typology are the following<sup>6</sup>:

- ✓ **Cross border function:** in case of a cross border node, is it multi-modal or uni-modal?
- ✓ **Sea port:** in case of a sea port node, is it a gateway or a regional hub?
- ✓ **Inland function:** in case of an inland node, is it a small or a big node (threshold is 1 million inhabitants or more)?

- ✓ **Relation of the node (logistics FUA) and the Corridor:** Urban (inbound focused on local consumption) versus Transit (outbound focused on production and transit of goods).
- ✓ Is the urban node located in a **developed** or in a **cohesion region**?
- ✓ Is the urban node **centric** or **poly-centric**, i.e. does the node serve multiple urban areas or only one urban area?

Table 1 shows the different characteristics of the urban nodes of Vienna and Rotterdam in their functionality of an urban node. Rotterdam as a gateway sea port mainly dealing with outbound-oriented production and transit to the hinterland. Vienna as a big (more than 1 million inhabitants in the metropolitan area) multi-modal inland and cross-border node.

Table 1 - Urban nodes typology, examples of Rotterdam and Vienna.

	Cross-border function	Sea port	Inland function	Relation of the node and the Corridor	Developed / cohesion region	Centric / poly-centric
Vienna	Multi-modal		Inland, big	Inbound/ consumption	Developed	Centric
Rotterdam		Gateway		Outbound/ production and transit	Developed	Polycentric

Source: Vital Nodes, Deliverable 2.3

<sup>6</sup> See D2.3 Synthesis document including grouping of solutions: [https://vitalnodes.eu/wp-content/uploads/2019/07/Vital-Nodes\\_D2.3\\_Synthesis-document-including-grouping-of-solutions\\_ECO\\_FINAL\\_PU.pdf](https://vitalnodes.eu/wp-content/uploads/2019/07/Vital-Nodes_D2.3_Synthesis-document-including-grouping-of-solutions_ECO_FINAL_PU.pdf)

The (indicative) functional areas for the urban nodes Rotterdam and Vienna illustrate the potential emerging spatiality when focusing on a freight and logistics perspective.

## Rotterdam

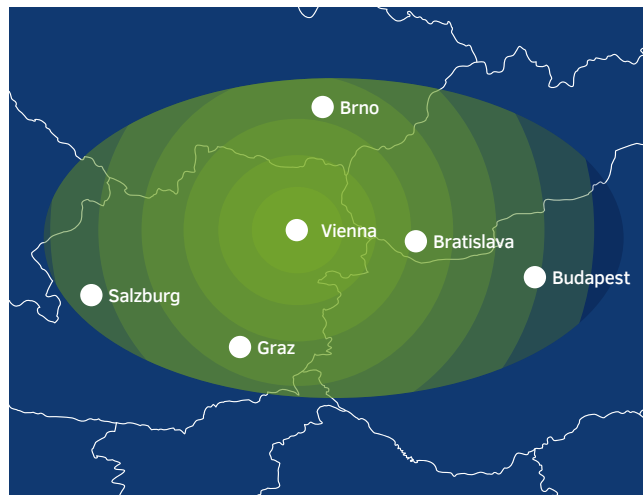
Figure 3 - The indicative functional urban area of Rotterdam



The functional urban area of Rotterdam extends along the multi-modal corridor towards the German Rhein/Ruhr area, passing smaller towns and cities.

## Vienna

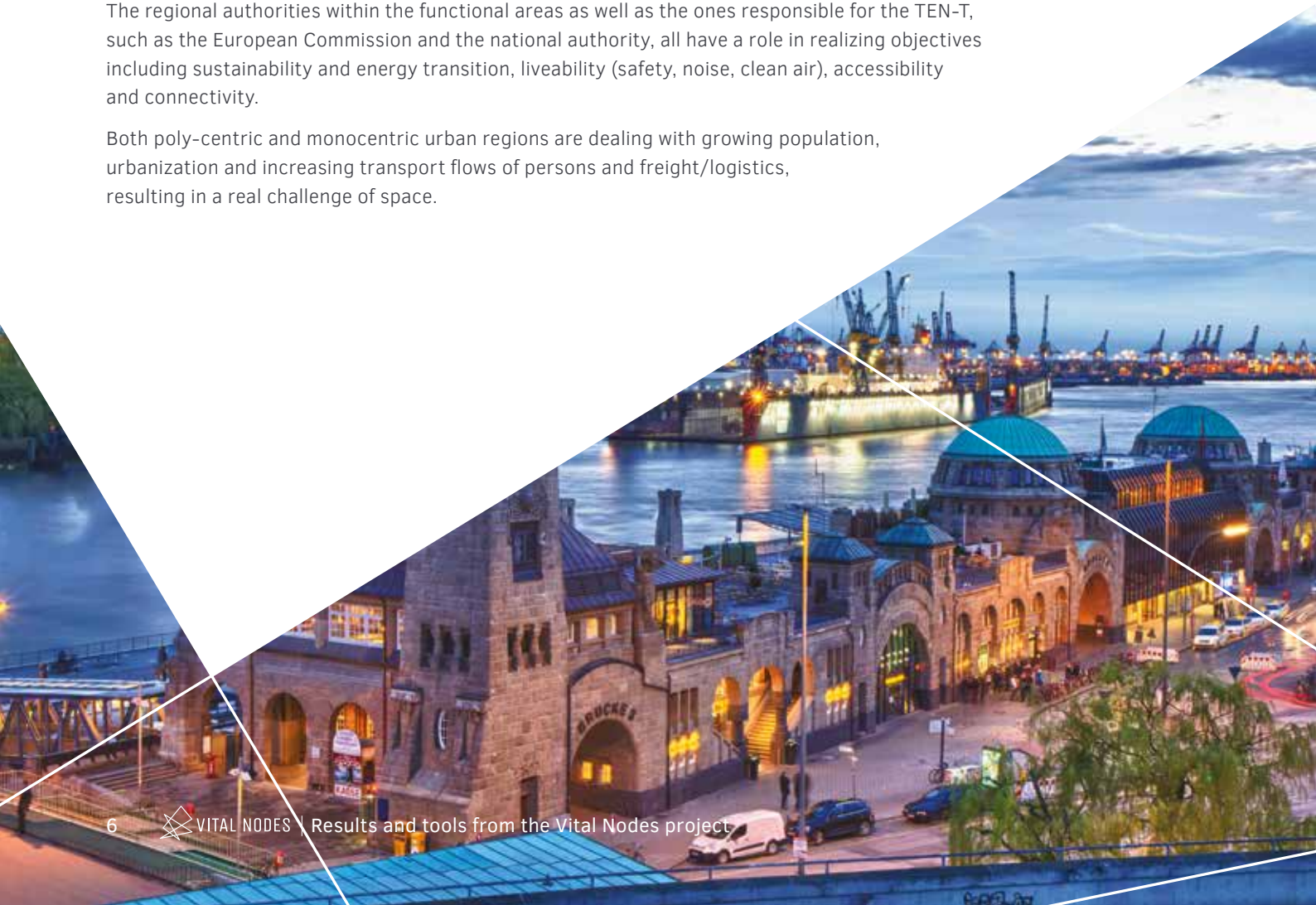
Figure 4 - the indicative functional urban area of Vienna



Vienna is an example of a centric, inland and inbound-oriented urban node. Vienna's functional urban area extends to the Slovakian capital of Bratislava, 60 km to the east.

The regional authorities within the functional areas as well as the ones responsible for the TEN-T, such as the European Commission and the national authority, all have a role in realizing objectives including sustainability and energy transition, liveability (safety, noise, clean air), accessibility and connectivity.

Both poly-centric and monocentric urban regions are dealing with growing population, urbanization and increasing transport flows of persons and freight/logistics, resulting in a real challenge of space.



# Key tools and results

Vital Nodes has defined a comprehensive approach by analysing the needs of the urban nodes and developing tools that can be applied in all the 88 urban nodes.



## Nodes Book

Section in the Vital Nodes website providing information on the urban nodes implementing solutions for a sustainable integration of urban nodes into the TEN-T network.



## Toolbox

A proven Vital Nodes approach consisting of an enriched and fine-tuned toolbox of methods and measures that can be applied in the urban nodes and a comprehensive fingerprint on the urban nodes.



## Recommendations

Validated recommendations on the integration of urban nodes in the TEN-T core network corridors.



## Network of networks

Establishment of a self-sustaining network of networks consisting of experts, end-users and case owners that were gathered in the framework of various Vital Nodes workshops and events.



# Nodes Book

The **Nodes Book** is a section in the Vital Nodes website that provides information on the urban nodes that have been active in implementing solutions for a sustainable integration of urban nodes into the TEN-T network. It is a comprehensive catalogue which can be continuously enriched with new urban nodes and solutions.

The Nodes Book is structured according to an interactive approach that allows the user to access to the single pages dedicated to urban nodes, which contain sub-pages describing the solutions realised by nodes, their type and their impact as assessed in the Vital Nodes project<sup>7</sup>.

Table 2 - An example form Gothenburg

NODE	GOTHENBURG
Description	Historically a multicultural place, Gothenburg is in a key strategic location at the mouth of the Göta älv, where Scandinavia's largest drainage basin enters the sea. The Port of Gothenburg is now the largest port in the Nordic countries.
Vital nodes workshop	<p>The Vital Nodes workshop in Gothenburg<sup>8</sup> (12 April 2018) addressed the following aspects:</p> <ul style="list-style-type: none"> <li>✓ Interconnection between infrastructure networks</li> <li>✓ Solving bottlenecks in the city centre</li> <li>✓ Awareness of the urban node function</li> <li>✓ Opportunity of logistics</li> <li>✓ Eye opener, sit more together</li> </ul>
Solution(s)	<p><b>Micro hub last mile deliveries</b></p> <p><i>Type of solution: Optimizing a terminal</i></p> <p>A good practice of a parcel collection point is the ElectriCity project<sup>9</sup> in Gothenburg. At the end/starting stop of the bus route 55 in the port area of Gothenburg a parcel collection point is installed. This is a solution for the last-mile transport of parcels since commuters, for example port employees, can pick up their parcels on a central point along their route and take the bus, reducing the number of trips for parcel delivery in the city. The final stop is an indoor stop in an annex to an existing building including a café and a parcel collection point. The ElectriCity partnership consists of partners from the industry, academia and society. It is about developing and testing solutions that will open new opportunities for public transport and urban development in the future.</p>
Impact overview	<p>The radar chart illustrates the impact of the solution across five dimensions. The dimensions are Accessibility, Safety, Economy, Vitality, and Connectivity. The chart shows a green outer ring and a red inner line. The values are approximately: Accessibility (10), Safety (8), Economy (7), Vitality (6), and Connectivity (5).</p>

<sup>7</sup> D2.2 Overview of solutions and their impact [https://vitalnodes.eu/wp-content/uploads/2019/08/Vital-Nodes\\_D2.2-Overview-of-solutions-and-their-impact\\_ECO\\_FINAL\\_PU.pdf](https://vitalnodes.eu/wp-content/uploads/2019/08/Vital-Nodes_D2.2-Overview-of-solutions-and-their-impact_ECO_FINAL_PU.pdf)

<sup>8</sup> <https://vitalnodes.eu/2018/04/23/vital-nodes-workshop-gothenburg/>

<sup>9</sup> <https://www.electricitygoteborg.se/en>



# The Vital Nodes toolbox

The **Vital Nodes Toolbox** is a *process guideline* to integrate urban mobility and TEN-T policy. It describes a broad range of methods and approaches for developing a comprehensive policy strategy in a multi-actor context.

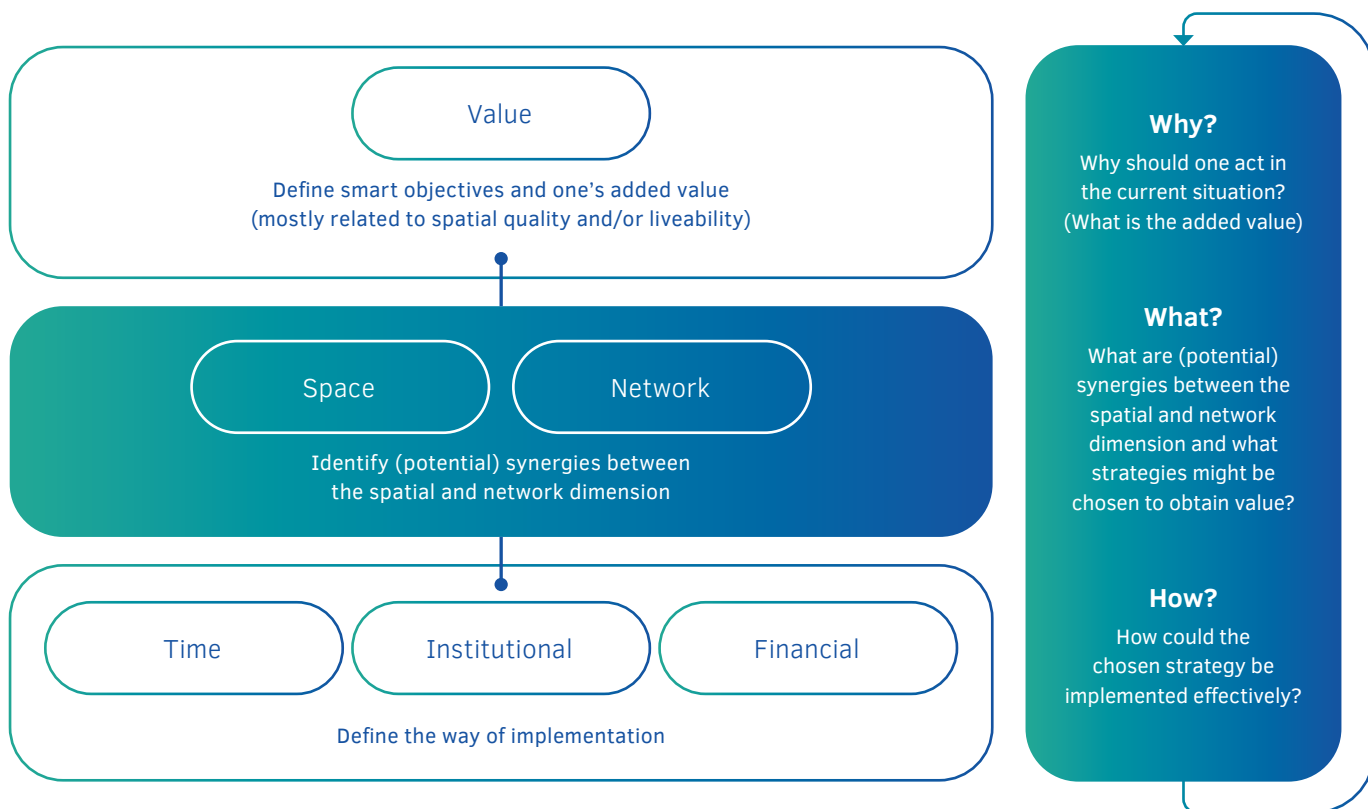
These are structured around three main questions:

- ✓ Why should one act in the current situation (what is the added value)?
- ✓ What are (potential) synergies between the spatial and network dimension and what strategies might be chosen to obtain value?
- ✓ How could the chosen strategy be implemented effectively?

The resulting process scheme necessarily consists of a feedback loop, in which data and monitoring are vital, covering interaction with relevant stakeholders and continuously looking back and forward to the added value created for each of the related stakeholders.

An important aspect of the Vital Nodes approach is the **fact-based comprehensive nature**, in which the interaction of multiple stakeholders about integration of urban nodes along corridors is fuelled with data, maps, knowledge, experience about both multi-modal infrastructure, mobility, freight/logistics and spatial developments at the urban node, FUA and corridor level.

Figure 4 - Configuration of the dimensions after application in Vital Nodes for integration of urban nodes and TEN-T



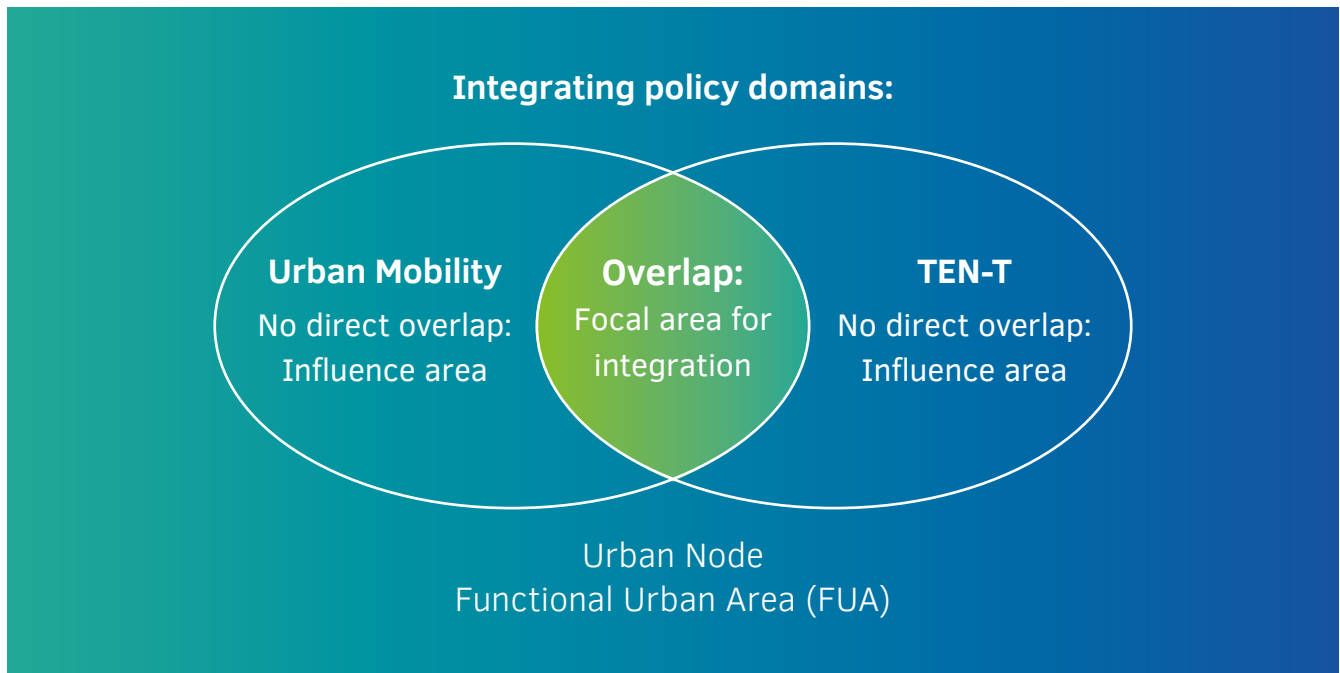
The existing NUVit toolbox has been enriched with a focus on freight and logistics and applied to the urban nodes in workshop settings. This new Vital Nodes Toolbox builds upon the experiences of the Vital Nodes project between November 2017 and June 2019. The full version of the toolbox is available on the Vital Nodes website: [www.vitalnodes.eu](http://www.vitalnodes.eu).

## Recommendations

The Vital Nodes policy recommendations focus on the overlap between two important transport policy domains at European level, i.e. *urban mobility policy* as defined in the *Urban Mobility Package*<sup>10</sup> (2013) and *TEN-T policy*, as set out in the *TEN-T Guidelines*<sup>11</sup> (2013).

When the two policy domains overlap, Vital Nodes addresses this 'focal area' for integration. For example,

challenging issues in the field of freight and logistics, passenger flows, sustainability, liveability and especially integration of urban nodes in the TEN-T network, require an integrated policy answer which often goes beyond the city level. The Vital Nodes policy recommendations therefore address the urban-regional or Functional Urban Area (FUA) level.



The policy recommendations of the Vital Nodes project are categorized in different clusters which are corresponding to the structure of the Vital Nodes Toolbox:

- ✓ Strategy + Value
- ✓ Network + Space
- ✓ Governance + Time
- ✓ Finance + Funding
- ✓ Research + Data

Each recommendation also indicates the target groups who can potentially act on the recommendation, including for example the European Commission, the urban nodes, terminal and logistics centres operators, European Investment Bank etc.

The full set of validated recommendations is available on the Vital Nodes website: **[www.vitalnodes.eu](http://www.vitalnodes.eu)**

<sup>10</sup> [https://ec.europa.eu/transport/themes/clean-transport-urban-transport/urban-mobility/urban-mobility-package\\_en](https://ec.europa.eu/transport/themes/clean-transport-urban-transport/urban-mobility/urban-mobility-package_en)

<sup>11</sup> [https://ec.europa.eu/transport/themes/infrastructure/ten-t\\_en](https://ec.europa.eu/transport/themes/infrastructure/ten-t_en)

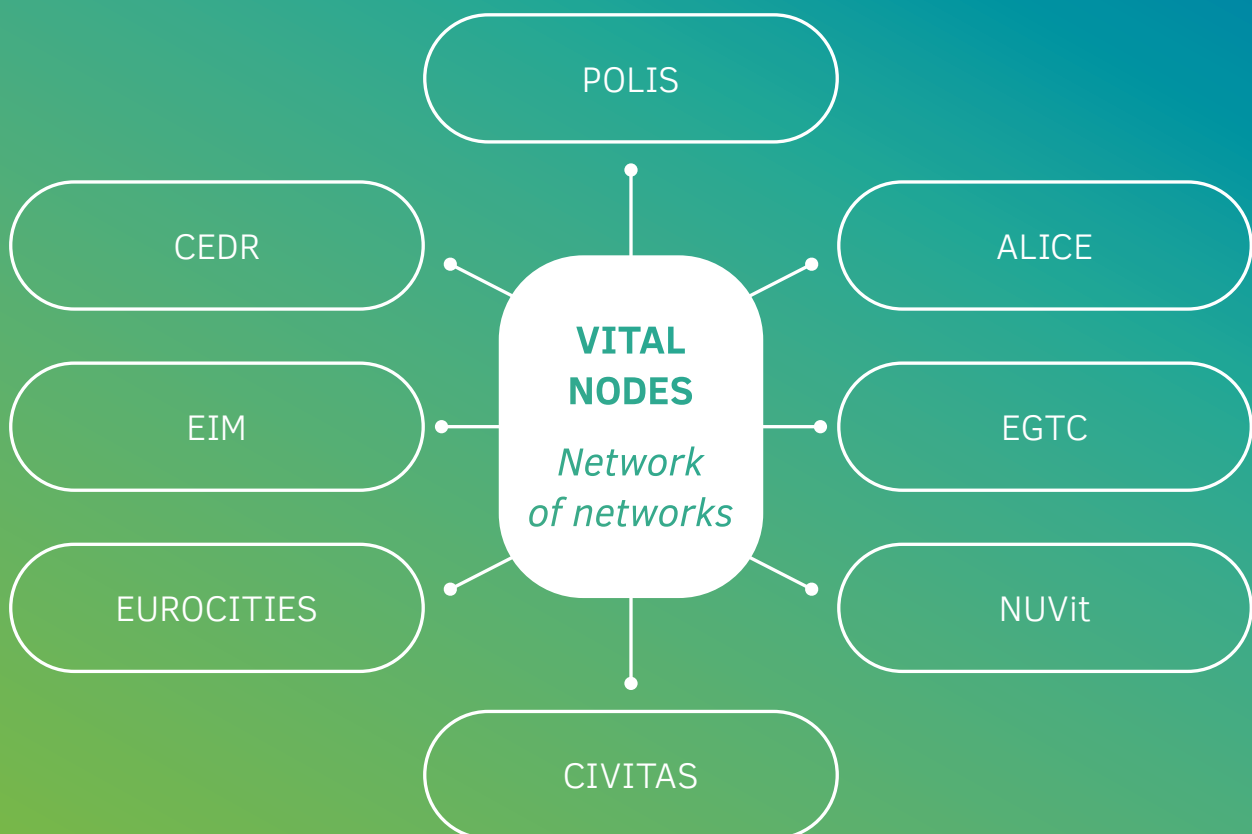
# Network of networks

VitalNodes brings existing networks together and creates a **network of networks** for ensuring long-term engagement and successful implementation.

The *VitalNodes network of networks* connects local and regional planning and infrastructure organisations and experts with the European planning and infrastructure organisations. Together with the knowledge on the validated recommendations, it paves the way towards an integrated planning approach for urban nodes and TEN-T corridors focusing on both freight delivery and passenger transport.

Experts from diverse and complementary networks and European Initiatives and platforms have been brought together to create long-lasting cooperation:

- ✓ urban and regional networks (POLIS / EUROCITIES / NUVit);
- ✓ co-modality and multimodality from national and regional road authorities (CEDR), rail authorities (EIM) and waterway authorities (INE);
- ✓ sustainable mobility and urban development (CIVITAS, Urban Development Network - UDN, URBACT), regional development (IRE, ECTP);
- ✓ corridor-level challenges (EGTC Rhine-Alpine).



In order to enhance a sustainable legacy, the VitalNodes network is not replacing existing networks but carefully linking them up, enhancing cooperation and knowledge development and exchange.

## Get Involved

As a stakeholder in one of the urban nodes, you may be a public authority, a network, an NGO, a research institution or a private company, you can join the *Vital Nodes network of networks*. Please get in touch if you would like to cooperate with the project.

Contact us if you are interested, we will be happy to discuss the details with you.

## The Partnership

The project consortium consists of experienced organisations that represent stakeholder of all levels, cities, regions, national and TEN-T corridors.

## More Information

Please contact the Vital Nodes secretariat

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Visit the project website and sign up for the newsletter:

**[vitalnodes.eu](http://vitalnodes.eu)**



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