VITAL NODES

Validated recommendations on the integration of the 8 individual urban nodes in the TEN-T network

D3.3

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Lead participant	Rijkswaterstaat
Written by	Kevin van der Linden (Rijkswaterstaat) Raymond Linssen (Rijkswaterstaat)
Reviewed by	Rainer Müller (EuroVienna) Ricardo Poppeliers (Ecorys) Karin De Schepper (INE) Jos Arts (Rijkswaterstaat)
Approved by	Sjaak van der Werf (Project Coordinator) Jos Arts (Innovation Manager)
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Executive summary

As part of the Vital Nodes project one pilot workshop and eight urban node workshops have been organised in Spring 2018 (Tier 1): Pilot city Vienna and eight urban nodes on the three selected TEN-T corridors (Scandinavian-Mediterranean, Rhine-Alpine and Rhine-Danube corridors): Rotterdam, Gothenburg, Budapest, Hamburg, Genova, Turku, Strasbourg and Mannheim.
This report starts with some general lessons learned from a practical point of view (Chapter 2) - based on the workshop format of deliverable D3.2. Based on the desk research and broad investigation in close cooperation with work package 2, factsheets (attachment 1) have been developed based on experiences and discussions before, during and after the workshops. Major trends and challenges, relevant for the integration of the urban nodes in the TEN-T network, has been the result. Among others densification/ urbanisation, redevelopment of brownfield areas, mixed use, sustainable transport modes, automation, micro hubs, e-commerce, the development of the new Silk Road, logistics sprawl, multi-company consolidation centres, synchro modality, service oriented economy, energy transition and awareness. Leading to recommendations to the European Commission and to the European urban nodes, based on the workshop discussions.

Focus is on the spatial, network and institutional dimensions and the recommendations are linked with the categorization of solutions with potential impact, as described in deliverable D2.3.

Recommendations on the **spatial dimension**:

- Growing and densifying cities need to reserve spaces for logistics activities.
- Position concrete (redevelopment) areas as linking pin between long-distance and las-mile freight flows and logistics activities.
- Zoom in and out at different scale levels: local, regional / functional urban area and corridor.
- Strengthen socio-economic relations between these (redevelopment) areas and nearby housing districts to offer better job accessibility to inhabitants.
- Use ‘research by design’ methods to explore potential cross-overs between fields of urban planning, mobility and infrastructure, freight and logistics and liveability in urban nodes.

Recommendations on the **network dimension**:

- Stimulate infrastructure fitness or network robustness in and around the urban nodes. For example by ‘shaving off’ parts of local short distance car trips to other modes.
- Relieving infrastructure barriers in the urban node offer benefits for urban quality and liveability with multiplying real estate investments in the broader area.
- Optimize the network by stimulating multimodal solutions in the urban node and between the urban nodes. For example by combining a Sustainable Urban Mobility Plan (SUMP) with logistics oriented development approaches.
- Stimulate better management of modes and chains on corridors and especially on cross-border barriers in regulation and (lack of) harmonisation.

Recommendations on the **institutional dimension**:

- Offer incentives for improving strategic regional planning on freight logistics to stimulate logistics oriented development and minimize logistics sprawl. Both for authorities and for private investors,

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for example by stimulating a coherent pattern of city-oriented consolidation centers and multi-company hubs in a regional SUMP.
- Remove barriers for cross-border freight and logistics processes and stimulate cross-border collaboration and harmonisation to realise seamless cross-border freight flows and logistics processes.
- Especially in poly-nuclear urban areas solutions can not only be implemented in the urban nodes but in a broader area as well. Think of a combination of initiatives on the comprehensive network in coherence with challenges and solutions in the urban nodes on the core network corridors. Investments in between the official urban nodes could free up space on the overall network and relieve pressure on a nearby urban node.

The recommendations and outcomes of these Tier 1 urban node workshops will be deepened and enriched in the next phase of the Vital Nodes project, within the outreach activities to Tier 2 and Tier 3 urban nodes that are part of work package 4. Recommendations on the **value dimension** will be discussed specifically in work package 5 (deliverables D5.1 / D5.3) that will deal with future research and funding needs.

Attached to this report are factsheets on all Tier 1 urban nodes that give an overview of facts and figures and challenges – basis for the workshop discussions – including maps of the urban node at local, regional or functional urban area and corridor scale levels.

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1 Introduction

In the first phase of the Vital Nodes project (a coordination and support action (CSA) executed under the European Commission's Horizon2010 program), one pilot workshop (consisting of two parts) and eight urban node workshops have been organised as part of Tier 1. Pilot city Vienna and eight urban nodes on the three selected TEN-T corridors (Scandinavian-Mediterranean, Rhine-Alpine and Rhine-Danube corridors): Rotterdam, Gothenburg, Budapest, Hamburg, Genova, Turku, Strasbourg and Mannheim. These urban nodes have very diverse geographical and infrastructural characteristics such as their size and location, their position on one or more TEN-T corridors, urban, regional and socio-economic developments, and the state of the art of their local and regional multimodal infrastructure networks but also in relation to governance issues.

The focus of the workshops has been on linking long-distance and last-mile freight logistics, while taking into account city developments, passenger transport, sustainability and addressing challenges by relating the perspectives of infrastructure, freight and spatial planning on multiple scale levels (see also deliverable 3.2 about the format of the workshops) . Besides, discussion on existing and coming practices (with potential impact) and challenges, integration issues, chances and barriers have been part of the workshop's agenda. Resulting in validated outcomes developed in an open discussion with stakeholders and experts in order to asses and validate the results.

The workshop results will be input for future transport and infrastructure investments funding strategies at urban, metropolitan and European levels thus improving the performance of the urban nodes throughout the entire TEN-T network. To this end, this report provides several recommendations based on the analysis of these 8+1 urban node workshops of Tier 1.

1.1 Scope of this report

Vital Nodes aims at enabling efficient, sustainable freight delivery across the TEN-T (as main action plan for comprehensive transport infrastructure development throughout the European Union[1] and is essential for the ambition to realise a single transport area in Europe[2.]) urban nodes (metropolitan areas), by bringing together existing European, national and regional networks of experts and professionals. As a result of increasing freight/logistic traffic, these urban nodes need to cope with challenges such as congestion, poor air quality, noise, and road safety risks.

The preparation and organization of workshops in eight European urban nodes (Tier 1) is closely related to the main objectives of the Vital Nodes project:

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.

1 See.: http://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/site/brochures_images/b1_2013_brochure_lowres.pdf
2 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'.

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The discussion on the effective and sustainable integration of urban nodes on the TEN-T core network corridor, connecting long distance freight and last-mile logistics has been elaborated and challenges and solutions with their potential impact are validated before, during and after the workshops with local stakeholders as well as experts and Vital Nodes consortium members.

In this report a first set of validated recommendations is provided as a result of the Tier 1 urban node workshops.

1.1.1 Reading guide

This report starts with some general lessons learned from a more practical point of view (Chapter 2) before zooming in on major trends and challenges relevant for the integration of the urban nodes in the TEN-T network (Chapter 3). Chapter 4 is the major part of this report, describing recommendations to the European Commission and to the European urban nodes, based on the workshop discussions and outcomes in these eight urban nodes (Tier 1):

- Vienna (AT), 16 November 2017 (pilot workshop) and 17 January 2018
- Rotterdam (NL), 29 March 2018
- Gothenburg (SE), 12 April 2018
- Budapest (HU), 3 May 2018
- Hamburg (DE), 30 May 2018
- Genova (IT), 12 June 2018
- Turku (FI), 20 June 2018
- Strasbourg (FR), 27 June 2018
- Mannheim (DE), 11 July 2018.

The recommendations will be structured according to *the six main dimensions* of the Vital Nodes conceptual model (based on the NUVit concept), as has been described in deliverable 3.4 (see figure 1), and further categorized based on the typological criteria as described in deliverable 2.3; optimize a terminal, optimize infrastructure, add infrastructure, optimize a mode, add a mode, spatial development and planning, governance and institutional arrangements.

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

These six dimensions can be seen as the various compartments of the Vital Nodes toolbox in which the different instruments developed will be ordered (the toolbox will be further elaborated in D3.5). This will also help the process of when and how to apply the various instruments available in the toolbox.

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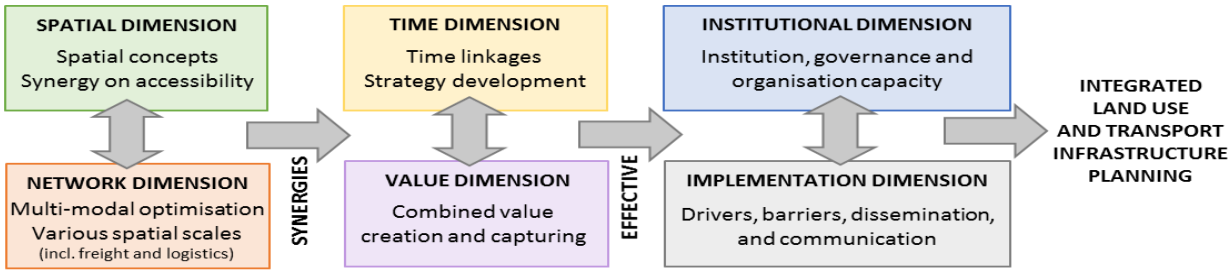

Figure 1 Vital Nodes conceptual model with linkages between different dimensions

Although the challenges and recommendations in this deliverable have been categorised based on the six dimensions described before, many of the challenges, good practices and recommendations are integrated approaches covering multiple dimensions (see solutions with potential impact in D2.2). The categorisation is based on their main focus and provides guidance to the often separated dimensions in everyday practise. For this reason is decided to use the spatial, network and institutional dimension as guiding dimensions and categorisation of the recommendations (in chapter 4). The time and implementation dimension are mostly an integrated part of these dimensions. Regarding the value dimension directions to recommendations are given as a step up to the work of work package 5 and related deliverables.

Attached to this report is more detailed background information of all Tier 1 urban node workshops:

- Attachment 1 contains factsheets of the nine urban nodes (‘finger prints’), giving infographics and short descriptions of their challenges, facts and figures and transport flows;
- Attachment 2 shows the list of participants of the nine Tier 1 workshops.

The factsheets in the first attachment have been developed in close collaboration with work package 2, including information (facts and figures) from desk research, elaboration and validation before, during and after the workshops among stakeholders from the nine Tier 1 urban nodes.

1.2 Relation with other Vital Nodes reports

This deliverable has strong relations with a wide range of other deliverables from the Vital Nodes project. The workshops that form the basis of the recommendations described in this report are organised according to the format of D3.2 in continuation of the preliminary recommendations of D3.1 and with a strong relation to the developed appraisal methodology of D2.1. D2.2 describes the solutions with potential impact that are identified before, during and after the Tier 1 workshops. Leading to the typology and criteria of D2.3.

The recommendations in this deliverable – halfway the two-year period of the Vital Nodes project – will be further validated and deepened in the Tier 2 and Tier 3 activities. Recommendations based on these Tier 2 and Tier 3 urban nodes will be described in deliverables D4.2 and D4.3 while the final Vital Nodes toolbox – based on Tier 1, 2 and 3 urban nodes – will be delivered before Summer 2019 (D3.5). D5.1 and D5.3 will deepen the recommendations related to the value dimension, giving directions for future funding mechanisms and research needs.

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1.3 Validation process

As said before, the recommendations in this report are based on the Tier 1 urban node workshops that have been organised in the first nine months of the Vital Nodes project.

Validation has taken place before, during and after the workshops – with the participating stakeholders and via (feedback on the) reports on every workshop – and via several conferences in the first year: Transport Research arena (TRA), EUROCITIES Mobility Forum, CIVITAS Urban Freight conference and CIVITAS Forum, TEN-T Days, Polis Urban freight working group, SUMP conference, AESOP, Cities for mobility International Congress, ISOCARP, EU Week of Cities and Regions, European Transport Conference and VREF conference on Urban freight. Besides the recommendations have been discussed with all Vital Nodes consortium partners and the Vital Nodes Advisory Board.

In work package 4 the recommendations will be deepened and further validated in order to reach out to all 88 European urban nodes.[3]

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

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2 Workshop process and lessons learned

As already experienced when organising the pilot workshop in Vienna (16 November 2017), the preparation phase is important to organise an effective, qualitative valuable workshop. During the preparation phase it is essential to get in close contact with a local stakeholder who really feels committed to jointly organise a workshop. In collaboration with the local stakeholder information is collected forming the base of the developed finger prints, as integrated whole with the appraisal methodology (D2.1), resulting in the typology of urban nodes (work package 2). Besides that, challenges are identified and a list of stakeholders is composed. Based on the information gained the workshop's half- or full-day programme is developed and the stakeholders are invited. Preparation has been based on the Vital Nodes workshop format, described in deliverable 3.2, and on lessons and experiences gained in the pilot workshop in Vienna on 16 November 2017, described in deliverable 3.1. This has been done in close cooperation between partners in work package 2 and work package 3.

2.1 Commitment of a local partner

Having a local partner in the urban node with whom to collaborate while preparing and organising an urban node workshop, plays a significant role for identifying the challenges and stakeholders in the city and the broader region and corridor(s) (see also D3.2). In most cases this contact person has been working for a city or regional administration (e.g. Rotterdam, Hamburg, Strasbourg and Mannheim) whereas in other cities this role was taken by representatives from a transport authority (Budapest), a port authority (Genova) and a corridor network organisation (Turku). The local partner acts as a 'linking pin' with the stakeholders in the urban node to join the workshop and to get custom-made input for the finger print/factsheet for each urban node. In close cooperation with the Vital Nodes partners, the local partners have contributed to these actions:

- Identify main challenges of the urban node;
- Identify solutions with potential impact;
- Identify all relevant stakeholders;
- (Jointly) inviting relevant stakeholders to attend the workshop;
- Gather relevant information for the development of the 'finger print' (facts and figures; see attachment 1);
- Inform the Vital Nodes consortium about major discussions, changes, events, etc. taking place in or relevant to the urban node;
- Take care of practicalities in the urban node (e.g. make reservations for venue and catering and print maps for the workshop on three scale levels);
- Host the workshop.

To discuss these actions several telephone conference have been organised in the workshop preparation phase. Facts and figures, background documents (e.g. a strategic city vision or transport plan) and maps have been delivered during this phase. Besides, the Vital Nodes team and the urban node discussed the definition of the functional urban area (FUA) and identified main challenges, solutions, drivers and barriers in each urban node. Before the workshop several stakeholders have been contacted to explain the workshop's objectives, to fine-tune the goals and expectations and to get input for the workshop.

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Engaging stakeholders

An important aspect in the organisation of the workshops is involving and mobilising all relevant stakeholders. The group of invited stakeholders entails a multi-level and multi-actor community, consisting of European, national, regional and local actors and experts. In this way, new combinations of different stakeholder groupings have been identified and selected, in collaboration with representatives of the nine urban nodes. These stakeholder groupings include representatives of multimodal hubs, (multimodal) freight and logistic operators, port authorities, infrastructure providers and spatial and urban planners. Every urban node workshop hosted ten to twenty participants from the urban node and additional external expert(s) in order to reflect the multi-level approach and (ideally) the six dimensions as described in the Vital Nodes conceptual model (see figure 1). The spatial, network and institutional dimensions have been emphasized in most of the nine workshops.

2.2 Practicalities

Besides the unmissable element of a committed local contact person several practical issues have been relevant in organizing a successful workshops:

- A preparation period of two to three months is needed to realize a well-structured and focused Vital Nodes workshop where most relevant stakeholders are able to participate;
- Commitment from a local high ranked person helps in getting stakeholders involved in the workshop and in the broader Vital Nodes network and potential follow-up activities;
- A committed local contact person is relevant for practical issues as well, in order to organize all different kinds of aspects on spot and to assist in identifying the relevant local stakeholders and experts;
- An intake at the start of the organizational process (in most cases by telephone conference) and a face-to-face meeting with the local contact person(s) one day before the workshop has been necessary. During these sessions the Vital Nodes team and the local stakeholder(s) have shared expectations and goals and discussed ideas on moderation and responsibilities;
- Planning a face-to-face kick off meeting might be helpful in acquiring local commitment from the urban node, especially in case there has been no personnel contact yet between the Vital Nodes team and the city representative. Due to agendas and to limit travel expenses this did not take place except for jointly preparing the Rotterdam workshop with representatives of the city government and port authority;
- The moderator of the session should preferably be independent and knowledgeable in the local context. It is not necessary to have an expert as moderator;
- In cases the amount of participants in the workshop is 15 or higher, it is useful to split the group in two smaller working groups, e.g. to discuss challenges and solutions;
- Many stakeholders are busy and have limited time available, especially in the period before summer holidays. This can be a bottleneck in terms of commitment and attendance.

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2.3 Process and network

Organizing the Tier 1 workshops can be considered as a first step in broader process, by bringing together stakeholders from different local, regional and (inter)national networks and by stimulating mutual learning and exchange of experiences.

- The gathering of different stakeholders is experienced as an eye opener, creating contacts across existing networks and fields of expertise with different backgrounds and perspectives (public and private sector, different scales, modalities and themes, passenger transport and freight);
- Participants have shown interest in presenting European case studies that are comparable with their own urban node. Especially input from experts from other urban nodes has been valued a lot, as external criticasters and by providing another perspective while presenting good practices from a city with similar challenges as the urban node where the workshop is held. For example in Genova and Turku experiences in respectively Antwerp and Gothenburg have been shared by colleagues of Vital Nodes partners 'Flanders department of Spatial Planning' and Trafikverket;
- The availability of three geographical maps – on the corridor level, the regional/functional urban area level and the local level – has really been valuable in facilitating the discussion, by 'zooming in and out';
- One workshop has shown to be too short to extensively deepen the discussion. (local) Stakeholders do have limited time available, while discussing all aspects in half a day is impossible. Therefore choices need to be made for the workshops. There seems to be a need for a second workshop/follow up in order to really get to the core and have the possibility to get to cover all relevant aspects of the local, regional and corridor discussions;
- Stakeholders are asking about possibilities to organize a follow-up, dedicated to the specific urban node. Focusing on custom made solutions by discussions and/or design.

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3 Trends and challenges

While preparing and conducting the urban node workshops several trends and developments influencing the relation between the TEN-T (core) network and the urban nodes have been addressed and discussed. Global developments such as the changing freight transport flows (China – Europe) might have a major impact at regional and local scale levels e.g. in Budapest. These trends are affecting spatial planning and mobility and freight flows in and between metropolitan areas and will have impact on infrastructure networks and liveability, especially in urban areas. The most important, mutually connected and multiple-mentioned trends are listed below. A trend is perceived as a general trend when it was discussed in at least five of the nine urban node workshops. Some of these trends will have major impact on the organisation of an urban node and the related transport flows in and around the urban node.

Growing cities with low-emission transport policies

In many European metropolitan areas population is growing and policy has to focus on **densification** in the existing built-up areas with **redevelopment of brownfield areas** into **mixed-use neighborhoods**. This results in enormous building tasks and related transport flows increasing pressure on the current transport system. At the same time cities are implementing Sustainable Urban Mobility Plans (SUMP) and are stimulating **sustainable transport modes** for inhabitants, employers, employees and visitors. In the meanwhile energy flows are changing, **automation** starts playing a bigger role in mobility and **innovations as 3D-printing** could bring production closer to the cities. As many cities are introducing Low Emission Zones (LEZ) and enhance car-free or car-light lifestyles the position of urban ring roads is changing. The urban ring road might become a ‘clash’ between local goals for real estate development and liveability on the one hand and national and European goals stimulating seamless long-distance transport flows for persons and freight on the other hand.

Another topic in this context of **urbanisation**, densification and **SUMP policy** is the implementation of **small distribution centers – ‘microhubs’ –** in or near many urban nodes historic city center. A microhub supports the modal shift from truck or van to a clean(er) vehicle, often an electric delivery van or cargo bike, in the last-mile freight delivery. Challenge is finding a good location for this micro hub(s) and linking up with global players. Developing smart policies on last-mile freight delivery and coherent regional planning of consolidation centers should diminish conflicts between citizens’ **liveability** and housing densification on the one hand and the logistic sector’s interest to deliver goods in time. Causing a ‘challenge of space’ on different scale levels.

E-commerce: increasing freight volumes and changing flows

More and more orders are placed online and via automatic order systems, which is called e-commerce. **E-commerce** and every day in-time delivery increase the amount of goods transported, between and within cities. Pressure on main road and rail networks is increasing, resulting in **bottlenecks in and around urban nodes**. However, this trend occurs at higher, European and global levels as well. Of high impact will be the **development of the New Silk Road** including new infrastructure and services between China and Europe e.g. ideas extending the broad gauge railway system to Western Europe.

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Freight flows might shift or increase as a result of this development. Therefore it is important to explore in what way the New Silk Road might impact the European transport network and freight flows.

XXL warehouses and logistics sprawl

Investments in freight logistics are mainly done by private or semi-private operators focusing on profit maximisation and cost minimisation. Seamless and often automated utilization of production processes and growing stock availability within short distance of major consumers markets is of growing importance for e-commerce companies. More and more products are required and big stocks are no exception – leading to an **economy of scales and development of XXL warehouses**. Drawback of this trend can be seen in many European towns and smaller cities where the retail function is decreasing. But the enormous growth in trucks and vans crossing neighbourhoods and burden (road) infrastructure in and between cities is another major sign of this trend. Discussion is if a global player as for example should contribute financially to maintenance and improvement of public funded infrastructure – infrastructure that is now used for free and is playing a key role in achieving the company's commercial objectives. Another challenge is preventing the suburban landscape around European urban nodes from **'logistics sprawl'**: Should every municipality welcome a new distribution for a single company or should regions stimulate **multi-company consolidation centers** at well-balanced locations?

From a spatial point of view the changing relationship with the labour market is important. Logistic oriented companies choose their location based on the availability of labour potential and on **access to this regional labour market**. Based on these choices the logistical activities might be located on locations that seem less logic places from an infrastructural point of view.

Growing demand of flexibility of logistics

In the manufacturing industry – which is reshoring to Europe - **robotisation** is taking over several functions while on road, rail and water **digitalisation** boosts multi-modality and aims to improve the efficiency of the corridors. Intelligent Transport Systems (ITS) are focused on aligning freight and demand for transport and different modalities and increase the efficiency of (using) the different modalities. Sharing transport modes and distribution/consolidation centres and vehicles on road, rail and inland waterways which is open and available for third parties is a growing demand. The wish to be flexible and share space and data to realise shorter waiting times in harbours grows. This so-called **synchromodality** becomes more important to stimulate fast and efficient freight delivery. However, combining cargo flows and stimulating synchro modality requests better collaboration between different private companies and different multimodal network operators, in terms of sharing data, liability, cross-border regulations, etc.

Transition of ports and industrial areas

Especially in many Western European urban nodes a shift towards a more **service-oriented economy** can be observed where classical industrial activities are diminishing. Which makes redeveloped warehouses need to be supplied with goods being consumed by residents, workers and visitors. Ports and industrial areas are changing in terms of types of goods transhipped and manufactured – as a result of the **energy transition** and development of **automation** – and new service and production activities step in. This results in different needs regarding labour force and a change from former industrial areas into brownfields that can be developed for housing, offices, new production services and **mixed use**

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functions. Example is a former shipyard in the Rotterdam region that has been transformed into a maritime hotspot for innovative off-shore activities. This trend can be sketched as the quest to reinvent the 'the productive city': What opportunities can be identified to strengthen the regional manufacturing economy and thus contribute to an economically strong and socially inclusive urban region?

As our society is on the eve of major impacts of energy transition this will change the position and function of urban nodes that are to a large extent dependent on the transport and storage of fossil fuels and bulk. This impact is beyond the scope of the Vital Nodes project but during several of the urban node workshops stakeholders mentioned this trend and potential upcoming changes of major concern as changing freight flows, the planning of refuelling infra and the connection with energy grid development.

Freight and logistics included in person transport and infrastructure planning

The nodal function of urban nodes is not widely known and recognized in all urban nodes. On policy and strategy level not every stakeholder and organisation is fully aware of the (potential) strategic position on the European transport network and the advantages and disadvantages of being an urban node. Most urban nodes focus on last-mile initiatives and for several cities the potential impact of the trends sketched before are beyond their local and regional planning scope. In practice a real **barrier exists between the planning of transport and infrastructure for persons and freight**: Passenger transport is driven by public policies whereas freight and logistics is driven by market parties. As logistics enterprises focus on private goals as transport efficiency, public assets as network development and spatial planning are beyond their scope. As some of the trends described in this chapter offer combination or win-win opportunities for local and regional policy makers, it would be valuable to explore these opportunities e.g. for integrating freight and logistics in labour market policy and urban functions as housing, mobility and liveability. The Tier 1 workshops have been a first step to create **awareness** and to put freight and logistics beyond the last-mile on the urban agenda. Further exploration of potential opportunities needs follow-up actions, deepening meetings and dissemination of experiences throughout Europe.

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4 Recommendations

4.1 Introduction

Following the trends and challenges described in the previous chapter this chapter focuses on recommendations on integrating (the Tier 1) urban nodes in the TEN-T network. These recommendations will be enriched via concrete input of solutions with potential impact that have been discussed during the Tier 1 workshops and will build on the grouping of solutions and criteria for urban nodes typologies as has been described in deliverable 2.3. Solutions have been grouped as follows:

- Optimize a terminal
- Optimize (the use of existing, sustainable) infrastructural systems
- Add infrastructure
- Optimize a mode
- Add a mode
- Spatial development and planning
- Governance and institutional arrangements

This grouping of solutions is matched with the six dimensions of the NUVit conceptual model.

Vital Nodes dimensions* (see also figure 1)	**Grouping of solutions**
Spatial dimension	Spatial development and planning
Network dimension	Optimize a terminal
	Optimize (the use of existing, sustainable) infrastructural systems
	Add infrastructure
	Optimize a mode
	Add a mode
Institutional dimension	Governance and institutional arrangements (including time and implementation dimensions)

Table 1 Grouping of solutions related to the six Vital Nodes dimensions

* In this chapter the time and implementation dimensions are closely related to the spatial and network dimensions. As the Tier 1 workshops have been structured via challenges and (potential) solutions the time and implementation dimensions have not been addressed separately. The value dimension will be dealt with specifically in the recommendations regarding funding needs and instruments and future research needs as described in deliverable D5.1 / D5.3.

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The time and implementation dimensions are critical aspects when deploying the specific solutions with potential impact. The value dimension will be discussed specifically in the deliverables of work package 5 - D5.1 / D5.3 (‘Validated recommendations on integrating nodes and corridors, on funding needs and instruments, and on future research needs’). A grouping of recommendations specified per urban node typology is too complex in this stage of the project. In the next phase of the Vital Nodes project (Tier 2 and Tier 3) and for potential follow-up activities this grouping can be made. Although the Tier 1 urban nodes vary in the proposed typology, several recommendations already offer valuable stepping stones e.g. for cross-border nodes (Strasbourg), centric nodes (Vienna, Budapest) and poly-centric node (Mannheim, Rotterdam), Sea Gateway hubs (Rotterdam, Hamburg) and Sea Regional hubs (Genova, Turku).

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4.2 Spatial dimension

The spatial dimension has a direct relation with solutions with potential impact that could be categorized under spatial development and planning in deliverable 2.2.

4.2.1 Challenge of space

Due to population growth, the growing need for additional housing and the thereto related densification of many European cities/urban nodes, transportation flows are growing. The amount of lorries entering cities (centres) to deliver packages as well as ships and trucks transporting freight between different urban nodes. On all scale levels multiple processes and activities are taking place, competing to use the same space, which is rather limited. Ports are growing, freight flows and tourism follow. The competing activities willing to use the limited amount of space in and surrounding urban nodes are part of the so called 'challenge of space'. All of these activities need to be overseen in an integrated way in order to interrelate processes and avoid disturbing everyday life.

Most urban space is used for real-estate development and brownfields are being redeveloped for housing. Saving urban space for logistics and new productive functions is under pressure. While e.g. Urban Consolidation Centers (UCC) and multi modal terminals demand considerable amounts of space. Implementing logistic solutions as urban consolidation centers have to take scarcity of space into account as a complicating factor. Planning and governance, e.g. the stimulation of multiple use of terrains and the reservation of areas within the city for logistic activities, can stimulate innovative approaches of which examples are addressed (e.g. in Vienna and Strasbourg).

Example: Genova

Genova is located on small strip of land at the southern end of the Rhine Alpine core network corridor and is facing further harbor development problems due to the location between the Apennine mountains and the Ligurian Sea. The port of Genova is collaborating with the port of Savona, nevertheless growth possibilities are limited due to the lacking availability of space. Road and rail capacity are facing the same challenge.

The image shows the cranes of the port area which are specifically shaped in order to allow the planes of Genova airport, located directly next to tis terminal, to arrive.

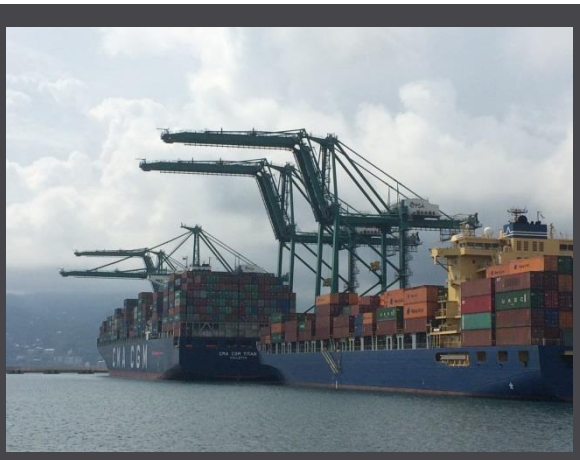

Figure 2 - Cranes in the Port of Genova (source: Kevin van der Linden)

Related solutions with potential impact: Budapest micro consolidation centres, Genova Cable Car, Vienna Produktieve Stadt, Vienna micro and midi hub, Rotterdam living lab urban logistics, Mannheim blue village Franklin, Gothenburg railport Scandinavia, Mannheim BAS-F cable car, Gothenburg micro hub ElectriCity, Gothenburg Cable Car, Turku integrated planning.

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4.2.2 Connecting different scale levels

Transport flows (passenger and freight) interfere and connect in specific areas in urban nodes. In these areas goods are stored and consolidated for modal shift (waterborne transport to rail or road, rail to road or road to rail). Parts of these transport flows can be linked to the urban node itself so there is potential for combining these cross-docking functions with a local distribution center or city hub for last mile distribution. The specific functions of these areas and the spatial design and configuration are highly influencing possibilities for sustainable freight and logistics flows within and between the urban node(s). Connecting different scale levels requires zooming in and out – as was done during the Tier 1 workshops.

Example: Rotterdam

The port of Rotterdam and municipality of Rotterdam are in collaboration developing the Waal-Eemhaven. This port area is now shifting from a deap sea to a short sea terminal and will develop into a City Terminal. In the future this area will be a link between the port and the city center on different scale levels. Not only the freight flows but also commuter flows are strongly interrelated in this area. The relation with nearby city districts – coping with high unemployment rates – will be improved to stimulate job opportunities and accessibility.

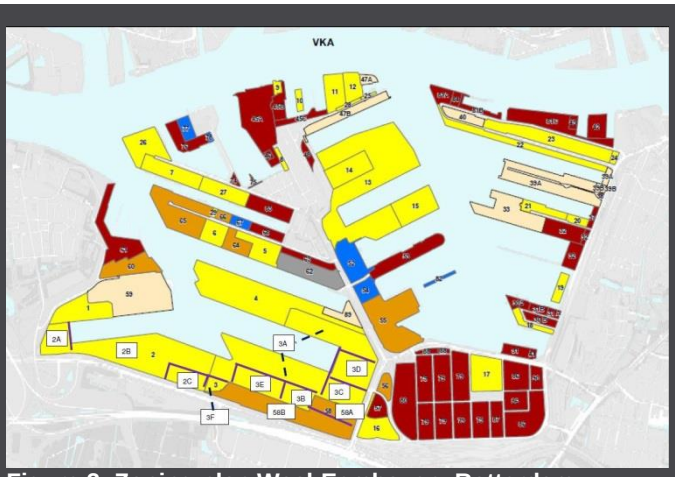

Figure 3: Zoning plan Waal-Eemhaven, Rotterdam (source: Port of Rotterdam)

Related solutions with potential impact: Gothenburg West Sweden Agreement, Turku Northern Growth Zone, Turku CaaS, Strasbourg new railway track, Norrkoping, Mannheim bike highway, Hamburg S-bahn, Gothenburg railport Scandinavia, Antwerp Ringland, Turku integrated planning.

4.2.3 Mixed use redevelopment areas

The shift from classical industries to service economy influences the spatial economic development of (the centers of) urban nodes. While cities are densifying it is challenging to accommodate all functions well and facilitate urban processes in the best way possible. This includes freight and logistics and new production activities, housing, vitality issues, etc. Cities should not focus only on real estate development but reserve space for these economic activities as well.

Example: Vienna

Within the city of Vienna many redevelopment areas (orange dots in figure 4) are dealing with challenges of development direction and potential. The population growth requires the development of housing and services. The accommodation of urban growth needs to level up with the infrastructure facilities and development of brownfield areas in the city region in order to accommodate an efficient and sustainable urban node.

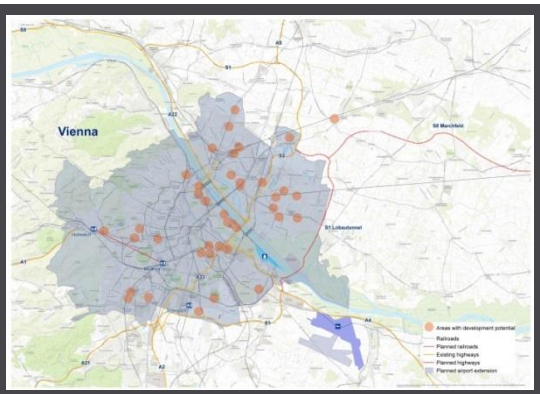

Figure 4: Map city of Vienna and its context (source: Ecorys)

Related solutions with potential impact: Budapest micro consolidation centres, Vienna Sud cargo terminal, Vienna Produktieve Stadt, Vienna micro and midi hub, Rotterdam Waal-Eemhaven, Mannheim Green Logistics Park, Mannheim blue village Franklin, Budapest bicycle last mile logistics.

4.2.4 Strengthening socio-economic relations

Not every urban node is aware of the potential role of freight and logistics in relation to socio-economic development. Positioning freight and logistics in direct relation to liveability, everyday life and interaction with citizens in terms of social inclusiveness is no common sense. Offering optimal location choices with good accessibility (by public transport and bike) to employees is key when improving this interrelation.

Rotterdam and Strasbourg are working on this socio-inclusiveness by improving accessibility of harbour areas for employees by sustainable transport modes, separated from road freight traffic. Rotterdam is connecting redevelopment of the Waal-Eemhaven to offering better job accessibility to inhabitants of the nearby districts that are now coping with high unemployment rates (see the example on the previous page – paragraph 4.2.2).

Example: Strasbourg

Extension of Strasbourg's tramway network to the German town of Kehl, on the eastern Rhine bank, is a major step in improving the socio-economic relations within the cross-border Daily Urban System. The tramline is a catalyst for regeneration of the Strasbourg port area as well, giving better access for employees by linking port and city.

Figure 5: Extention of Strasbourg's tramway network (source: Ville de Strasbourg, www.strasbourg.eu)

Related solutions with potential impact: Budapest micro consolidation centres, Vienna micro and midi hubs, Rotterdam Waal-Eemhaven, Rotterdam Erasmus bridge, Mannheim micro hub last mile deliveries, Mannheim blue village Franklin, Mannheim bike highway, Gothenburg micro hub ElectriCity, Budapest bicycle last mile logistics, Antwerp ringland.

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4.2.5 Recommendations regarding spatial dimension

Integrate the two worlds of person transport and freight and logistics

Flows of person transport and freight and logistics are often conflicting and using the same space on roads, rail tracks and waterways. Enter the urban nodes on the same locations and at the same time. Developments regarding person transport an freight and logistics are nevertheless often separated and little interacting. The interaction regarding developments and spatial claims of both person transport and freight and logistics has great potential, which – when discovered – could add value to the vitality and economy of many urban nodes.

Added value from spatial dimension development as a factor in infrastructure planning

There is no 'natural' interaction between spatial planning and mobility and infrastructure planning, especially planning for freight and logistics on the other hand. Bringing together stakeholders from these different fields at local, regional and corridor level, has shown to deliver new insights and connections. More added value will be delivered by involving spatial planning professionals already in the most early phase of infrastructure planning by jointly developing integrated area developments. This approach will offer more potential for mutual benefits on spatial quality, vitality and accessibility.

Use of 'Research by design' to investigate potential integrated solutions

Lots of challenges in complex urban nodes have to do with the integration of the different fields (spatial planning, infrastructure and logistics). In order to stimulate integrated solutions and development approaches cross-silo studies are needed regarding on hand visions and step by step programming. In order to facilitate thorough processes together with different stakeholders a research by design approach – developing spatial concepts and solutions – is advised. A specific proposal to launch a research by design approach would be to execute an extensive study on urban node challenges with urban planners and designers in multi-sector workshop teams in urban nodes of different categories with different functionalities as a node. Via this research by design approach the potential for integrated solutions and developments could be discovered and the potential impact could be visualised.

Support multiple land use

Densification is everyday business in and surrounding urban nodes. In order to be able to facilitate growth and accommodation of freight and logistics as well as housing, creative use of existing space is required. Stimulation of 'multiple land use' within the functional urban areas of urban nodes could tackle the problematic accommodation of logistic processes by smart integration of functionalities and modalities. Limiting the movements within and out of the city.

Save parts of brownfield areas for new production services

Often brownfield areas are redeveloped to accommodate housing, offices and other economic services. This positively influences the land value and economy. Nevertheless in order to ensure sustainable and socio-economic development of (central) urban areas cities should reserve space within the city boundaries for more industrial and production functions, allowing deliveries to enter the city and avoiding an enormous growth of trucks entering and leaving the city.

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Design interfaces (integrated planning approach) between trans national network and local transport (last-mile)

Planning processes on different scale levels require a certain level of standardisation in order to be able to facilitate freight and logistics in the most efficient way. Decisions in the (private) logistics sector are mostly driven by optimal network accessibility and connectivity from the company's perspective. From a broader public planning perspective the link with local and regional freight flows (last-mile) should be improved. Especially the linking regional scale has shown to be highly important to facilitate efficient and sustainable interwoven processes on transnational (corridor) level and local level (last-mile).

A city's identity of logistics

Logistics is now in many urban nodes and regions seen as something that just needs to be done. It is put away and not seen as something that can add value to the quality of the city and region. Especially in service-based cities as Vienna freight and logistics is not a 'natural asset' of the city's DNA. Bringing in new ideas on design and functionality of logistics and adapting it to the local and regional identity could result in more custom-made solutions for urban nodes. Besides this approach could result in a different image for logistics than just 'storing containers'.

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4.3 Network dimension

Each network dimension aspect/challenge has solutions with potential impact related to one or multiple groupings of solutions (D2.3); optimize a mode, optimize infrastructural systems, add infrastructure, optimize a mode and add a mode.

4.3.1 Resilience of the network and infrastructure fitness

Having specific axes in the urban nodes that are vulnerable (e.g. bridges across rivers) influences the robustness/fitness of the network on other scale levels including the corridors. Not only between the cities, but also within cities the network and interrelation is important. 'Shaving off' parts of this transport flows – especially local car (commuter) trips – can give more space to the longer-distance freight flows. Potential solutions with positive impact on this infrastructure fitness ('adding new infrastructure') are the Gothenburg cable car and the proposed freight cable car across the Rhine in Mannheim, between two parts of the BASF chemical plant.

Example: Gothenburg

Bottleneck situation in the center of Gothenburg with freight and passenger flows merging together, mixing access to port, city and northern area.

Figure 6: Constructioon area near Götaälybron (south side) and Güta Älv, Gothenburg (source: Kevin van der Linden)

Related solutions with potential impact: Gothenburg West Sweden Agreement, Turku Northern Growth Zone, Turku CaaS, Strasbourg urban logistics ELP, Rotterdam utilization of road network, Rotterdam Theemsweg railtrack, Norrkoping, Mannheim BAS-F cable car, Hamburg S-bahn, Gothenburg railport Scandinavia, Gothenburg cable car, Turku integrated planning.

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4.3.2 Barriers in and around urban nodes

Infrastructure as barriers for city life, liveability and accessibility of urban nodes. Conflicting with other aspects relevant for the function of urban nodes/cities and everyday life.

Example: Genova

Bridges and elevated roads are blocking views and urban developments. Genova's historic inner city is fenced off from the waterfront by an elevated highway (SS1). Investments in tunnels and thereby creating conditions for value-capturing have shown significant increases in real estate and ground prices in the broader area around the former highway or ring road. Make-overs can be admired in e.g. Madrid and Maastricht while Antwerp is planning to tunnel a significant part of the ring road.

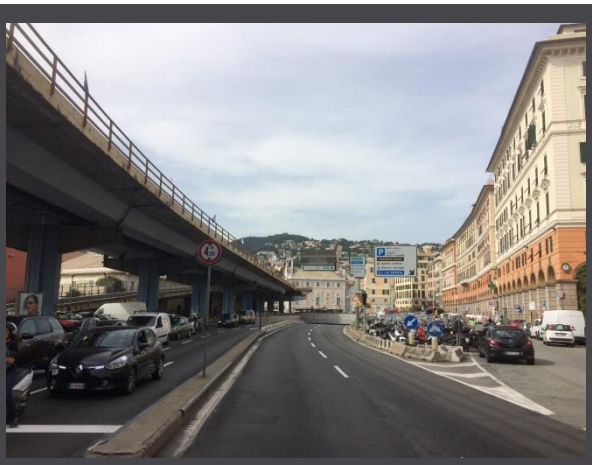

Figure 7: SS1 crossing the city of Genova (source: Raymond Linssen)

Related solutions with potential impact: Genova cable car, Mannheim night deliveries, Turku autonomous shipping, Rotterdam urban logistics emissions, Rotterdam Erasmus bridge, Norrkoping, Mannheim BASF cable car, Gothenburg cable car, Antwerp Ringland, Turku integrated planning.

4.3.3 Optimizing network use by multimodal solutions

Networks are often full, among others, due to the enormous growth of transport flows. The situation in which passenger and freight transport use the same tracks isn't an exception. Causing conflicting interests within one modality. By making smart and efficient connections between modalities in the form

Example: Turku 'One Hour Train'

Finland is planning a new 'short cut' railway track between Helsinki and Turku, to reduce the travel time between these cities from the current 2 hours to around 1 hour and 15 minutes. When this new rail road is in service, more capacity will be available for rail freight on the existing railroad. This plan is part of the Northern Growth Zone in SouthWest Finland with connections to Stockholm in the West, Tallinn in the South and St. Petersburg in the East. It brings together an economic area of 333 billion euros. The Zone exists of 5 sub-regions, 27 municipalities and is semi-polycentric. The Turku-Helsinki One Hour Train plan is not just a railway but a regional development tool, connecting the whole South West Finland to the capital region. Including regional commuting trains, electrification of the track between Turku and Uusikaupunki, a modern & sustainable public transport system of Turku City Region and urban development of railway yards to multimodal travel center. Besides the railway network the E18 Turku Ring Road is planned to be improved as well with a € 310 million improvement plan.

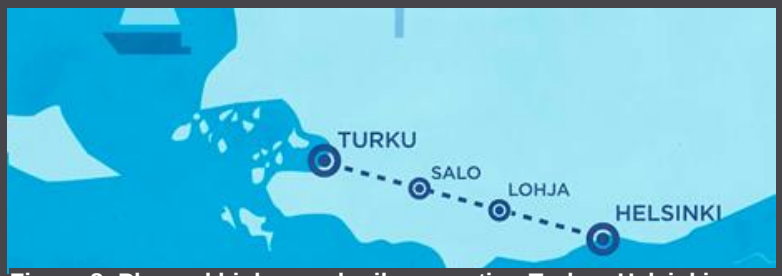

Figure 8: Planned high speed rail connection Turku - Helsinki (source: Tunnin Juna)

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of multimodal solutions a better optimization of network(s) could be realized.

Related solutions with potential impact: Budapest utilization of the road network, Gothenburg West Sweden Agreement, Turku Northern Growth Zone, Strasbourg Port de Lauterbourg, Vienna Sud Cargo Terminal, Vienna Produktieve Stadt, Vienna micro and midi hubs, Turku CaaS, Strasbourg urban logistics ELP, Strasbourg new railway track, Rotterdam utilization of road network, Norrkoping, Mannheim micro hub last mile deliveries, Mannheim green logistic park, Hamburg S-Bahn, Gothenburg microhub ElectriCity, Gothenburg Railport Scandinavia, Turku integrated planning.

Another example is the extension of the regional railway track (S4 – S-Bahn) between Hamburg and Bad Oldesloe. This project has received CEF funding by successfully demonstrating the positive influence on corridor level, enlarging capacity on the route between Hamburg and Copenhagen via the new Fehmarn Belt bridge-tunnel.

4.3.4 Need for framework conditions for tomorrow (supply chain)

Challenges do occur for cross-border rail freight, as the Rastatt tunnel accident in August 2017 showed. Lowering of tracks during tunnel construction works led to closing down railway traffic for passengers and freight between Karlsruhe and Basel for almost 2 months. To stimulate infrastructure fitness and resilience (or network robustness) connectivity with the French railway network should be improved including breaking down regulations in cross-border freight traffic.

Example: Mannheim

In case of a traffic accident on the A5 south of Mannheim freight traffic could be offered an alternative route to Basel via the left bank of the Rhine. However at this moment offering this route via France (A35) is difficult due to difference in regulations and trucks are not allowed to make this detour.

Figure 9: Administrative borders of the Mannheim region (source: Metropolregion Rhein-Neckar)

Related solutions with potential impact: Gothenburg West Sweden Agreement, Turku Northern Growth Zone, Vienna Produktieve Stadt, Turku CaaS, Turku autonomous shipping, Rotterdam urban logistics emissions, Rotterdam living lab urban logistics.

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4.3.5 Management of modes and chains

At this moment in many cities the focus is on last-mile city logistics. The relation with long distance connectivity is missing. Cities should be made clear that they are part of a broader network system and that collaboration with neighbouring regions and other partners along the corridor(s) is needed. For example for the Port of Strasbourg railway and waterway are the main modalities. The Rhine offers good infrastructure and within the existing infrastructure the amount of freight transport can still be doubled. However, container traffic is a challenge in terms of the logistic chain. A barge starting in Basel is making stops at different container terminals towards Antwerp. If there is a delay it impacts the entire chain. A better flow of information between the container terminals would really help and the supply chain would improve. Difficulty is that the container terminals along the Rhine are in different countries and are dealing with different mass transport systems. Challenge is how to inform this supply chain?

Example: Strasbourg

Relation with port areas and connecting urban nodes relevant in order to manage transport flows near and in Strasbourg.

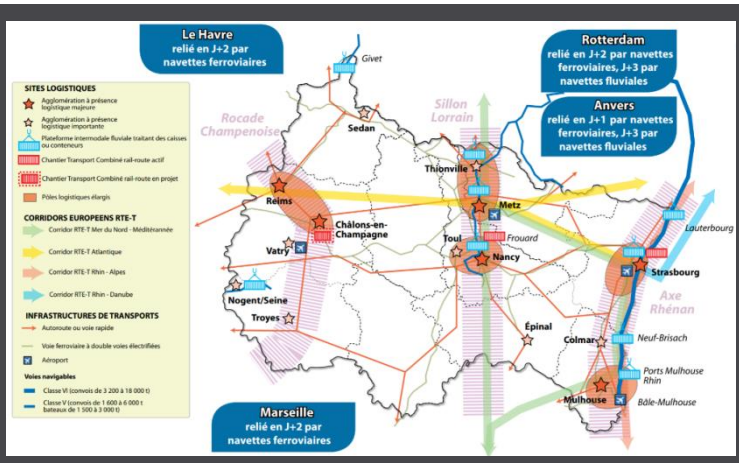

Figure 10: ... (source: ...)

Related solutions with potential impact: Genova Ferrobonus, Gothenburg West Sweden Agreement, Turku Northern Growth zone, Turku CaaS, Rotterdam Theemsweg railtrack, Norrkoping, Hamburg S-Bahn, Gothenburg railport Scandinavia.

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4.3.6 Need for a modal shift – competing transport flows

Use of the existing networks and shift to other modes, stimulate multimodality and mobility management (optimizing a mode, adding a mode). These types of solutions will support other sustainability ambitions of the urban node and beyond, as energy transition, limit CO_2 emission goals and health.

Example: Turku

The archipelago west of Turku is nice from nature and recreational perspectives, but not so much for sea freight. In order to guide the ships from the open sea through the Archipelago to Turku, they need to be piloted. The pilotage fees are calculated with a basic fee and a fee per mile. The amount of miles that the ships need to be guided through the Archipelago is huge which brings high costs and therefore an advantage for competing ports, which do not have such pilotage fees. In order to become more competitive as a port possibilities to change the build-up of the fee or to make it the same for all ports should be discovered, comparable with the ice breaking fees).

Figure 11: Port strategies - Comprehensive ports in Finland, ports along the corridors (source: Finnish Port Association)

Related solutions with potential impact: Budapest micro consolidation centres, Genova Ferrobonus, Gothenburg West Sweden Agreement, Turku Northern Growth Zone, Vienna micro and midi hub, Turku autonomous shipping, Strasbourg new railway track, Rotterdam Theemsweg railtrack, Rotterdam living lab urban logistics, Mannheim Green logistics Park, Mannheim bike highway, Hamburg S-Bahn, Gothenburg railport Scandinavia, Budapest bicycle last mile logistics.

4.3.7 Locations for consolidation centres on all scale levels

Link between multiple levels and the importance of having a connection between the different levels – structuring the transport flows.

Example: Budapest

Budapest is coping with huge freight flows around, in and through the city. Strategic locations should be chosen for distribution hubs and consolidation centers to connect with the regional and local freight flows . Restrictions for the inner city apply to facilitate the right flows of freight traffic and to relieve neighborhoods from these flows.

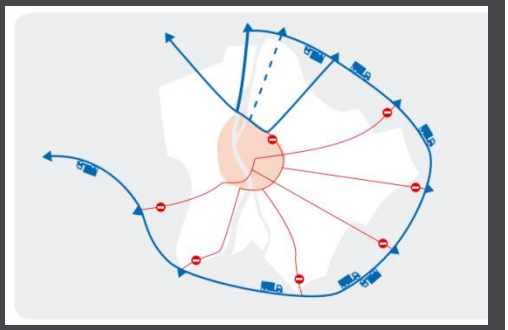

Figure 12: Freight transport strategy, Budapest (source: BKK)

Related solutions with potential impact: Budapest micro consolidation centres, Vienna Sud cargo terminal, Vienna micro and midi hub, Norrkoping, Mannheim micro hub last mile deliveries, Mannheim green Logistics Park, Gothenburg micro hub ElectriCity.

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4.3.8 Sustainable network: emission-free transport vehicles

Several urban nodes have huge ambitions to stimulate the use of cleaner, emission-free and more silent freight vehicles. This shift can be supported by implementing transhipment locations at strategic locations at the city border, well connected with the international infrastructure network.

Example: Mannheim

The Green Logistic Park is a concept to create a terminal system at the Coleman Barracks to consolidate all goods at one point. The location is near the A6 in the north of Mannheim, close to the A67. Via road goods can be transported to the terminal with large trucks, which forms a transhipment location to factories and costumers in Mannheim. Shipping the goods to the factories is planned to be done by a combined (electric) shuttle in the future. In this way the number of (large) trucks crossing the city could be reduced. Besides, the exhaust of emission will be reduced as electric trucks/shuttles will connect the city centre and factories with the logistic hub.

Figure 13: View on industrial area near the port of Mannheim (source: Raymond Linssen)

Related solutions with potential impact: Genova Cable Car, Turku autonomous shipping, Rotterdam urban logistics emissions, Mannheim Green logistics Park, Mannheim bike highway, Mannheim BAS-F cable car, Gothenburg micro hub ElectriCity, Gothenburg Cable Car, Budapest bicycle last mile logistics.

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4.3.9 Recommendations regarding the network dimension

Stimulate network resilience and infrastructure fitness

Local, regional and (inter)national traffic are often interconnected within cities. Road and rail river crossings are vulnerable elements in these networks. Planning for the missing links in these networks could contribute to offering alternative routes for long-distance freight transport flows that are now burdening the local and regional infrastructure network. After having 'freed' the local network from the long-distance freight flows, quality of the urban space can be improved for cyclists and pedestrians as well. In addition, it is for to enhance linkages between the various networks of different transport modes, as this creates a more overall resilient network. This is especially important in relation to the peri-urban ring infrastructures that function as the 'hinge' between long-distance and local urban transport – i.e. the level of the functional urban area.

Stimulate exploring the Functional Urban Area

From a freight and logistics point of view a focus on the Daily Urban System (equipped for person transport flows) does not fully match with current relations and flows in freight and logistics. Initiatives between urban nodes, elsewhere on the corridor are at least as much important as investments within the core urban nodes. Examples can be found in the Rhine Alpine corridor in Venlo, Nijmegen and Duisburg, all in between the official nodes of Rotterdam, Antwerp and Düsseldorf/Cologne.

For a monocentric urban nodes as Vienna the Functional Urban Area extends to the Slovakian capital of Bratislava, 60 km to the east. As there is no common vision on the Functional Urban Area development yet, this links to the governance dimension as well. This recommendation is directly related to the following.

Focus on bottlenecks in the wider TEN-T (comprehensive network) corridors, not only 'on' TEN-T corridors. Referring to the second order effects

The Rastatt accident (2017) illustrated the need for widening the scope of the TEN-T corridor. Investing in upgrading an alternative railroad on the (French) west bank of the Rhine will contribute to overall network resilience on the Rhine Alpine corridor. These investments and connected liveability improvement solutions e.g. in the city of Strasbourg (as diverting the A35 highway) should be part of the TEN-T investment scope as well. This recommendation will contribute to the following, overarching one.

Explore effective approaches for future-proof multi-modal networks

At a European level: Elaborate on a strategy on the link with the Silk Road: Are all 88 urban nodes of equal importance for this link? At this moment a freight train from China via Sofia and Budapest to Duisburg crosses 3 TEN-T corridors and at least 12 urban nodes.

Combine Transit Oriented Development (TOD) with Logistics Oriented Development (LOD) concepts

Include freight and logistics when stimulating multi-modality ambitions and solutions. SUMP's are often limited to passenger transport solutions, so widen the scope and include freight solutions beyond the last-mile as well. The CIVITAS initiative offers a good base to explore concepts of LOD and to stimulate awareness raising and knowledge exchange among urban nodes and other cities. For example on

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exploration of solutions concerning the effective sustainable integration of smaller (micro and midi) hubs in urban nodes. Do not only focus on the local city level, but include the regional and corridor levels as well. E.g. by researching and monitoring the impact of freight transport flows in the urban node by developments on the corridor and by developing and deploying integrated measures on corridor level and local/regional level. Specific attention should be paid to (potential) bottlenecks in urban nodes as railway bridges where local, regional and international transport for passengers and freight transport meet (examples Vienna, Budapest, Mannheim and Hamburg). In case of renovation or renewal of these road and rail bridges specific attention must be paid to a broader regional approach on the impact of bridge closures: not only for transport but also in socio-economic terms.

Data applicability on NUTS 2 and 3 level

Data of freight streams at the level of city and functional urban area are scarce. The functional urban area is not defined and the data are not comparable because of non-existence or different ways of collections – incomparability. Decision making on corridor level requires comparable data (on functional urban areas). Creating the necessity to develop a clear definition and marking of the different FUA's of the EU urban nodes (research need) and coherent/consistent registration of data throughout Europe.

Awareness raising of a city's function as an urban node

There was little awareness of the role of some urban nodes in the TEN-T network. Within the strategic planning department often the focus is making local aspects function well. Therewith there is no awareness of the necessity to provide capacity for long distance freight ("not my issue/problem"). There might be problems on the TEN-T network if the network surrounding an urban node hasn't got the necessary capacity. Directly impacting the flow of transport on long distances by creating a bottleneck. Addressing the TEN-T network perspective and relation to urban policies and projects could strengthen the (core) network corridors as a whole. Follow-up on the first set of urban node workshops on implementation of TEN-T perspectives in the (local) strategies would be a first step.

Creating possibilities for living labs and piloting

Stimulate the possibilities to execute pilots and living labs in urban areas relating to (innovations in the field of) freight and logistics. Linking the last mile deliveries and long distance transport, taking into account sustainability and transitions by policy integration on the TEN-T core network corridors. Helping innovative tools and developments to be tested and to be transformed from plans/good practices to tested/applied 'best' practices.

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4.4 Institutional dimension

4.4.1 (Lack of) regional spatial planning governance

In several Tier 1 urban nodes spatial planning is limited to the city boundaries. This topic has already been discussed in the first workshop in Vienna (Deliverable 3.1) as the regional area of Vienna includes parts of the neighboring state of Lower Austria (Niederösterreich) where land use planning is the responsibility of the every municipality. Especially urban sprawl throughout the region by developing housing districts and warehouses in greenfield areas might occur as a strategic regional strategy and metropolitan governance for the Vienna region are absent. Regional opportunities for transit oriented development (TOD) – and the potential combination of this with Logistic Oriented Development – are not taken nowadays as municipalities are mutually competing. 'Logistics Sprawl' is a real threat when planning of logistics and consolidation centers is not organised in a coherent regional planning approach, stimulating multimodal solutions and good access for freight flows and employers.

Recommendation is to think of a strong incentive ('stick' or 'requirement') for co-operation in strategic planning at functional urban area level by the authorities for receiving CEF-funding.

Example: Vienna

Municipalities around Vienna are responsible for their local spatial planning. Planning of logistics and consolidation centers is not coordinated at the regional level. While Vienna is concentrating major logistics functions in the Rail Road Terminal Wien Süd, 'Logistics sprawl' is a real threat in Vienna's surrounding metropolitan region.

Figure 14: Development Logistikzentrum Wine-Süd (source: Logistikzentrum Wien-Süd)

Related solutions with potential impact: Gothenburg West Sweden Agreement, Turku Northern Growth Zone, Strasbourg Port de Lauterbourg, Antwerp Ringland, Genova cooperation ports, Turku integrated planning.

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4.4.2 Incentives for companies for specific locations to prevent sprawling

Limited free space in urbanised areas leads to the use of every possible plot by companies resulting in urban sprawl and uncontrollable logistics/transport processes (as said in 4.5.1). Causing longer detours and intensified use of infrastructure. Creating financial or facility related incentives to accommodate companies in certain areas would be in line with a strategy aiming for an equal distribution of transport flows over the network on local, regional and (inter) national level.

Example: Vienna

Vienna has two main hubs for freight, the Port of Vienna (Hafen Wien) and the RRT Wien Süd . Via rail the Port of Vienna is connected to the west (Hamburg and the 'ZARA' harbors (BE, NL)) and east, and serves as an inland shipping node on the Danube. The RRT Wien Süd went into operation in December 2016 and serves as a major freight hub in the region, connecting basically all directions by lying directly on a high-level rail-road crossing. The terminal's capacity might experience a further stage of expansion in a second step.

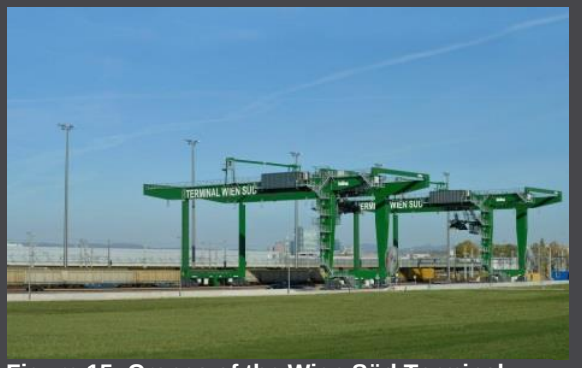

Figure 15: Cranes of the Wien Süd Terminal (source: Raymond Linssen)

Related solutions with potential impact: Genova Cable Car, Vienna produktieve stadt, Strasbourg urban logistics ELP, Rotterdam Waal-Eemhaven, Rotterdam Theemsweg railtrack, Rotterdam Erasmus bridge, Norrkoping, Mannheim Green Logistics Park, Mannheim blue village Franklin, Mannheim BAS-F, Gothenburg micro hub ElectriCity, Gothenburg cable car.

4.4.3 Governance of city-oriented consolidation centres and multi-company hubs

Due to densification, urbanization and growth of transport volumes, cities are searching for new ways to plan (for) consolidation centers to distribute goods in the area. They face difficulties to accommodate (multi company) hubs in the proximity of the city and locate them well in relation to their access routes. Innovative ways of transportation as truck platooning (big scale and volumes) and cargo bikes (small scale and volumes) ask for different locations and facilities resulting in governance discussions on the availability and addressing of locations to (private) consolidation hubs.

Example: Budapest

Specified buildings for micro and midi hubs needed. But difficult to find possibilities within a dense city. The former slaughterhouse in Budapest (image) is situated south of the city center, close to an urban ring road, railway line and the Danube. This complex might be re-used as a midi hub, respecting the industrial heritage values.

Figure 16: Slaughterhouse location (source: Raymond Linssen)

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Related solutions with potential impact: Gothenburg West Sweden Agreement, Turku Northern Growth Zone, Strasbourg port de Lauterbourg, Vienna Süd cargo terminal, Rotterdam Waal-Eemhaven, Norrköping, Mannheim Green Logistics Park, Genova cooperation ports.

4.4.4 Cross-border collaboration and harmonisation

Too often borders between European regions erect barriers for cross-border freight and logistics processes. Public and private collaboration in cross-border processes and chains and between urban nodes and freight hubs in different countries could support improving seamless and efficient multimodal transport flows. Besides opportunities could be taken for offering a more harmonised cross-border labour market with common rules and legislation. Authorities at several levels should take their responsibility for improving conditions for freight and logistics.

Example: Strasbourg

To cover one kilometer by freight train across the French-German border (Strasbourg-Kehl) costs 15-20% of the total costs of transport between Strasbourg and Rotterdam, so this is really an issue of competitiveness. An access project is in development to connect Germany with Strasbourg, not using the international network. Regulation issues are a big barrier as French and German networks have their own regulations. Comissioner for Transport Violeta Bulc has mentioned this as a clear example of a bottleneck.

Figure 17: Early 1970's postcard (source: La Cicogne – Collection Raymond Linssen)

Related solutions with potential impact: Gothenburg West Sweden Agreement, Turku Northern Growth Zone, Strasbourg port de Lauterbourg, Turku CaaS, Hamburg S-Bahn.

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4.4.5 Recommendations regarding governance and institutional arrangements

Regional SUMP including freight logistics
To connect and integrate developments on local, reginal and (inter)national level the collaboration between related authorities is of huge importance. Strategies and long term goals and plans are key elements to grow a coherent, sustainable and efficient transport system. This requires strategic alignment and regional planning to facilitate linkages between regional, and local level. A regional SUMP (Sunstainable Urban Mobility Plan) including freight logistics 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.

Regional collaboration as requirement in developments and when applying for funding
To prevent logistical sprawl regional collaboration is needed when aiming to (add value nodal and locational. This requires a collaboration between different constitutional levels, local and regional departments. Creating a common vision on spatial planning, mobility, infrastructure, multimodality (supporting modalities) and the DUS ("Daily Urban System). Since DUS ≠ urban node. Even if a city is not so directly impacted by its function as urban node, the region is. Through better metropolitan governance negative (environmental) effects might be mitigated and opportunities better exploited. In some cases (e.g. Vienna, Budapest, Strasbourg) the functional urban area, in a TEN-T perspective, might even cross the country border and include parts and nodes in the neighboring country. Underlining this need for regional collaboration (in master planning) could well fit in the implementation of a requirement for regional collaboration in developments and when applying for European funding.

Governance responsibility
While different sectors and fields are worked out in plans and strategies for (future) developments clarity in responsibilities becomes more and more important to realise sustainable and efficient projects. Within Europe, governmental systems differ a lot and are not easily comparable with one another. To sustain clarity the allocation of responsibility should be seen as an important requirement within projects to guarantee process and continued contributions in terms of maintenance.

Smaller nodes are equally important – relation to the core network corridors
Combination of smaller nodes on the comprehensive network (or not even) is in many cases as important or determinative as the urban nodes on the core network corridors. This means that investments on the smaller nodes could free up space on the network of the bigger nodes and increase the quality of the corridors. Comparable with the management of transport flows above chain.

Awareness raising logistics
Raising awareness of logistics in everyday life via integration of freight and logistics within spatial planning and infrastructure projects as well as mentioning the relevance in terms of communication. Freight and logistics is part of everyday life but not as clear to all parties and people. In average the NIMBY effect ('Not In My Back Yard') applies to most urban odes in living areas. Appreciating the benefits of freight and logistics amongst others to every day door to door delivery, not willing to deal with the consequences regarding use of space (spatial) and network, liveability consequences, etc. Growing awareness could help in a more natural integration of freight and logistics in future developments. For example via a communication campaign involving stakeholders and inhabitants in planning processes.

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Available elements in funding for participation processes – matching with the growing need for participation processes.

Connect with other/additional stakeholder groupings
Connecting with stakeholders working in the fields of real estate development, environmental specialists and the private sector in general (among others) while developing new policies and regulations has been highly valued by the participants in the Vital Nodes Tier 1 workshops already. Current developments in the build environment related to housing, spatial planning and transitions to renewable energy and climate changes are influencing the needs for infrastructure investments and developments in freight and logistics. Private parties are using publically financed infrastructure in a more and more intensive way. Related to which coordination and long term planning interaction would be of big added value. Therefore the connection with new/other stakeholder groupings becomes more and more relevant within the process of policy and project development.

Align international regulations to create possibilities for flexible detours (via coherency in policy and noise, pollution and emissions)
Focus in local, regional and (inter) national transport and infrastructure is mostly on specific (core) network corridors, crossing regional and international borders and urban nodes. Regarding regulation (for example noise, pollution, emissions and use of highways by trucks) the focus is on aligning regulations along specific corridors and cross borders. However international regulations do not always facilitate in easy distribution of flows over different (core) network corridors. Due to differences in regulations/policies regarding truck requirements and possibilities/allowance in terms of, for example, emissions and pollutions. Strengthening the alignment of certain regulations on E level would simplify the possibilities to make detours in case of traffic bottle necks and distributing the transport flows over the entire network.

4.5 Value dimension

As said before, recommendations on the value dimension will be discussed specifically in work package 5 (deliverables D5.1 / D5.3) that will deal with future research and funding needs. To give a foretaste some building blocks that have been brought up at the Tier 1 urban node workshops are summarized;

- Focus on solutions with a potential impact that request a smaller investment volume (around 50 million euros), which can be invested in coherence with other small initiatives and deliver an interesting proposition;
- Potential for a high return on investments on the corridor is in border areas (as Strasbourg);
- There is an added value for European funding for multi-stakeholder governance, focused on mutual interests and reciprocity;
- Urban nodes should not be considered as independent units. They should be considered more strongly in their spatial and functional environment on the entire corridor (functional urban area);
- Investments should not only be planned in the urban nodes and on the core network corridors, but in the comprehensive network as well. Bottlenecks on the core network corridors might be remedied by initiatives outside the urban nodes but within their functional urban area (e.g. initiatives in Venlo and Duisburg within the functional urban areas of Rotterdam respectively Düsseldorf / Cologne);
- Discovering possibilities for multi-donor funding.

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5 Attachments

1. Factsheets per urban node
2. Lists of participants workshops

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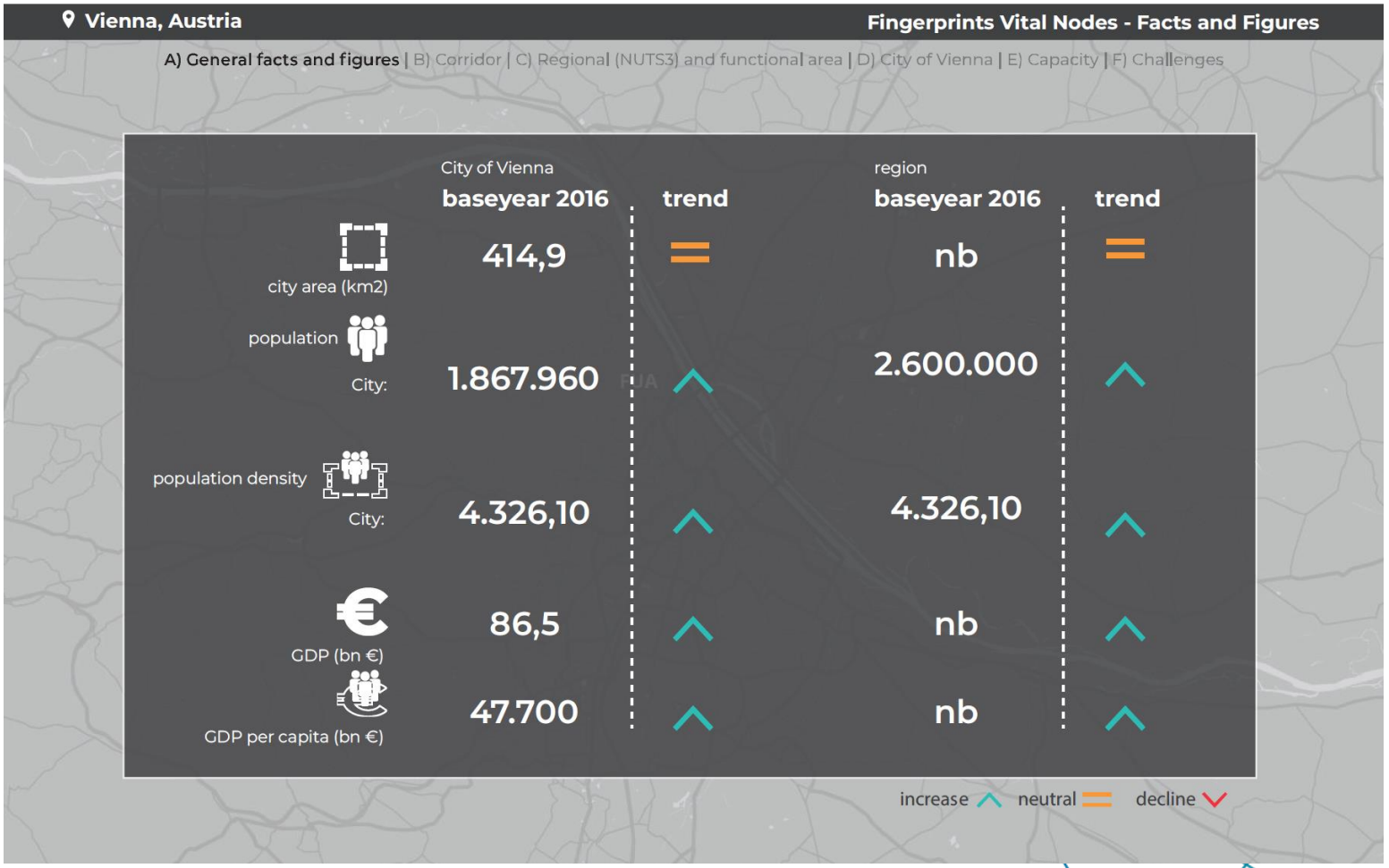
1. Factsheets per urban node

Factsheet Vienna



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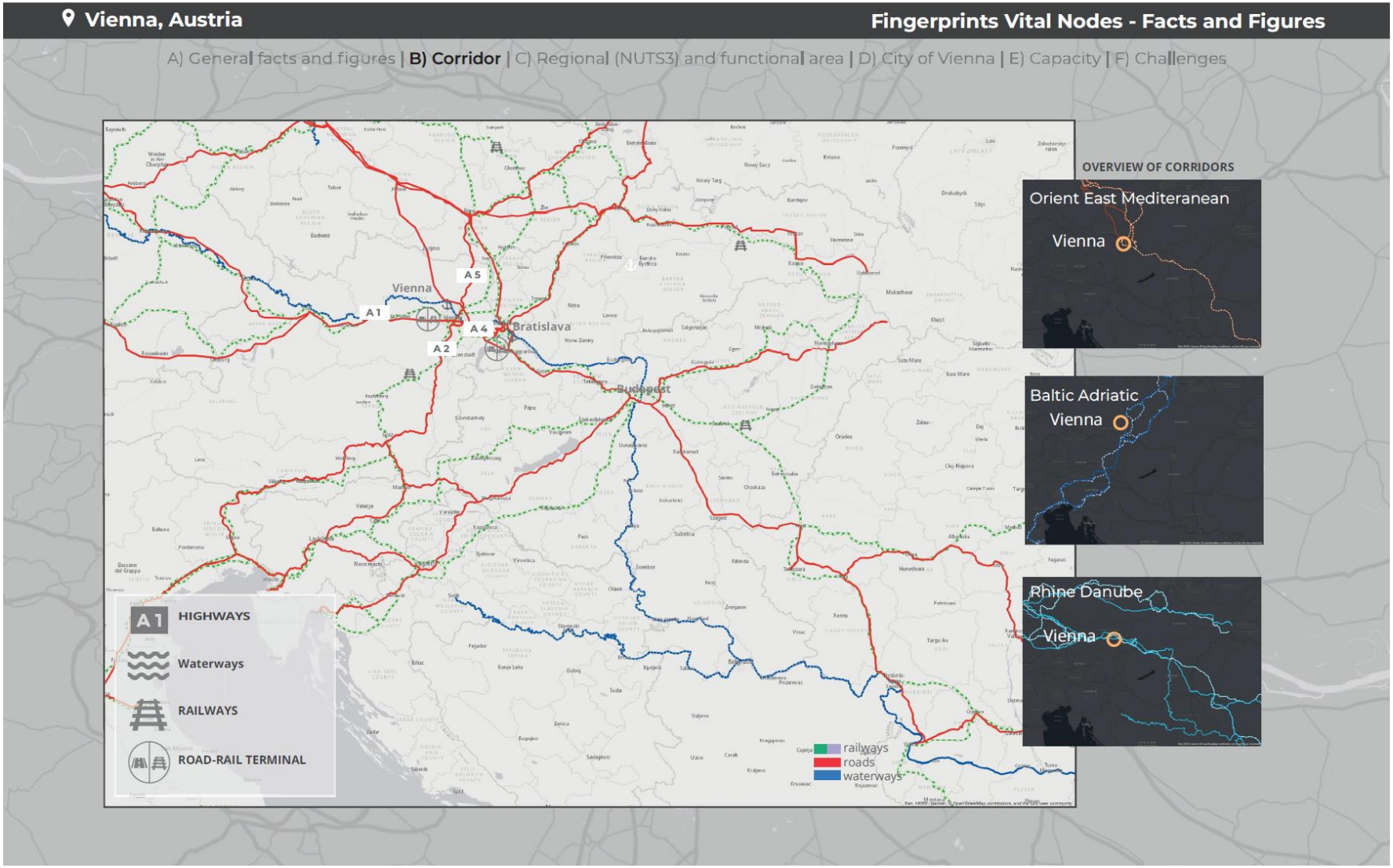
VITAL NODES



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VITAL NODES

Vienna, Austria

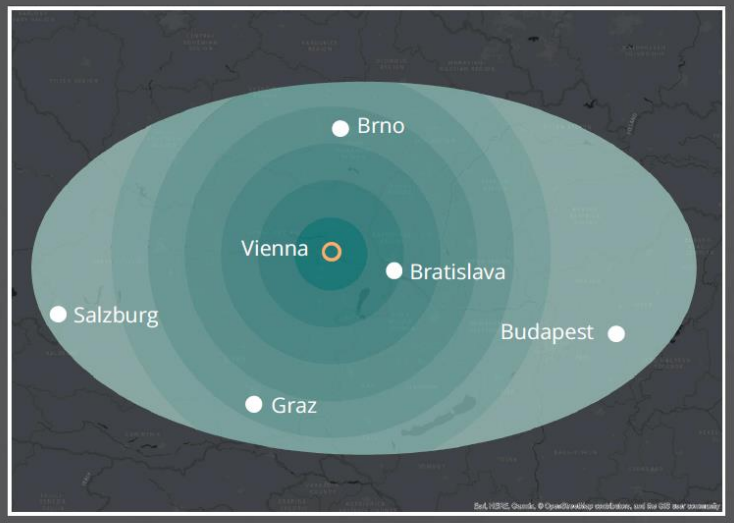
Fingerprints Vital Nodes - Facts and Figures

A) General facts and figures | B) Corridor | **C) Regional (NUTS3) and functional area** | D) City of Vienna | E) Capacity | F) Challenges

IMPORTANT CHARACTERISTICS:

- Regional developments
  - urban developments
  - passenger developments
- DC / location / throughput
  - logistics developments

INDICATIVE FUA



FREIGHT INFRASTRUCTURE
baseyear 2016

	Number	ha	mton	TEU
Road-Rail terminal	1 =	57 ^	4 ^	440.000 ^
Air terminal	1 =		0.5 ^	na
Trimodal terminal	1 =	300 ^	7 ^	200.000 ^

incline ^ neutral = decline v

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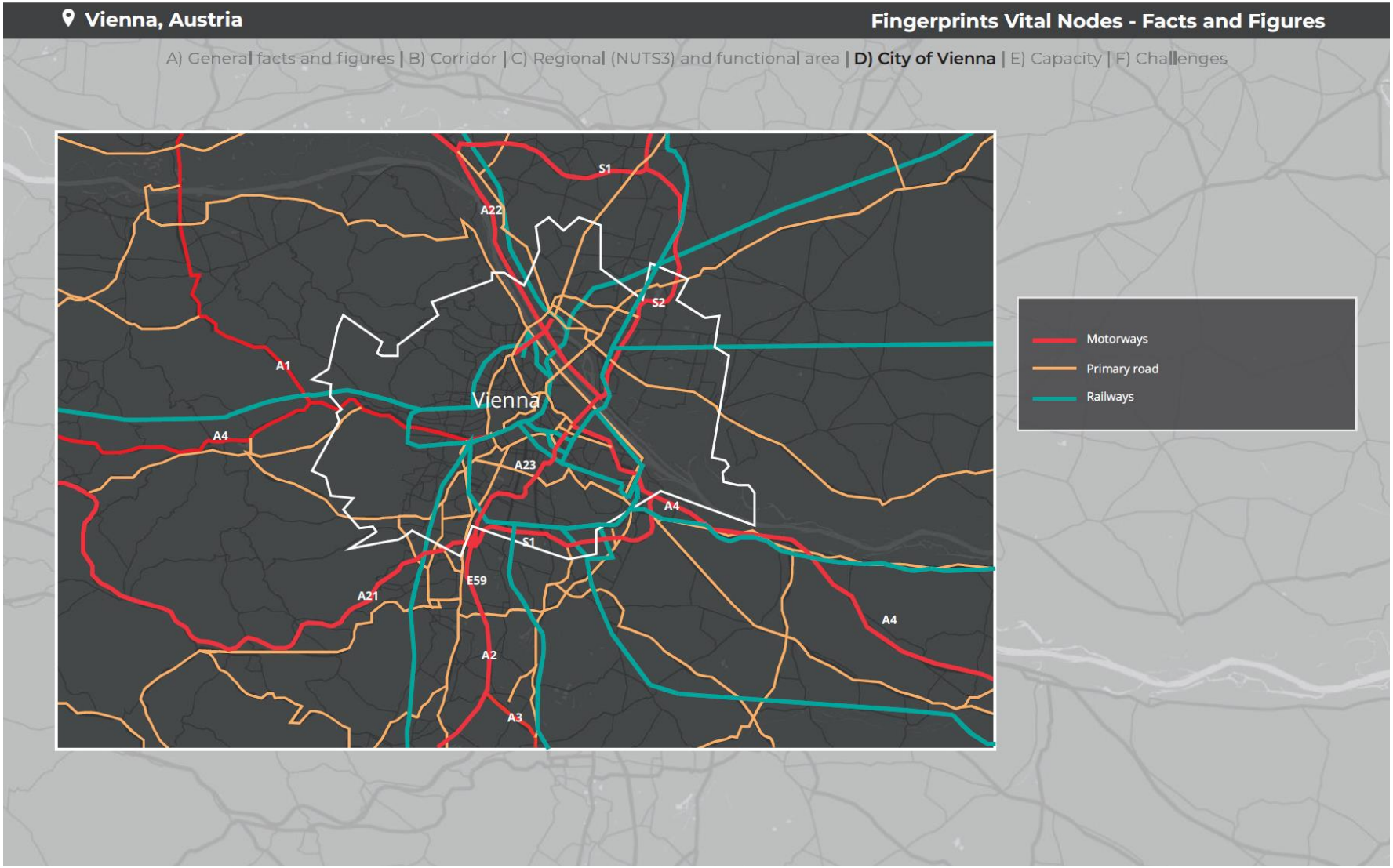

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VITAL NODES

Vienna, Austria

Fingerprints Vital Nodes - Facts and Figures

A) General facts and figures | B) Corridor | C) Regional (NUTS3) and functional area | D) City of Vienna | **E) Capacity** | F) Challenges

CAPACITY RAIL
Link Hütteldorf-Meidling
Discussion about link Airport:
Eastern Rail Line (Budapest)

CAPACITY WATER
No major capacity issues observed

CAPACITY AVIATION
Discussion about extra runway

CAPACITY ROAD
Average intensity road on evening peak:

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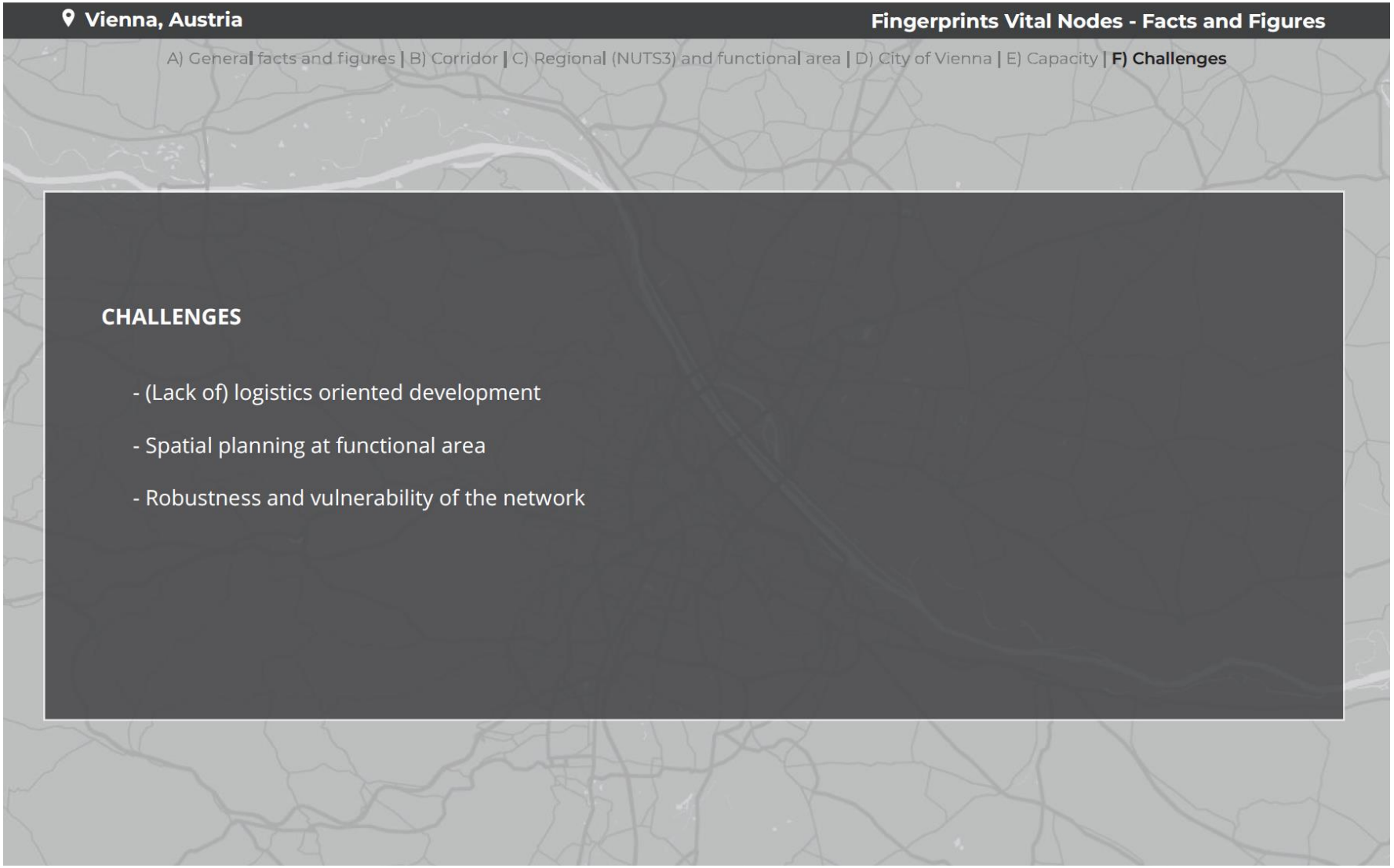

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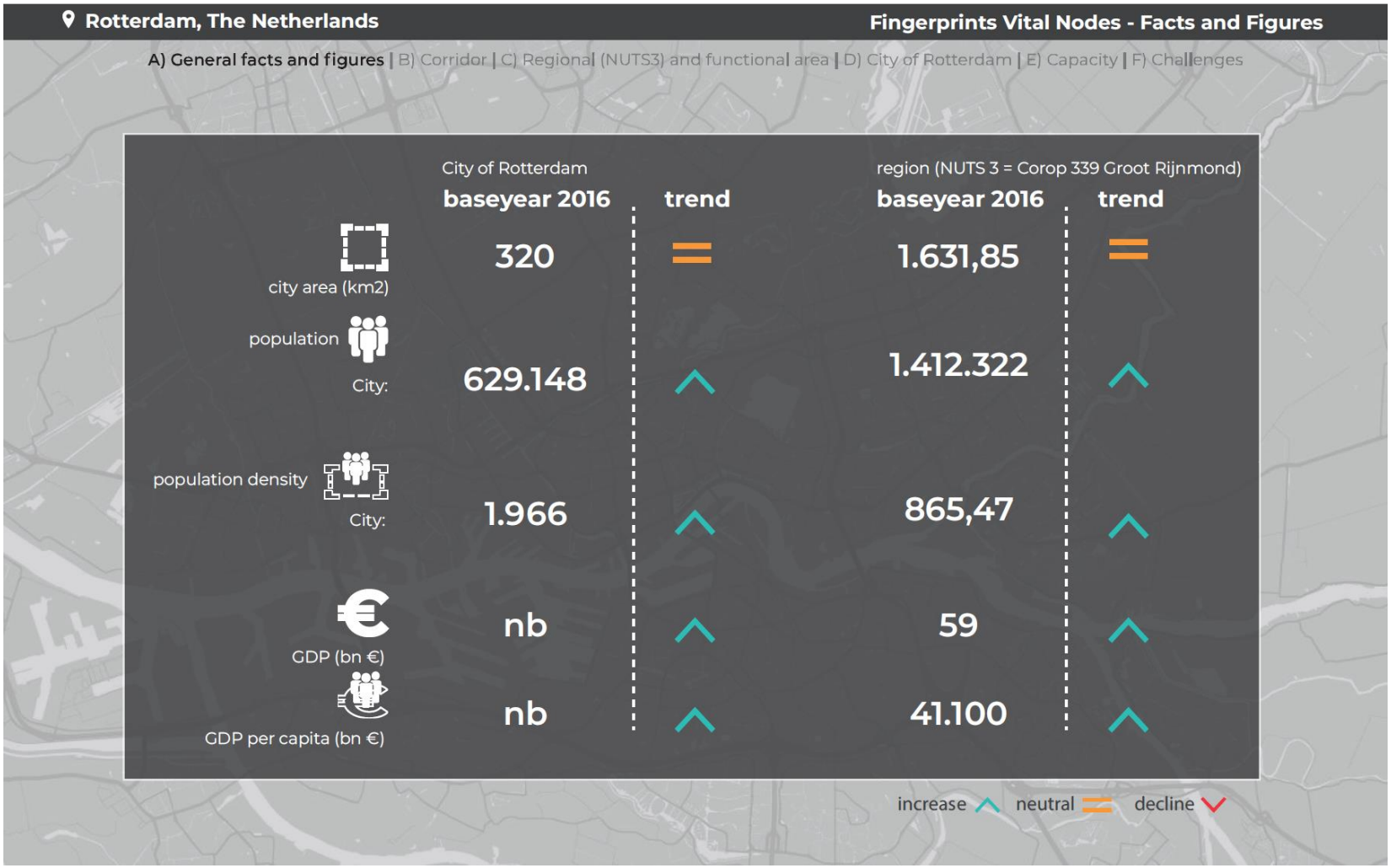
Factsheet Rotterdam



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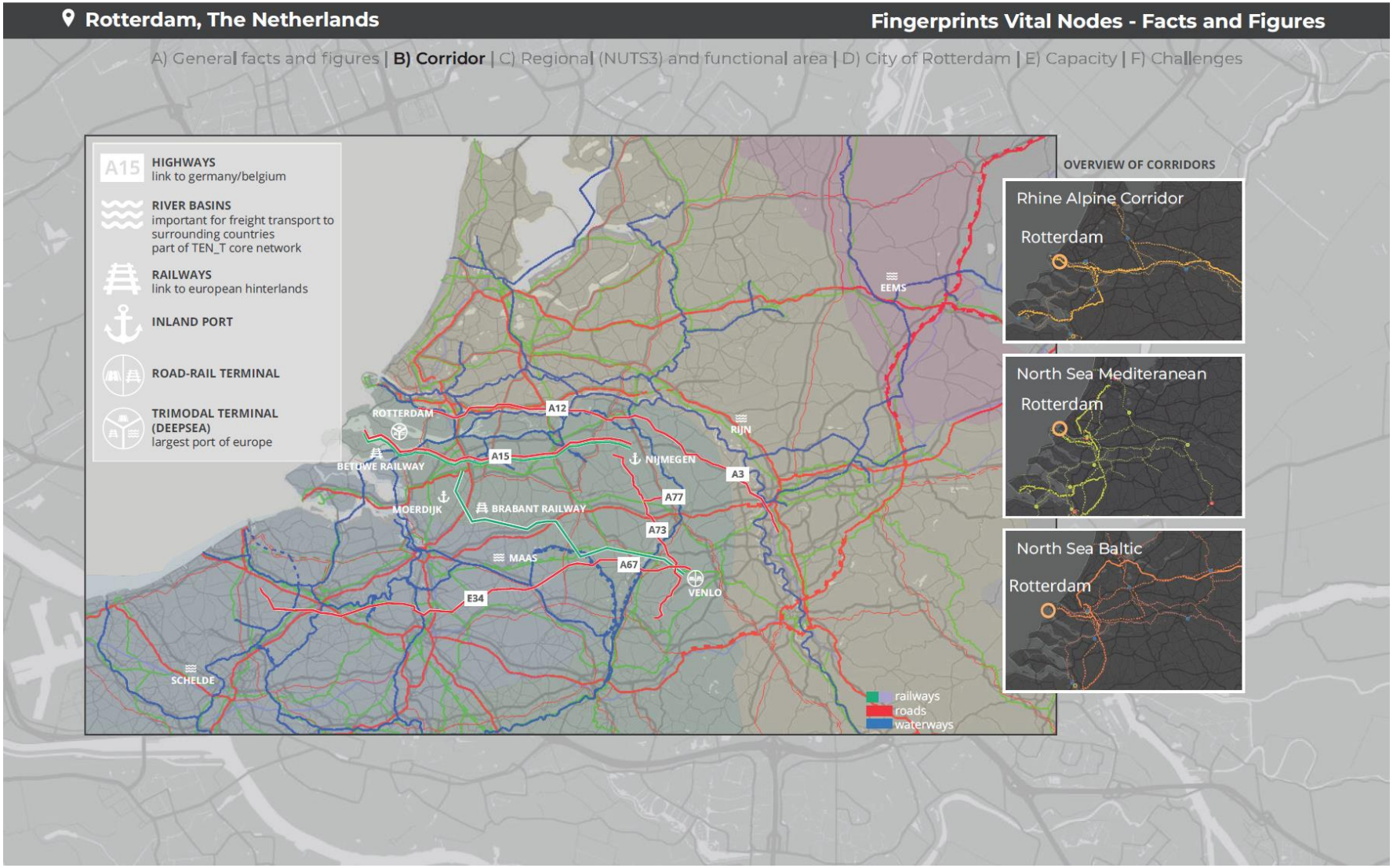

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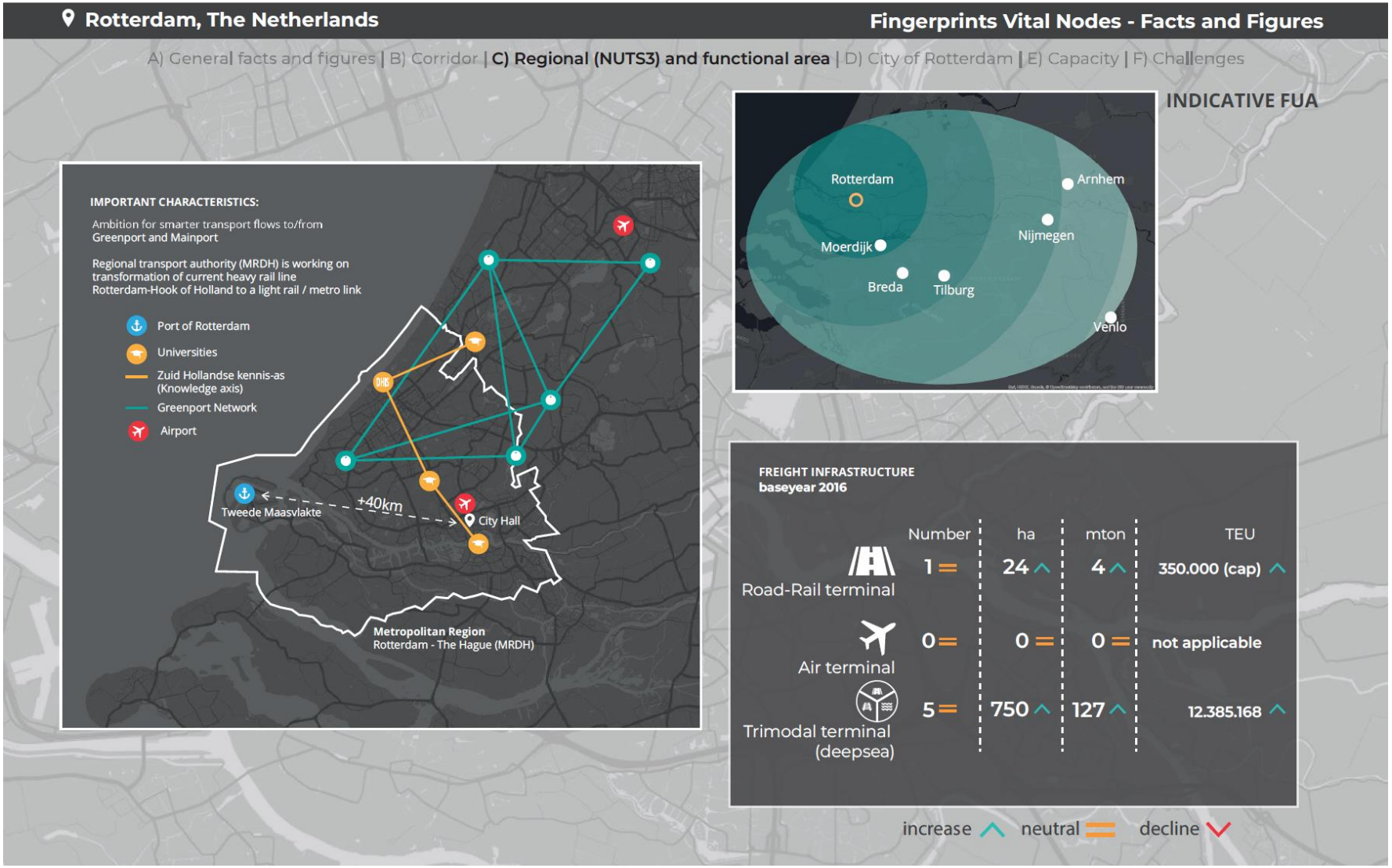

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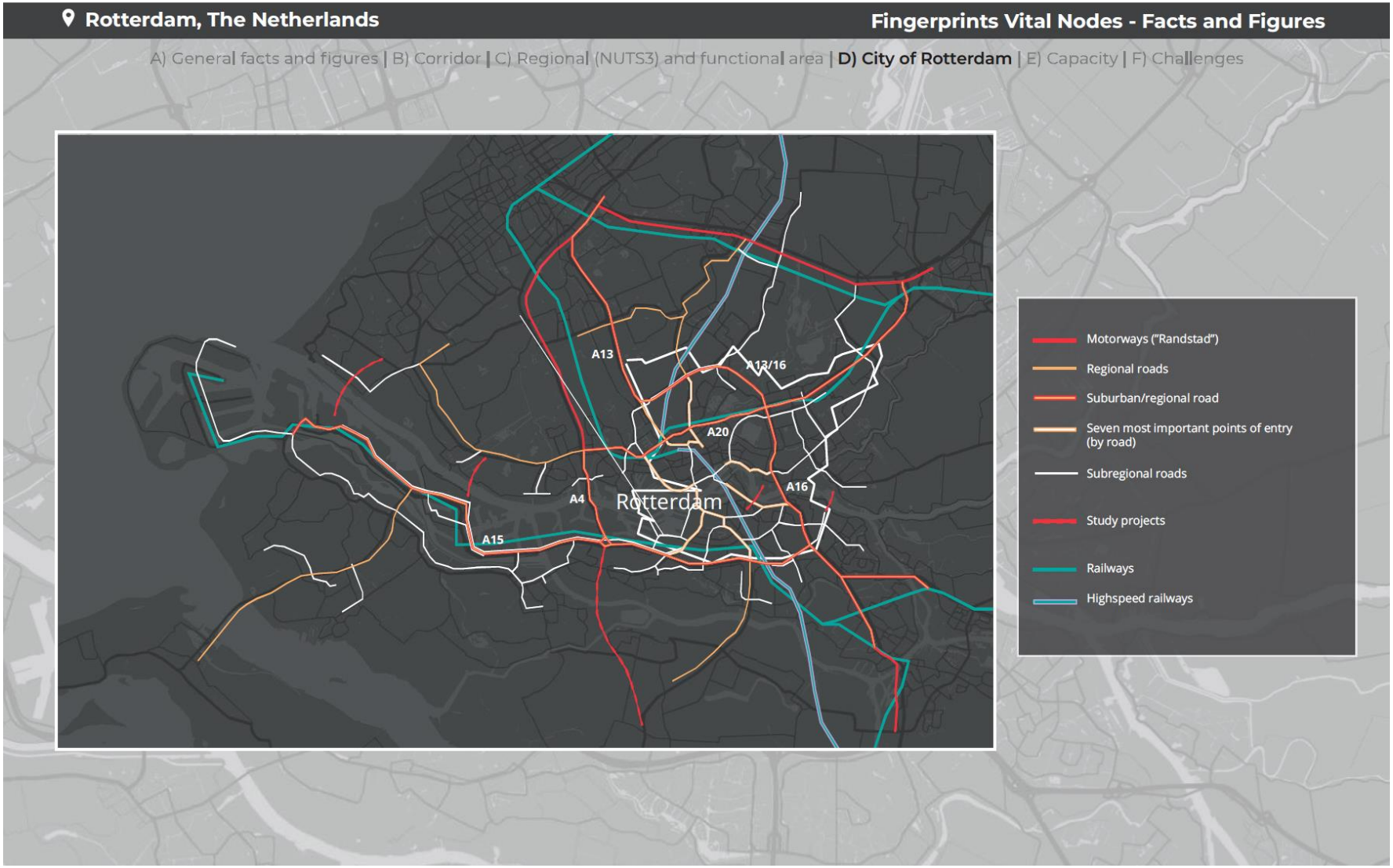
VITAL NODES



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Ministry of Infrastructure and Water Management

VITAL NODES

Rotterdam, The Netherlands

Fingerprints Vital Nodes - Facts and Figures

A) General facts and figures | B) Corridor | C) Regional (NUTS3) and functional area | D) City of Rotterdam | **E) Capacity** | F) Challenges

CAPACITY RAIL
Expansion of the German part of the Betuweroute (ABS Emmerich-Oberhausen) will serve as stimulus for growth in rail freight along the Rhine-Alpine Corridor.

CAPACITY WATER
No major capacity issues observed.

CAPACITY AVIATION
Rotterdam - The Hague airport only serves passenger traffic.

CAPACITY ROAD
Average intensity road on evening peak:

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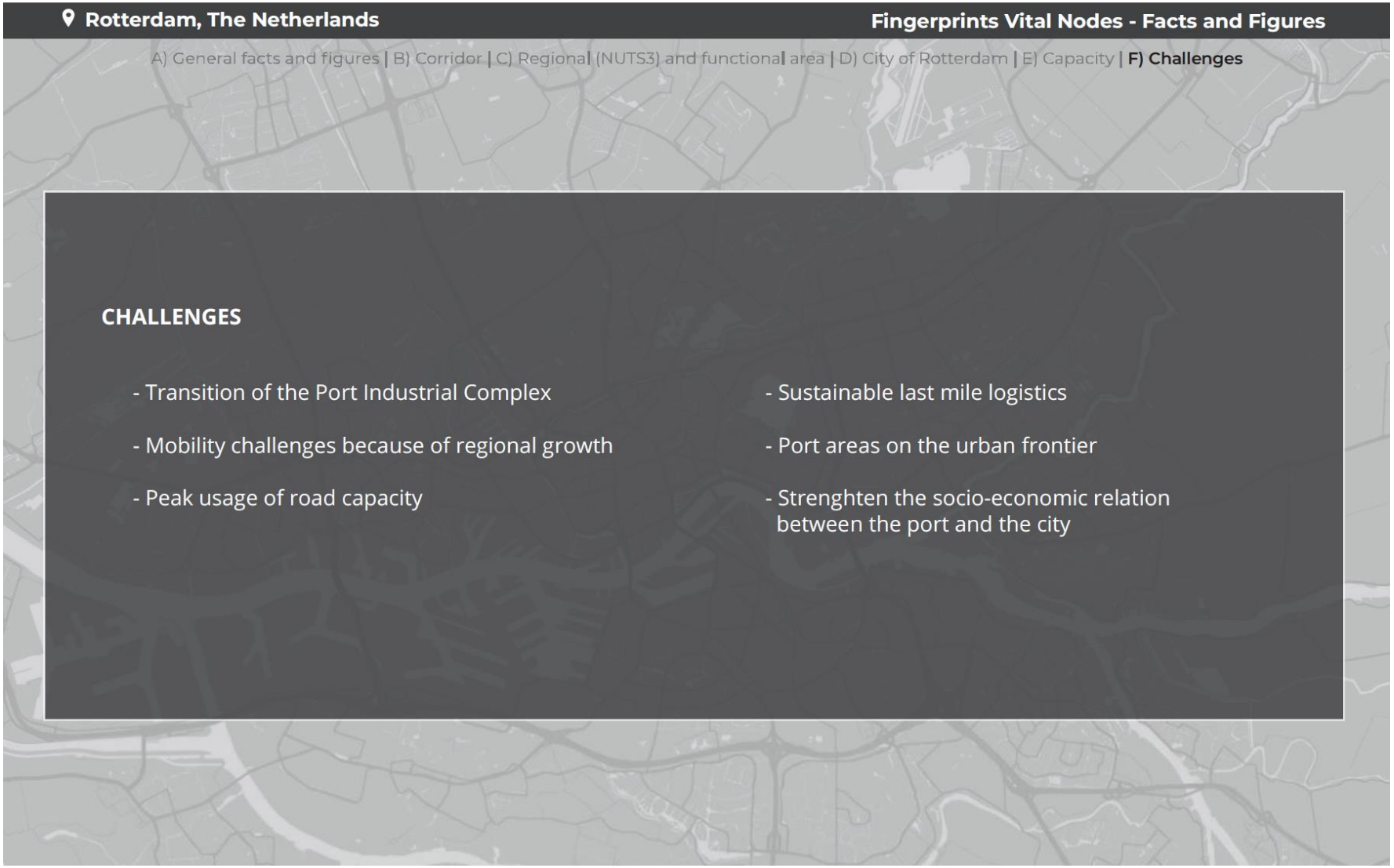
VITAL NODES



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Factsheet Gothenburg

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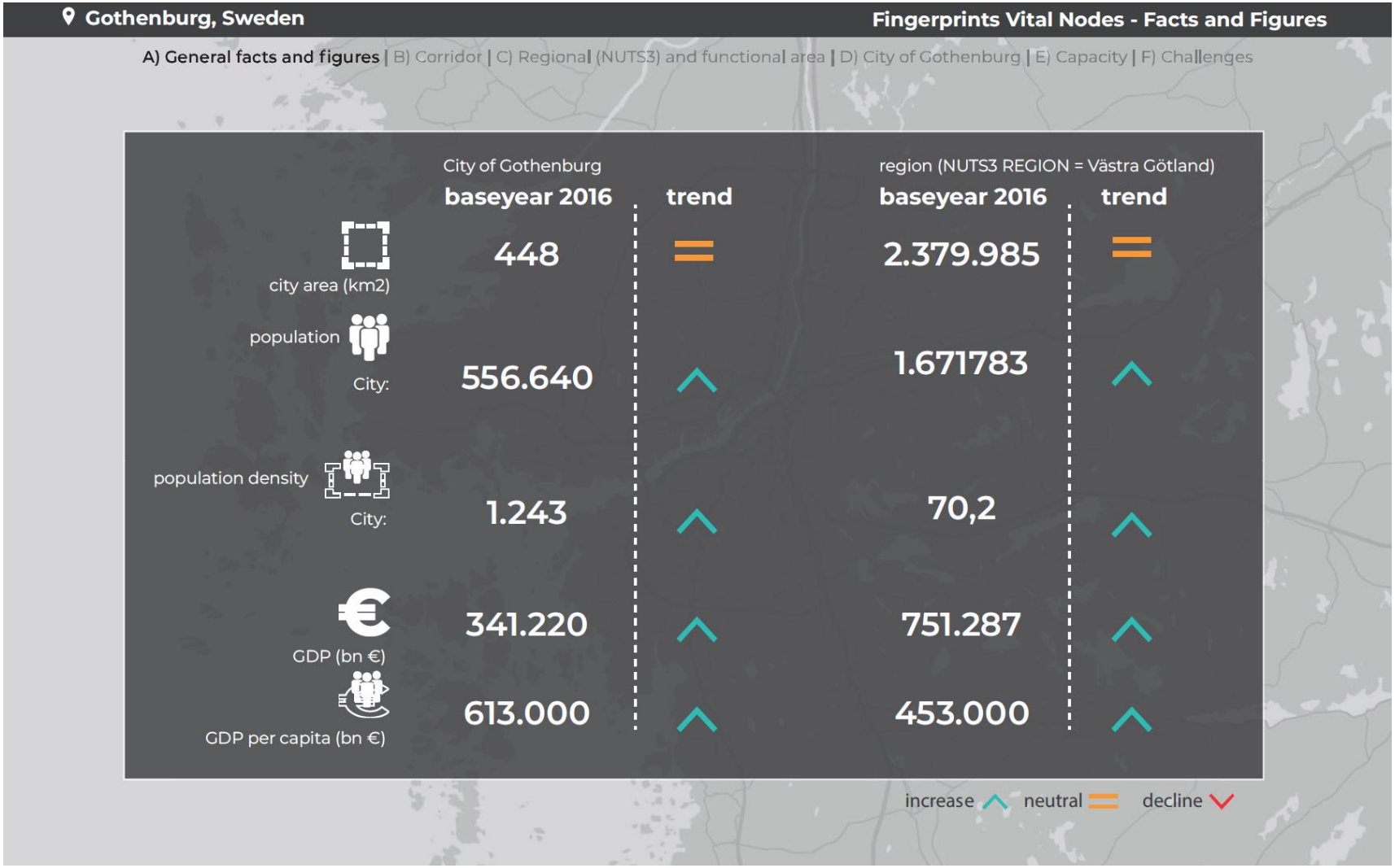
VITAL NODES



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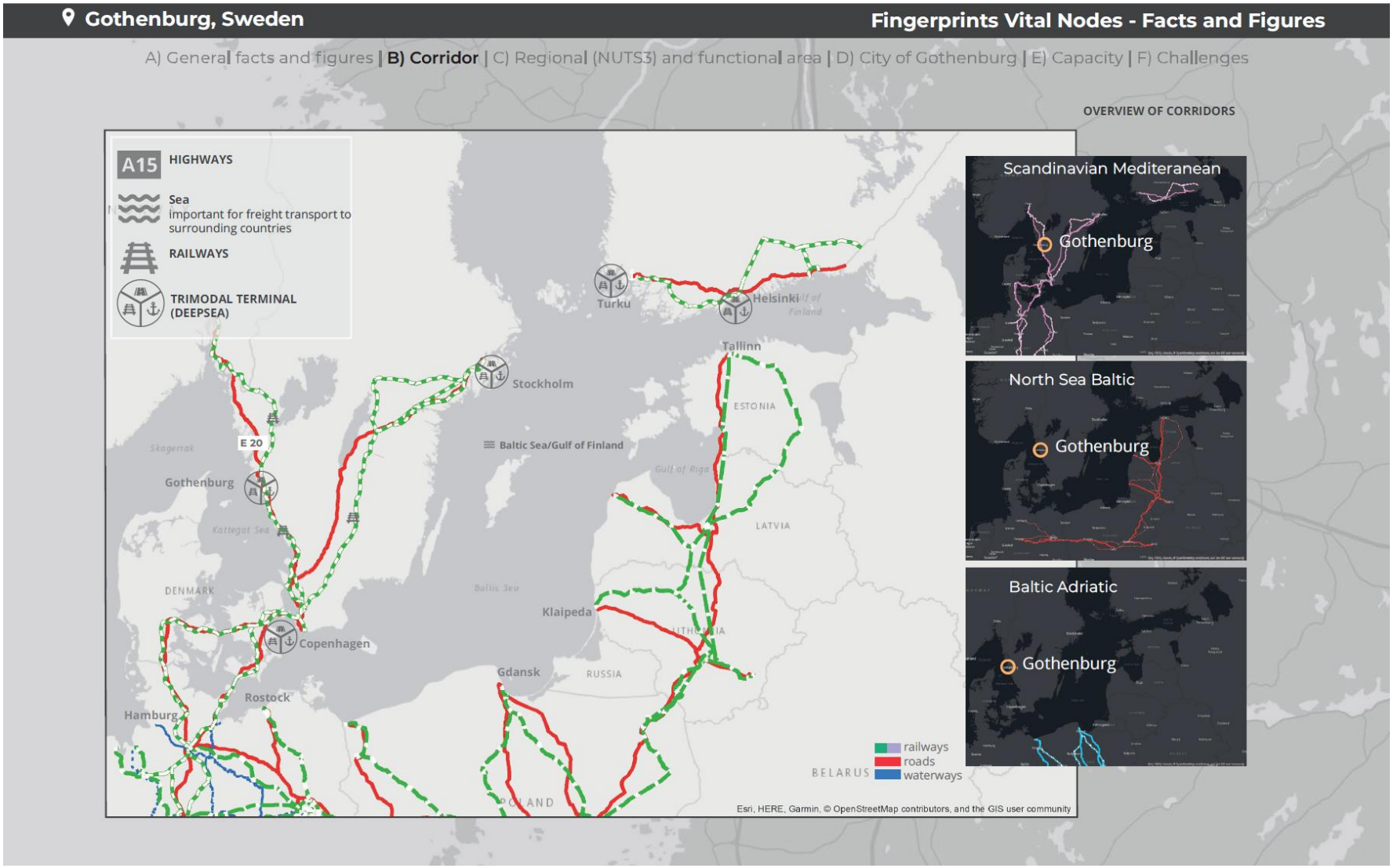
VITAL NODES



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Ministry of Infrastructure and Water Management

VITAL NODES

Gothenburg, Sweden

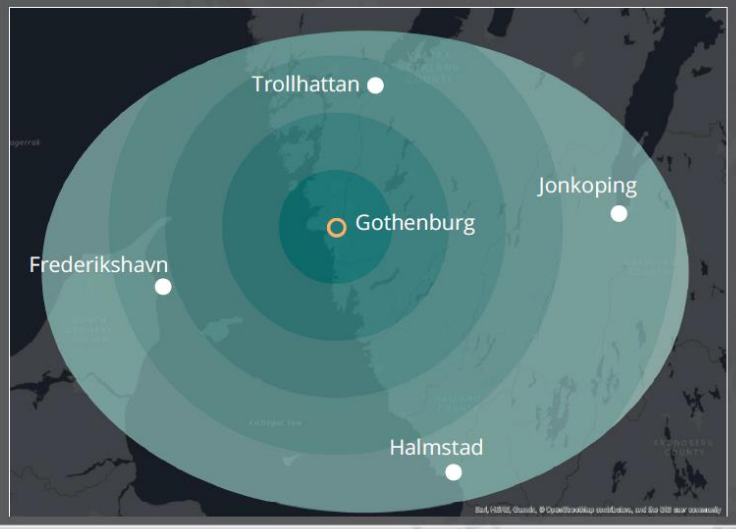
Fingerprints Vital Nodes - Facts and Figures

A) General facts and figures | B) Corridor | **C) Regional (NUTS3) and functional area** | D) City of Gothenburg | E) Capacity | F) Challenges

IMPORTANT CHARACTERISTICS:

The Västra Götland region has a diversified business environment: Automotive manufacturing and trade are important sectors. Employees in NUTS-3 region Västra Götaland work in areas such as healthcare and medical care, trade and industry, culture and the environment. The largest private employer is Volvo Personvagnar AB, which has manufacturing facilities at many locations in the county.

INDICATIVE FUA



FREIGHT INFRASTRUCTURE
baseyear 2016

	Number	ha	mton	TEU
Road-Rail terminal	1 =	6 ^	na	na
Air terminal	1 =	na	0,06 ^	na
Trimodal terminal (deepsea)	6 =	na	na	na

incline ^ neutral = decline v

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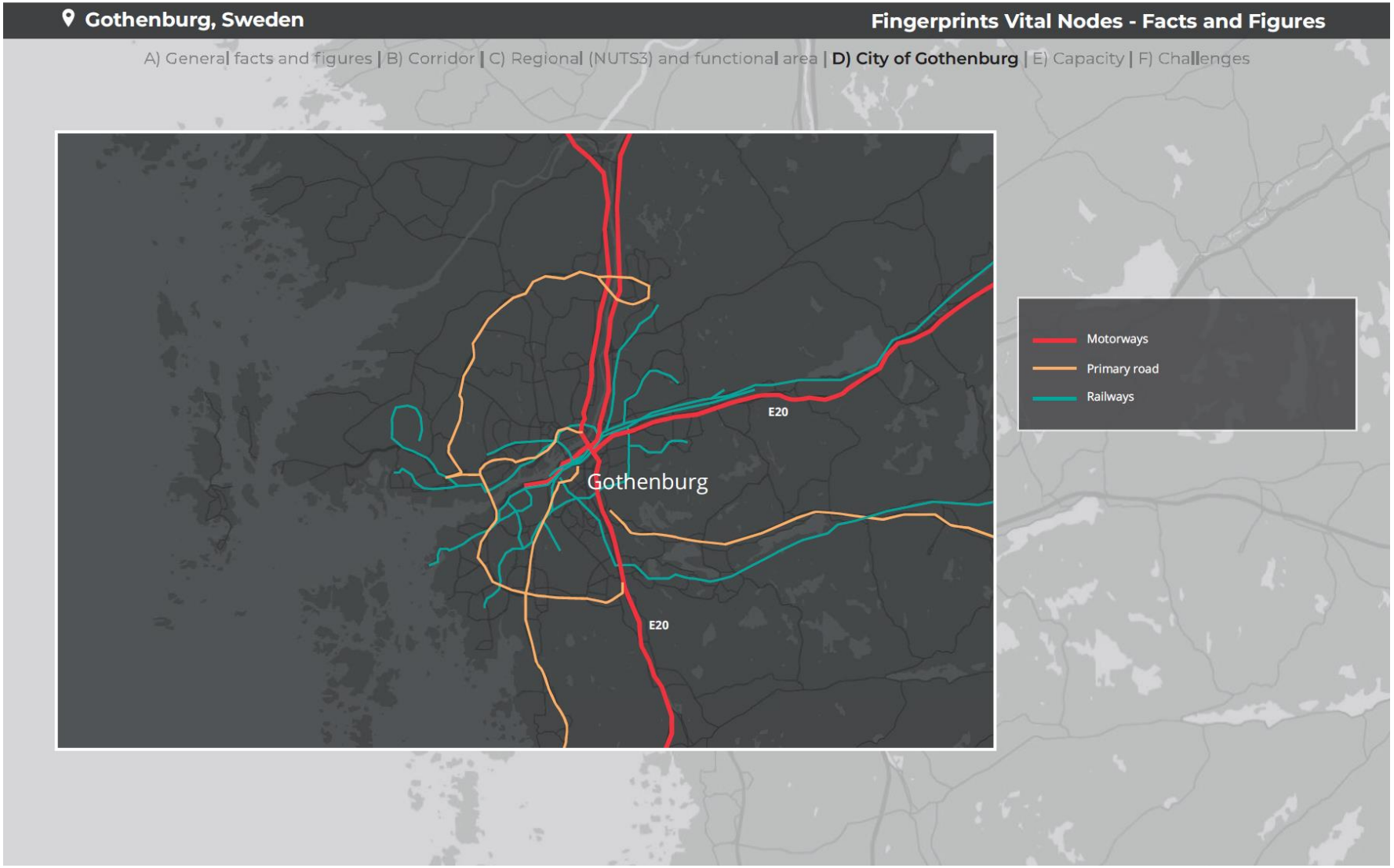

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Ministry of Infrastructure and Water Management

VITAL NODES

Gothenburg, Sweden

Fingerprints Vital Nodes - Facts and Figures

A) General facts and figures | B) Corridor | C) Regional (NUTS3) and functional area | D) City of Gothenburg | **E) Capacity** | F) Challenges

CAPACITY RAIL
Rail infrastructure for goods is insufficient even for the current volume.
The rail link to the port leaves no room for expansion.
Increase rail connectivitity in the region for better access to airport and better integration with Boras

CAPACITY WATER
The capacity of the Port of Gothenburg is constraint by the depth of the channel outside the port; it does not enable megaships to access

CAPACITY AVIATION
- The airport is currently having stand capacity challenges
- The airport is facing challenges on landside in regards to facilitating optimal conditions for cargo related activities
- the airport will see rapid future passenger growth

CAPACITY ROAD
Average intensity road on evening peak:

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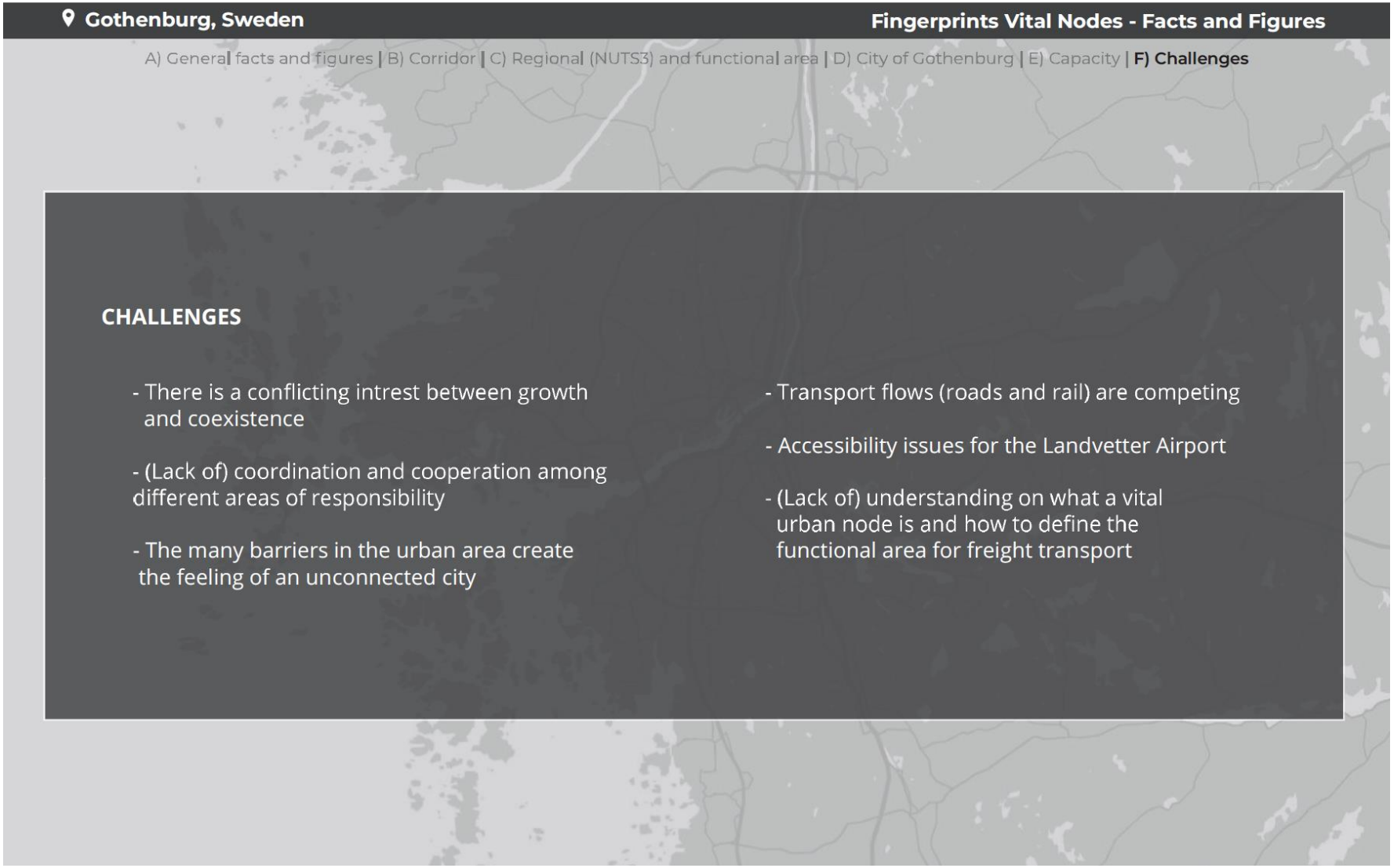

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Factsheet Budapest

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Ministry of Infrastructure and Water Management

VITAL NODES

Budapest, Hungary — **Fingerprints Vital Nodes - Facts and Figures**

A) General facts and figures | B) Corridor | C) Regional (NUTS2) and functional area | D) City of Budapest | E) Capacity | F) Challenges

	city of Budapest baseyear 2016	city of Budapest trend	region (NUTS 2 = Közép-Magyarország) baseyear 2016	region (NUTS 2 = Közép-Magyarország) trend
city area (km2)	525	=	6.919	=
population City:	1.759.407	=	2.993.948	^
population density City:	3.351	^	433	^
GDP (bn €)	nb	^	51	^
GDP per capita (bn €)	nb	^	30.400	^

increase ^ neutral = decline v

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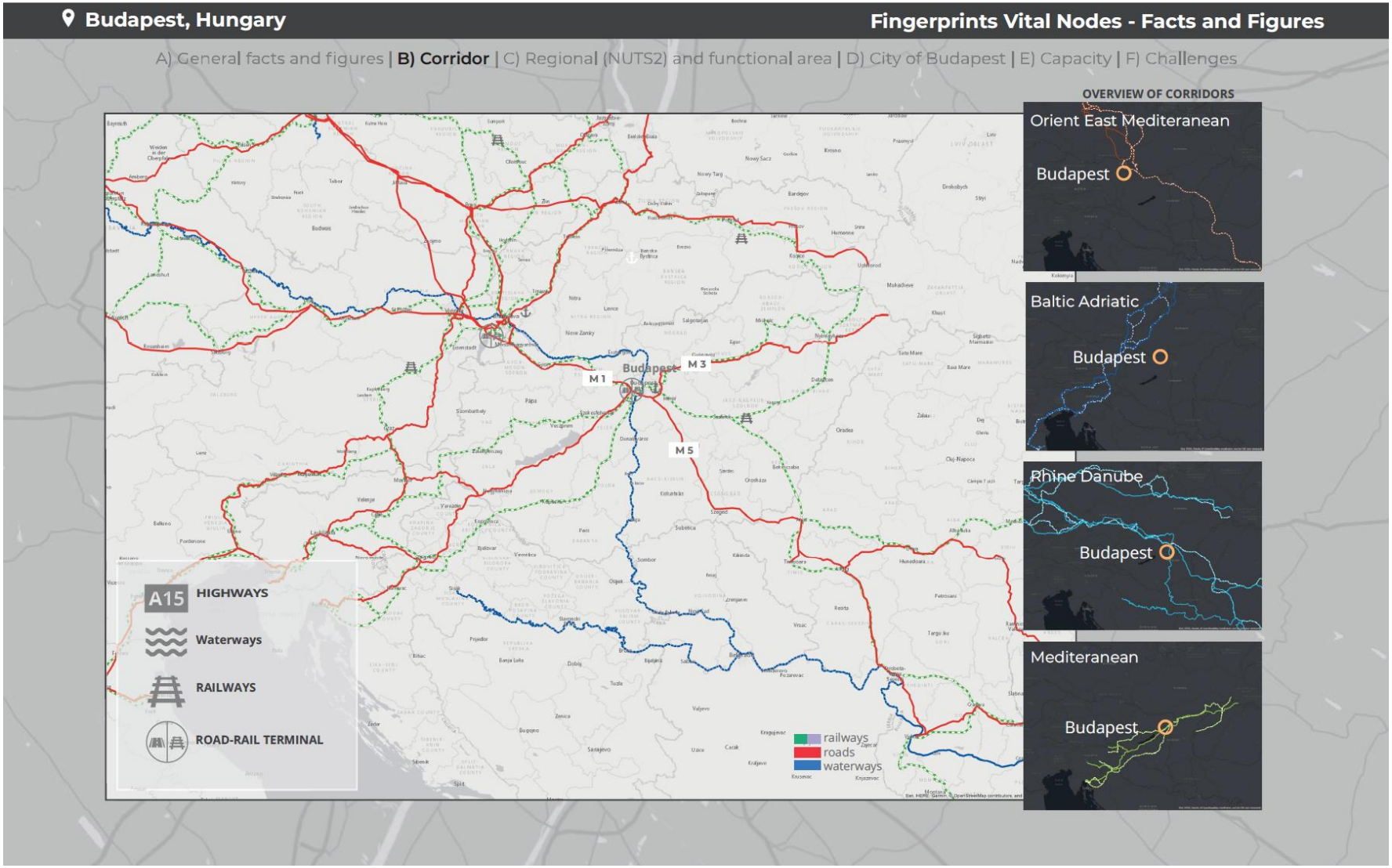

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Rijkswaterstaat
Ministry of Infrastructure and Water Management

VITAL NODES

Budapest, Hungary

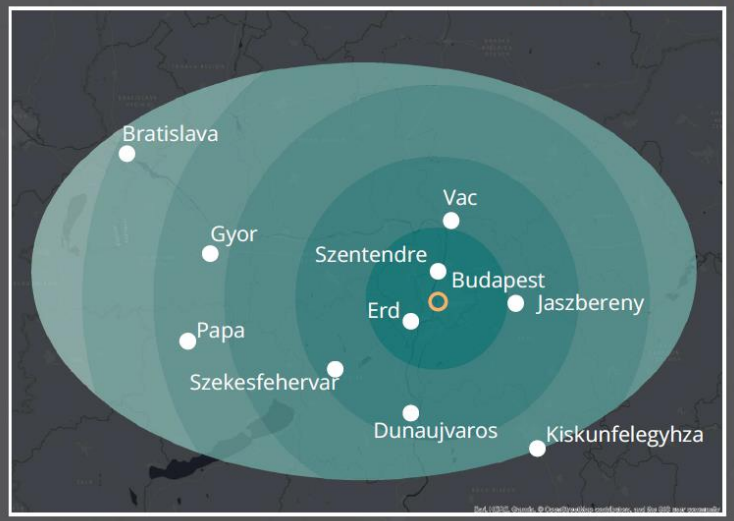
Fingerprints Vital Nodes - Facts and Figures

A) General facts and figures | B) Corridor | **C) Regional (NUTS2) and functional area** | D) City of Budapest | E) Capacity | F) Challenges

IMPORTANT CHARACTERISTICS:

Regional train services in the Budapest area are upgraded with new trainsets (Flirt) and infrastructure improvements. There is a rise in the number of intermodal freight trains running from the different Budapest terminals towards for instance the port of Koper or inland German destinations such as Munich.
The BMT plan calls for Cooperative regional connections, including waterborne services within the region and waterborne freight transportation connections should be enhanced on the border area of Budapest and the town of Érd.

INDICATIVE FUA



FREIGHT INFRASTRUCTURE
baseyear 2016

	Number	ha	mton	TEU
Road-Rail terminal	3 =	119 ^	na ^	510.000 (cap) ^
Air terminal	1 =	0 ^	0.12 ^	na ^
Trimodal terminal (deepsea)	1 ^	10 ^	2.2 ^	170,000 ^

increase ^ neutral = decline v

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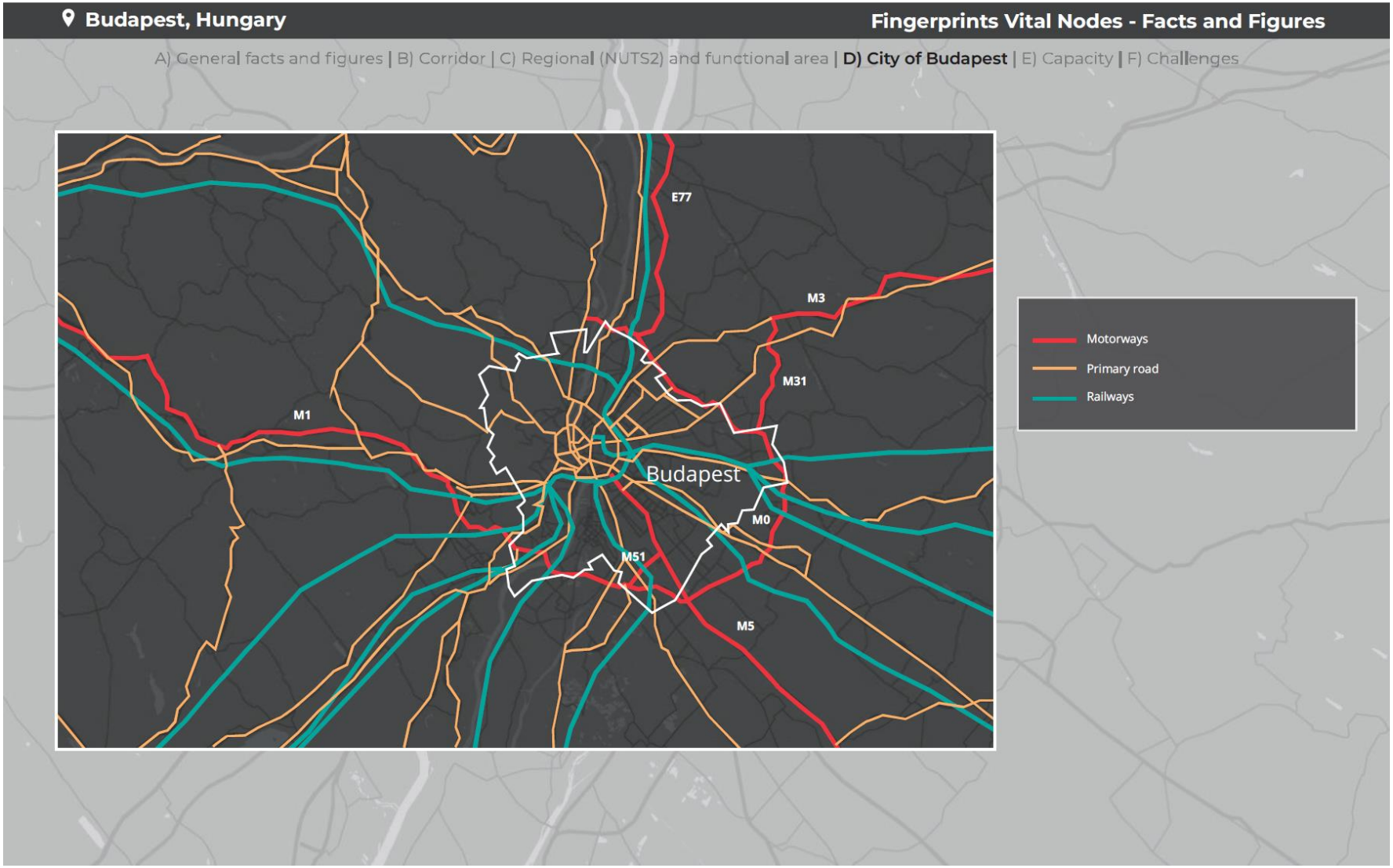
Ministry of Infrastructure and Water Management

VITAL NODES



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ECORYS

Rijkswaterstaat
Ministry of Infrastructure and Water Management

VITAL NODES

Budapest, Hungary

Fingerprints Vital Nodes - Facts and Figures

A) General facts and figures | B) Corridor | C) Regional (NUTS2) and functional area | D) City of Budapest | **E) Capacity** | F) Challenges

CAPACITY RAIL
Under the current CEF programme a study is undertaken for capacity development at the Budapest railway node which currently is a bottleneck

CAPACITY WATER
No major capacity issues observed

CAPACITY AVIATION
There are major redevelopments for freight handling at Budapest airport (BUD). The BUD:2020 Development Program will give a 250.000 tonnes p/a capacity.

CAPACITY ROAD
Average intensity road on evening peak:

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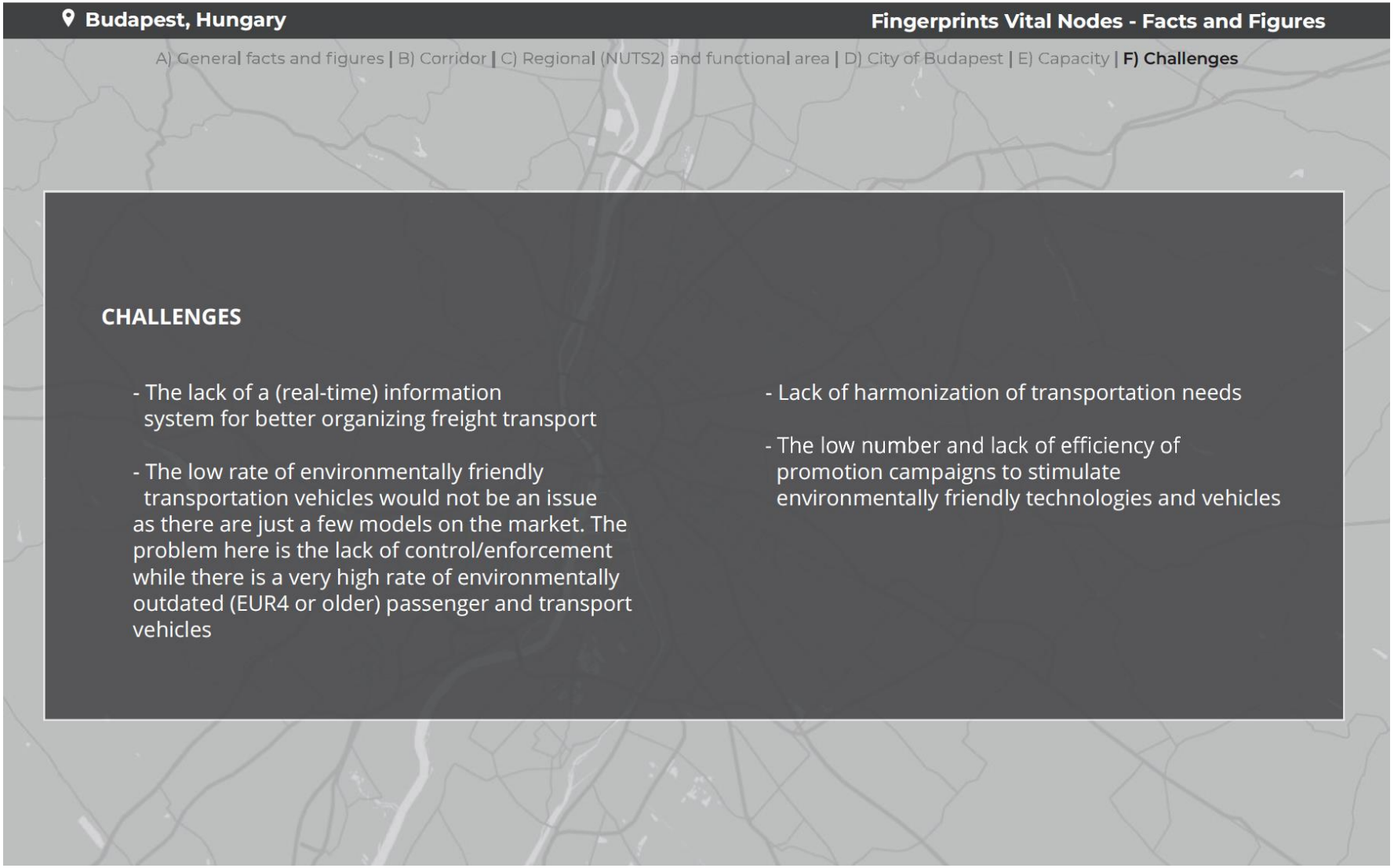

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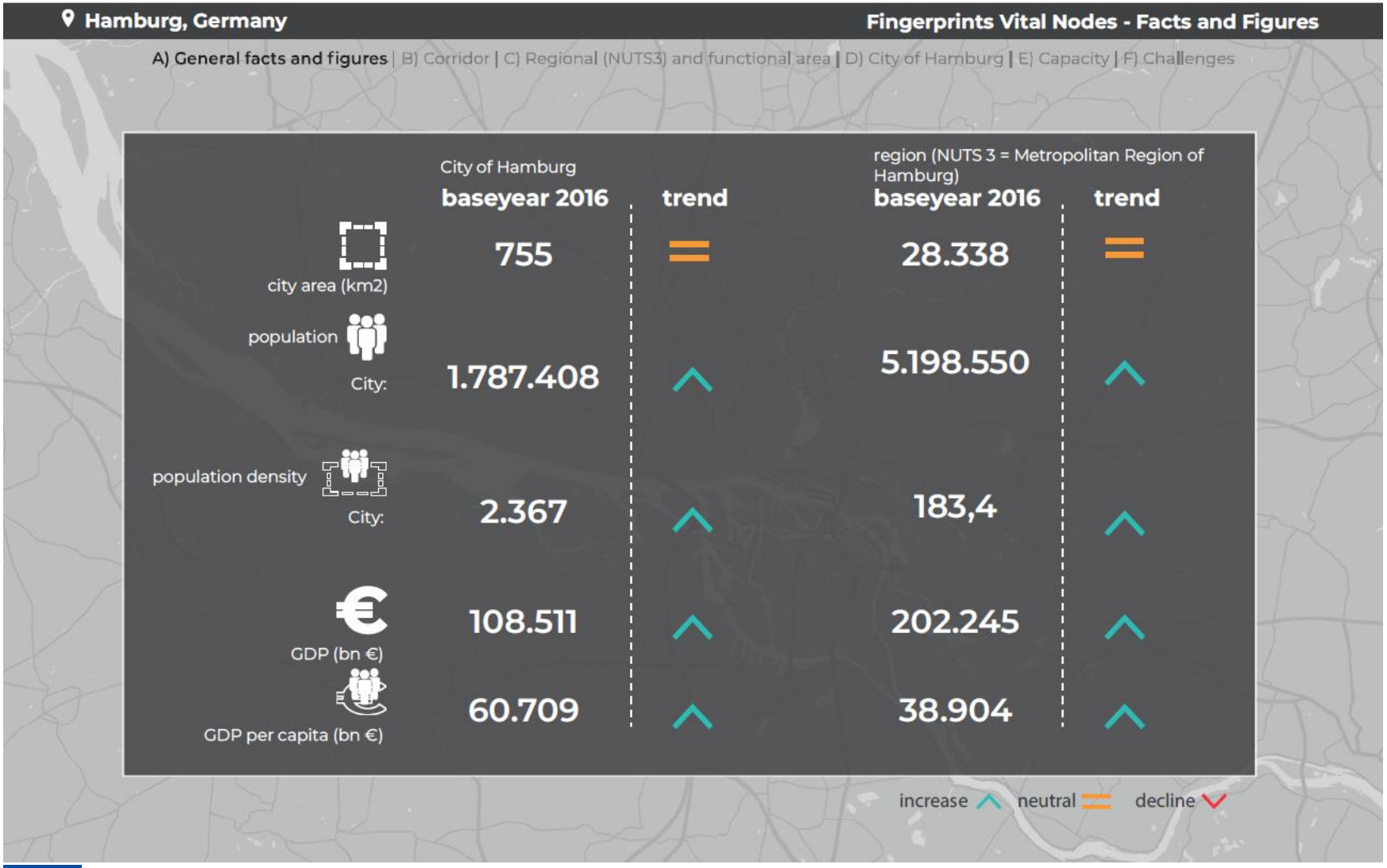
Factsheet Hamburg



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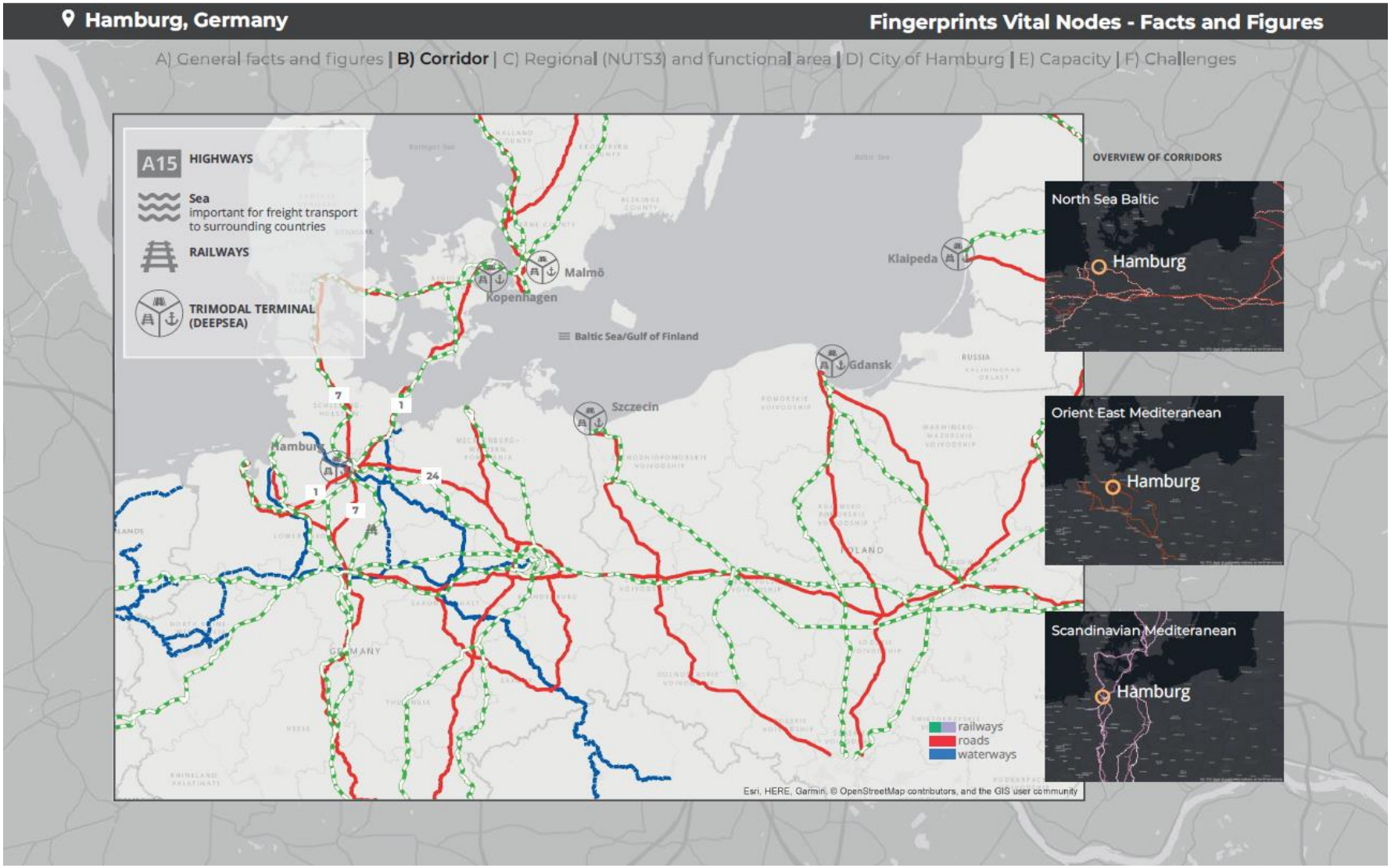

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Rijkswaterstaat
Ministry of Infrastructure and Water Management

VITAL NODES

Hamburg, Germany

Fingerprints Vital Nodes - Facts and Figures

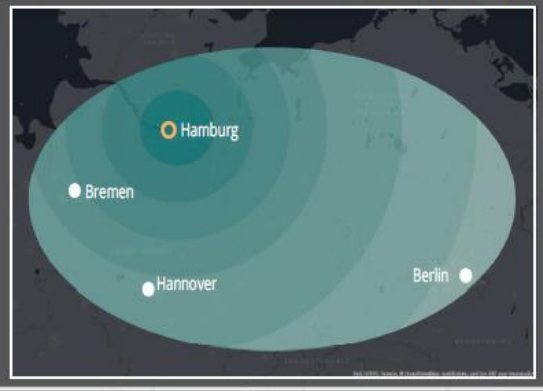
A) General facts and figures | B) Corridor | **C) Regional (NUTS3) and functional area** | D) City of Hamburg | E) Capacity | F) Challenges

IMPORTANT CHARACTERISTICS:

Hamburg is the 2nd largest city of Germany and core of the Region of Hamburg. And the 3rd largest port in Europe with many intermodal hubs and 40 million ton per year transported to and from the port by rail. Hamburg is Europe's biggest railway port for maritime transport. The urban node Hamburg is located on three core network corridors: Scandinavian-Mediterranean, Orient/Eastern Mediterranean and North Sea Baltic. The node is an important railway junction on the route to Scandinavia and connects 'Northern' Europe with for example Italy.

The metropolitan region of Hamburg forms the functional urban area for freight of the urban node Hamburg. Key economic sectors are finance, commerce, logistics and indus try, while the area is a hub for science, research and education with several universities and institutions.

INDICATIVE FUA

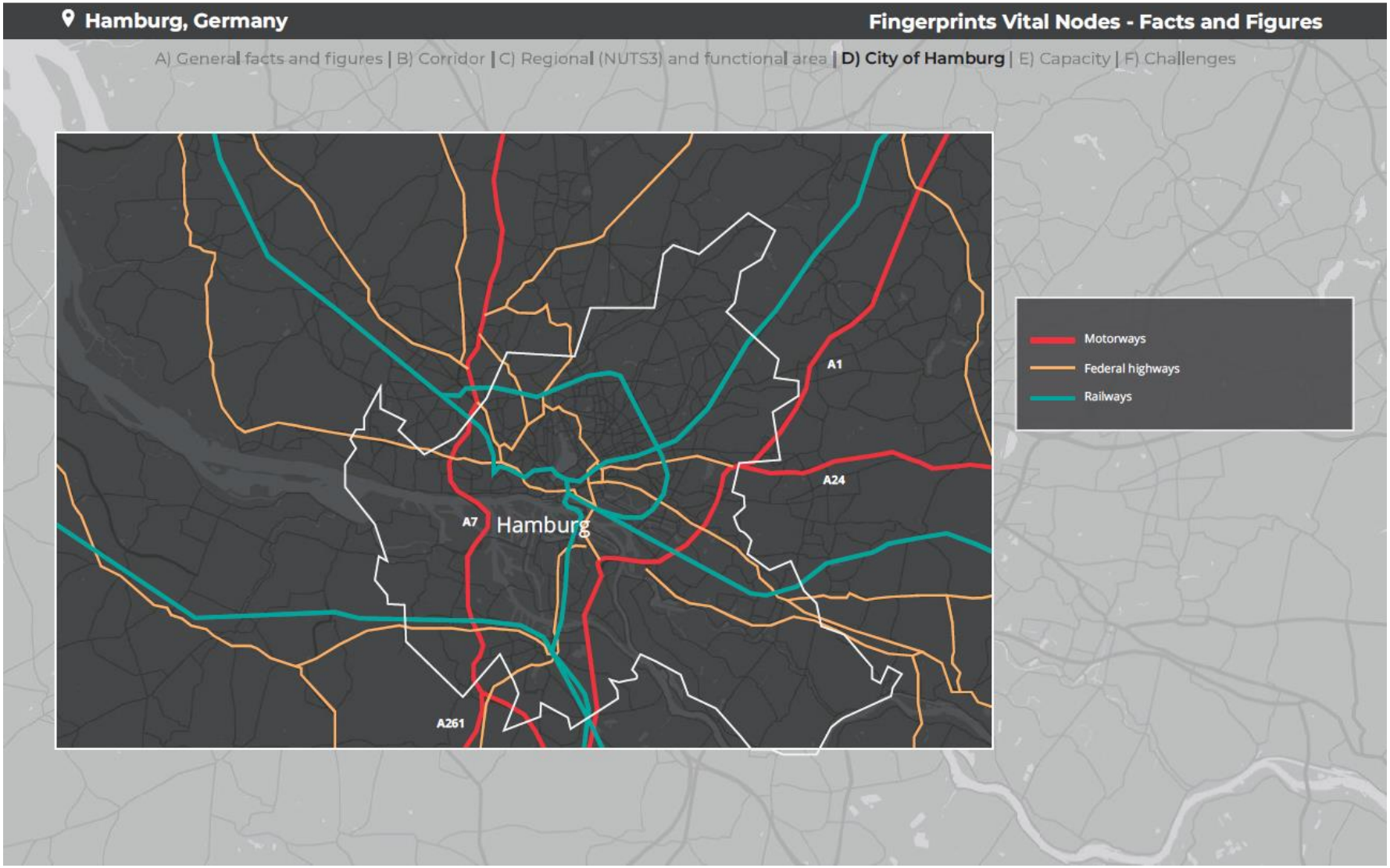


FREIGHT INFRASTRUCTURE
baseyear 2016

	Number	ha	mton	TEU
Road-Rail terminal	1 =	18	na	370.000
Air terminal	1 =	2	0,15	na
Trimodal terminal (deepsea)	19 =	na	na	5,3 mil

increase ^ neutral = decline v

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



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ECORYS

Rijkswaterstaat
Ministry of Infrastructure and Water Management

VITAL NODES

Hamburg, Germany

Fingerprints Vital Nodes - Facts and Figures

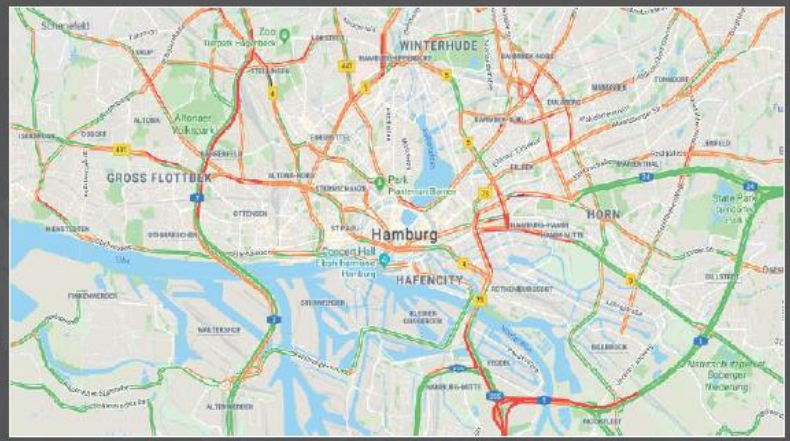
A) General facts and figures | B) Corridor | C) Regional (NUTS3) and functional area | D) City of Hamburg | **E) Capacity** | F) Challenges

CAPACITY RAIL
No major capacity issues observed

CAPACITY WATER
With regard to the hinterland services, it is a political goal to increase the inland waterway share on the modal split. The extension of the Nord-Ostsee Kanal is important for feeder transport into the Baltic Sea Region

CAPACITY AVIATION
No major capacity issues observed

CAPACITY ROAD
Average intensity road on evening peak:



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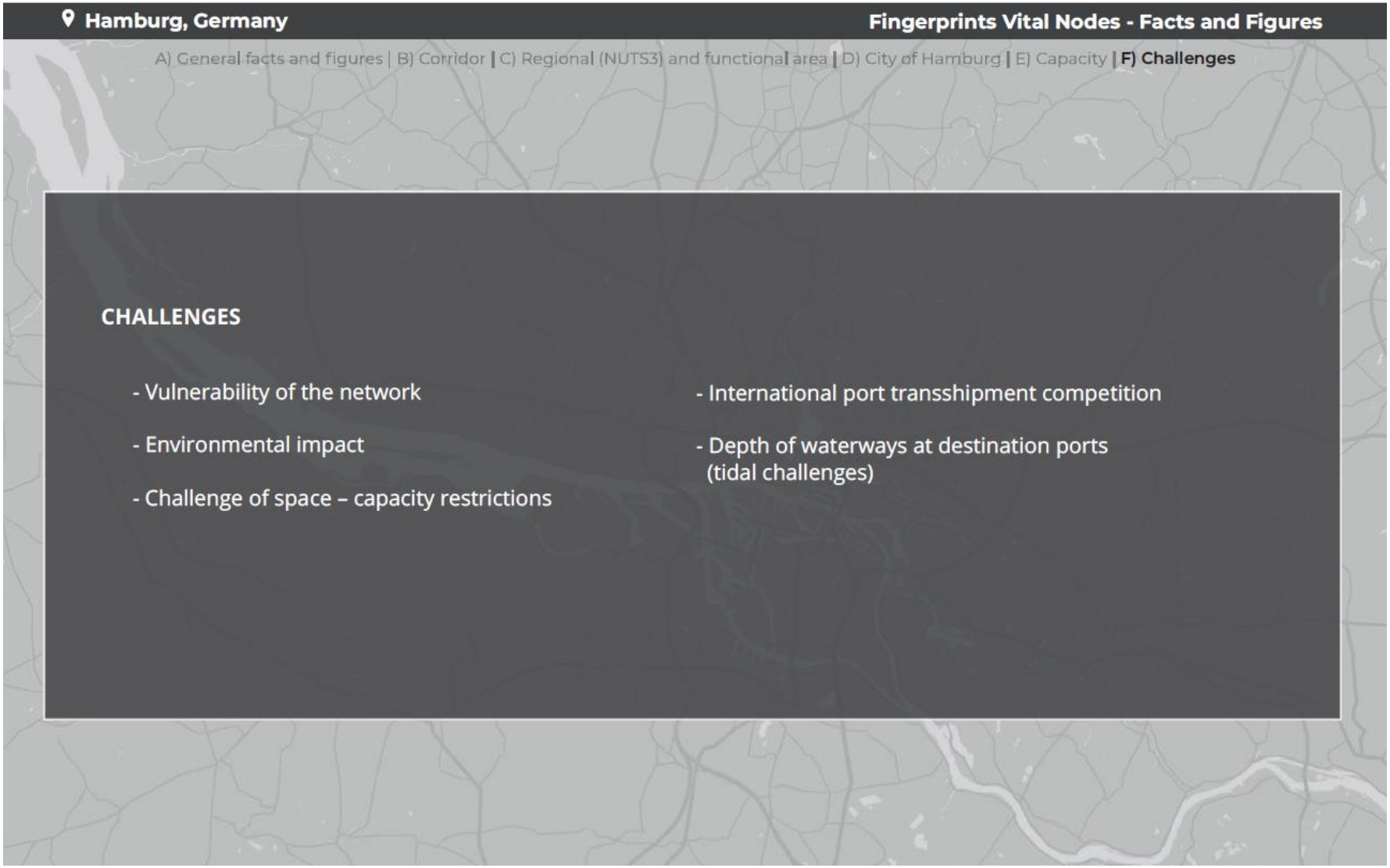


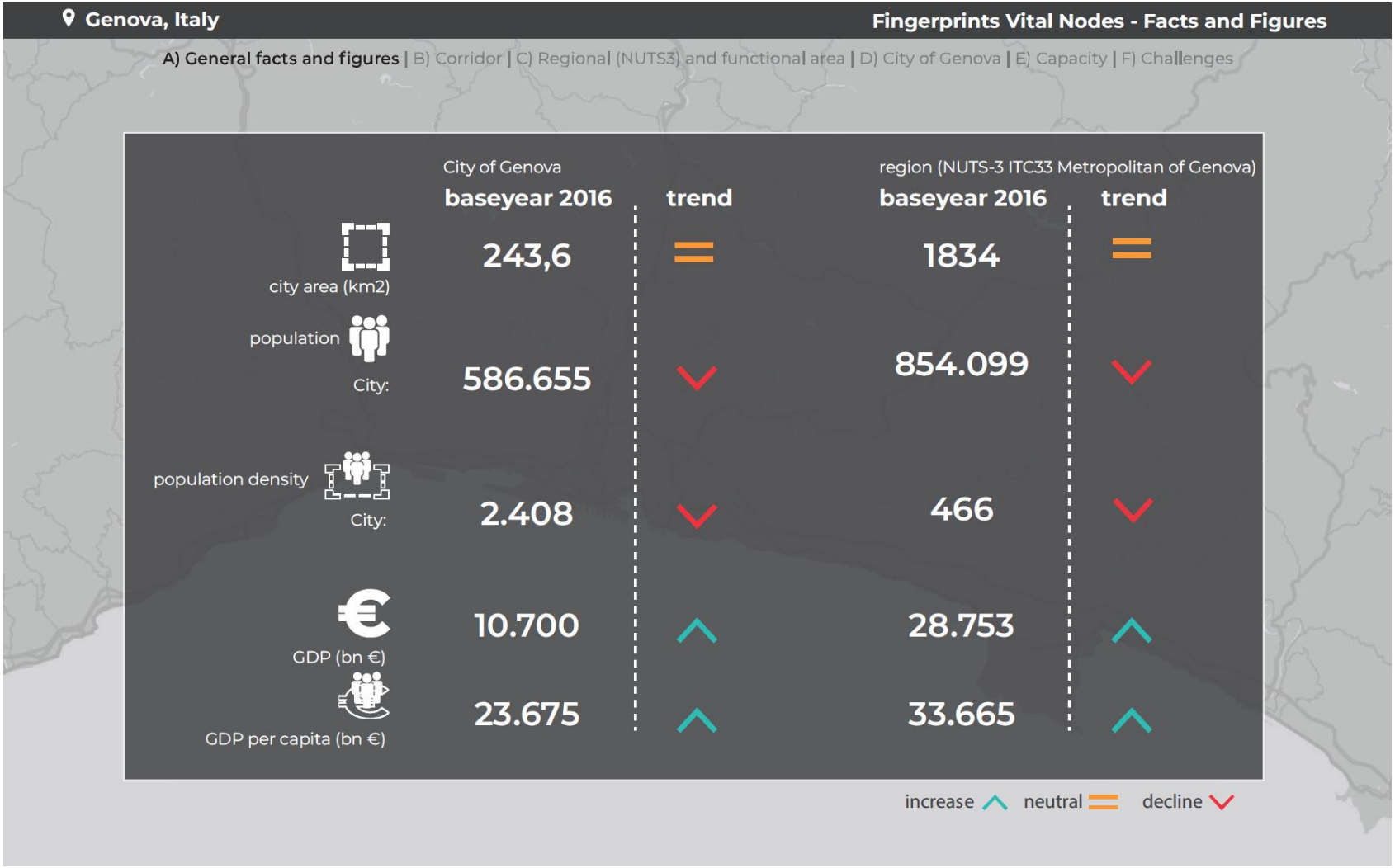
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769458

Factsheet Genova

ECORYS

Rijkswaterstaat
Ministry of Infrastructure and Water Management

VITAL NODES



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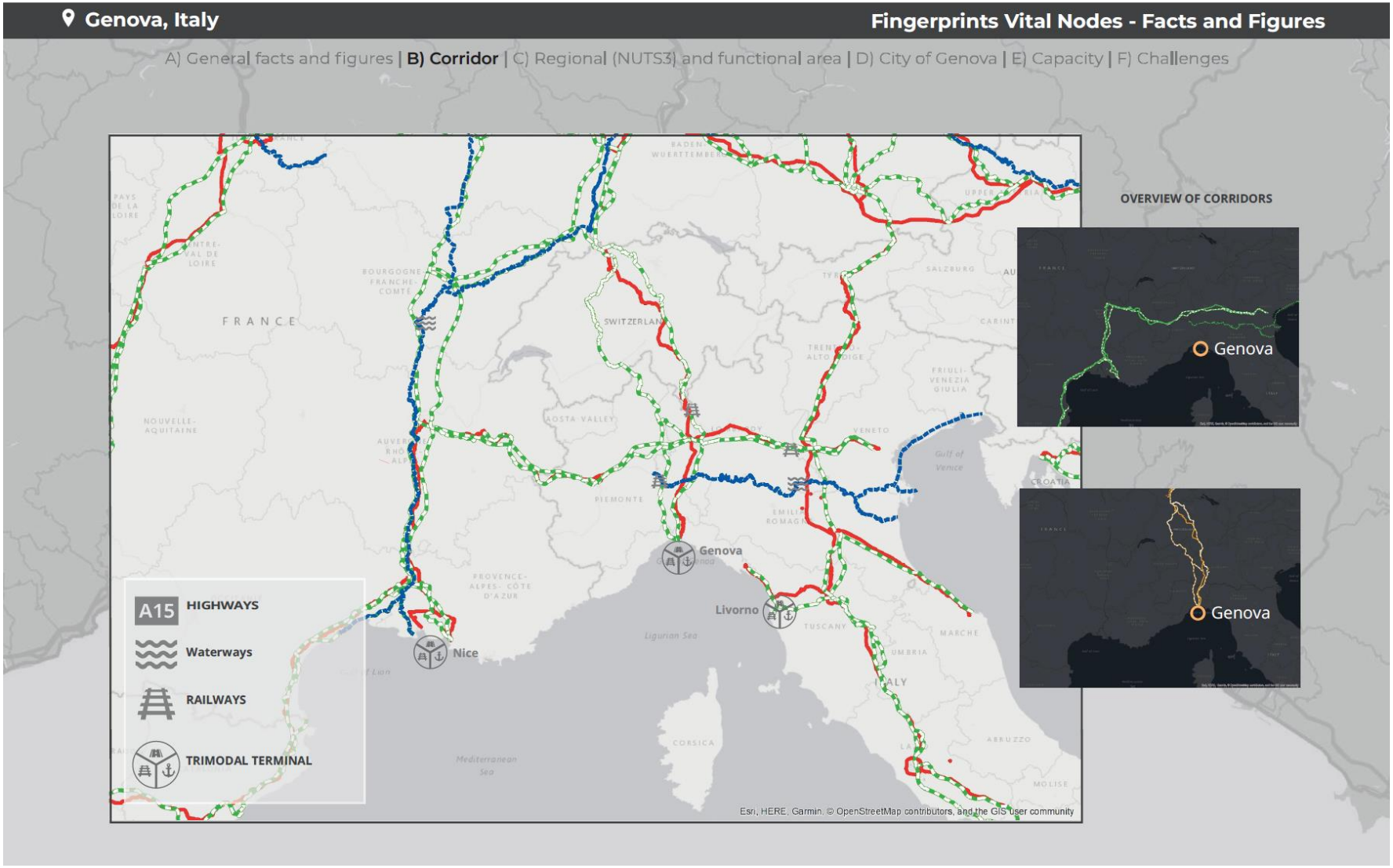

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ECORYS

Rijkswaterstaat
Ministry of Infrastructure and Water Management

VITAL NODES

Genova, Italy

Fingerprints Vital Nodes - Facts and Figures

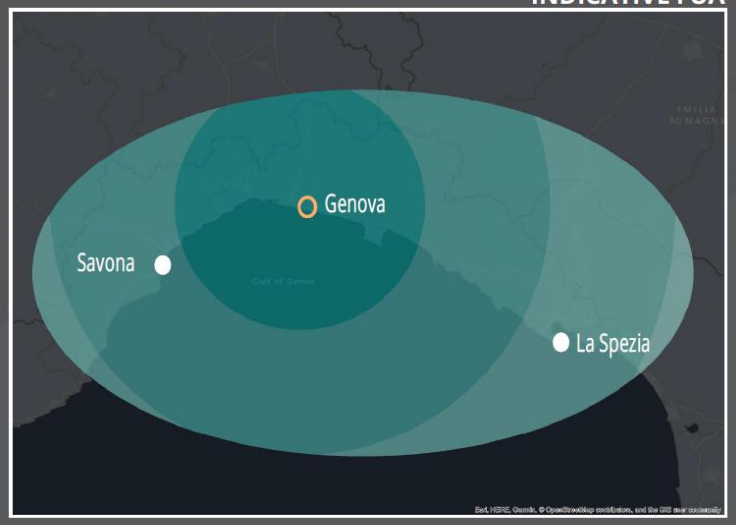
A) General facts and figures | B) Corridor | **C) Regional (NUTS3) and functional area** | D) City of Genova | E) Capacity | F) Challenges

IMPORTANT CHARACTERISTICS:

The seaport of Genova is a one-stop multi-purpose port with over 20 private terminals that can accommodate any type of vessel and cargo. Cargoes handled in the Port of Genova include containers, general cargo, liquid and solid bulk, metals, forestry products, perishable goods, petroleum products, and passengers

The airport (Genova Cristoforo Colombo Airport) has a limited freight function.

INDICATIVE FUA



FREIGHT INFRASTRUCTURE
baseyear 2016

	Number	ha	mton	TEU
Air terminal	1	0.3	2.580	-
Trimodal terminal (deepsea)	6	120	68mil	2.6mil*

*2017

increase neutral decline

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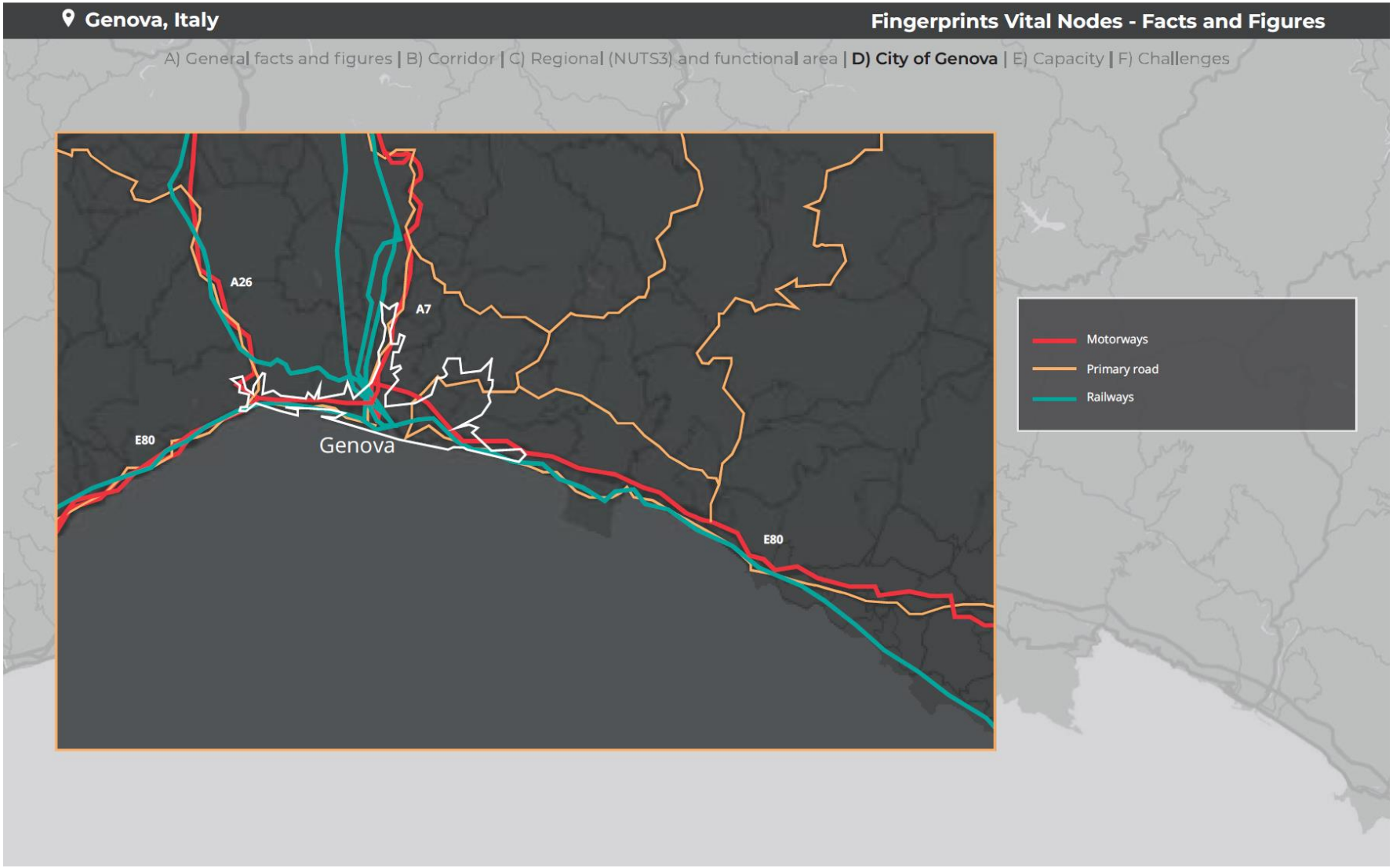
ECORYS

Rijkswaterstaat
Ministry of Infrastructure and Water Management

VITAL NODES



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ECORYS

Rijkswaterstaat
Ministry of Infrastructure and Water Management

VITAL NODES

Genova, Italy

Fingerprints Vital Nodes - Facts and Figures

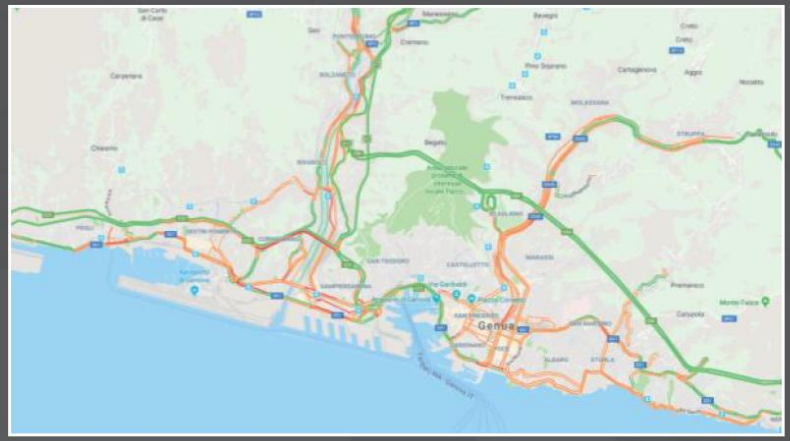
A) General facts and figures | B) Corridor | C) Regional (NUTS3) and functional area | D) City of Genova | **E) Capacity** | F) Challenges

CAPACITY RAIL
Last mile connections are a critical issue as far as rail transport performance and competitiveness is concerned

CAPACITY WATER
Due to the increase of maritime traffic, port capacity is an issue

CAPACITY AVIATION
Cargo terminal: 3,000 square metre warehouse and a similar sized area which houses the airport, customs and shipping offices

CAPACITY ROAD
Average intensity road on evening peak:



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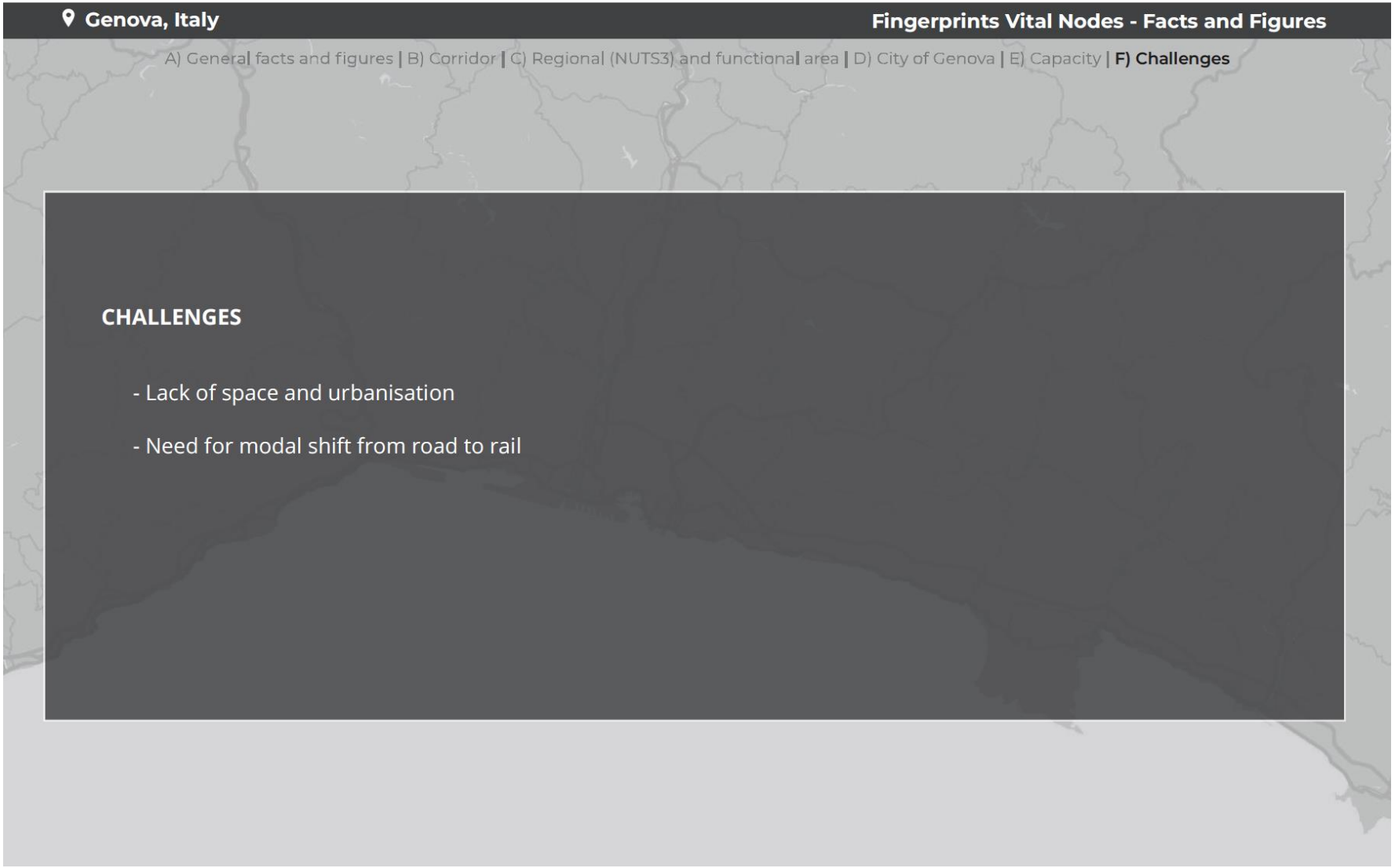
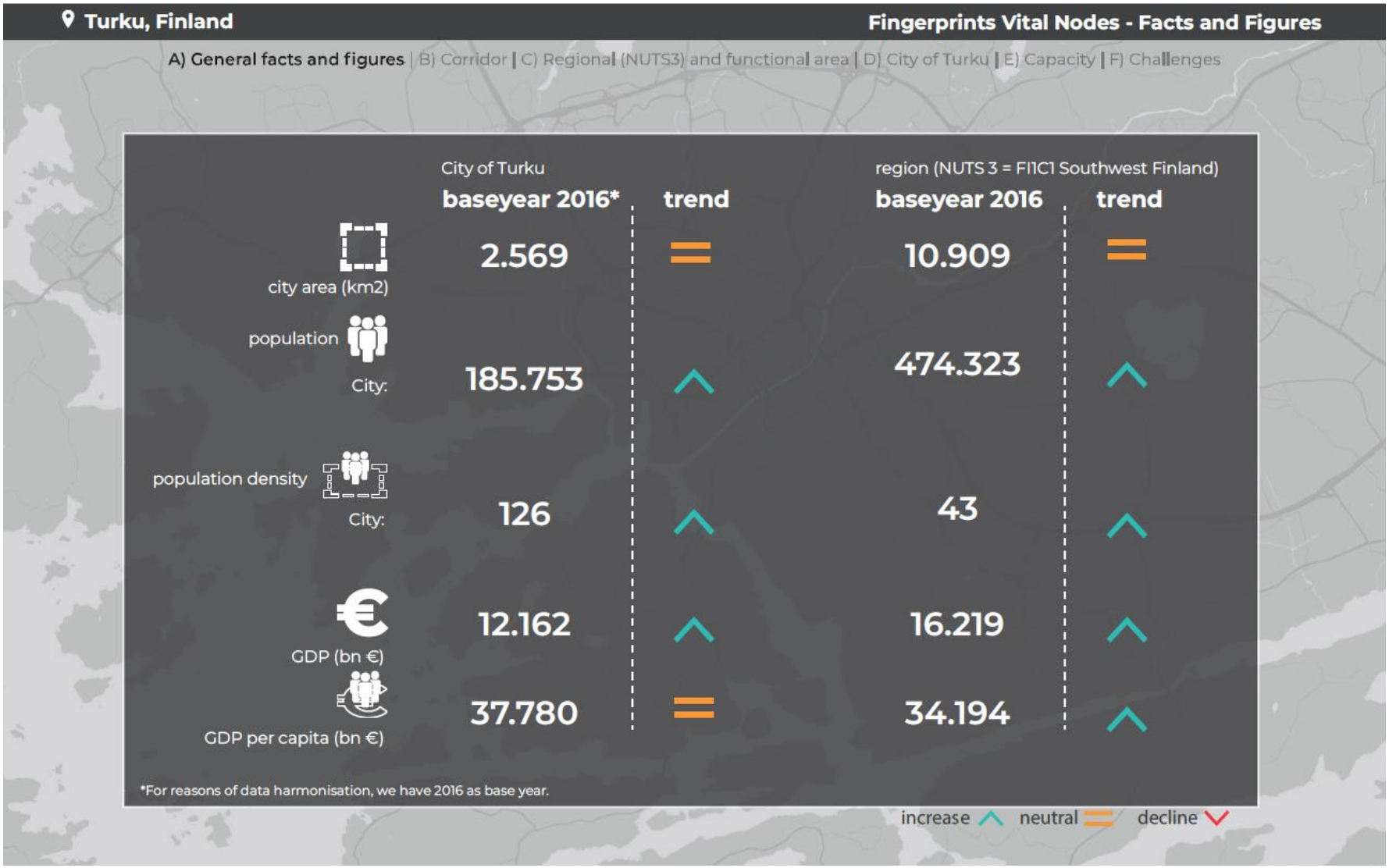


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769458

Factsheet Turku



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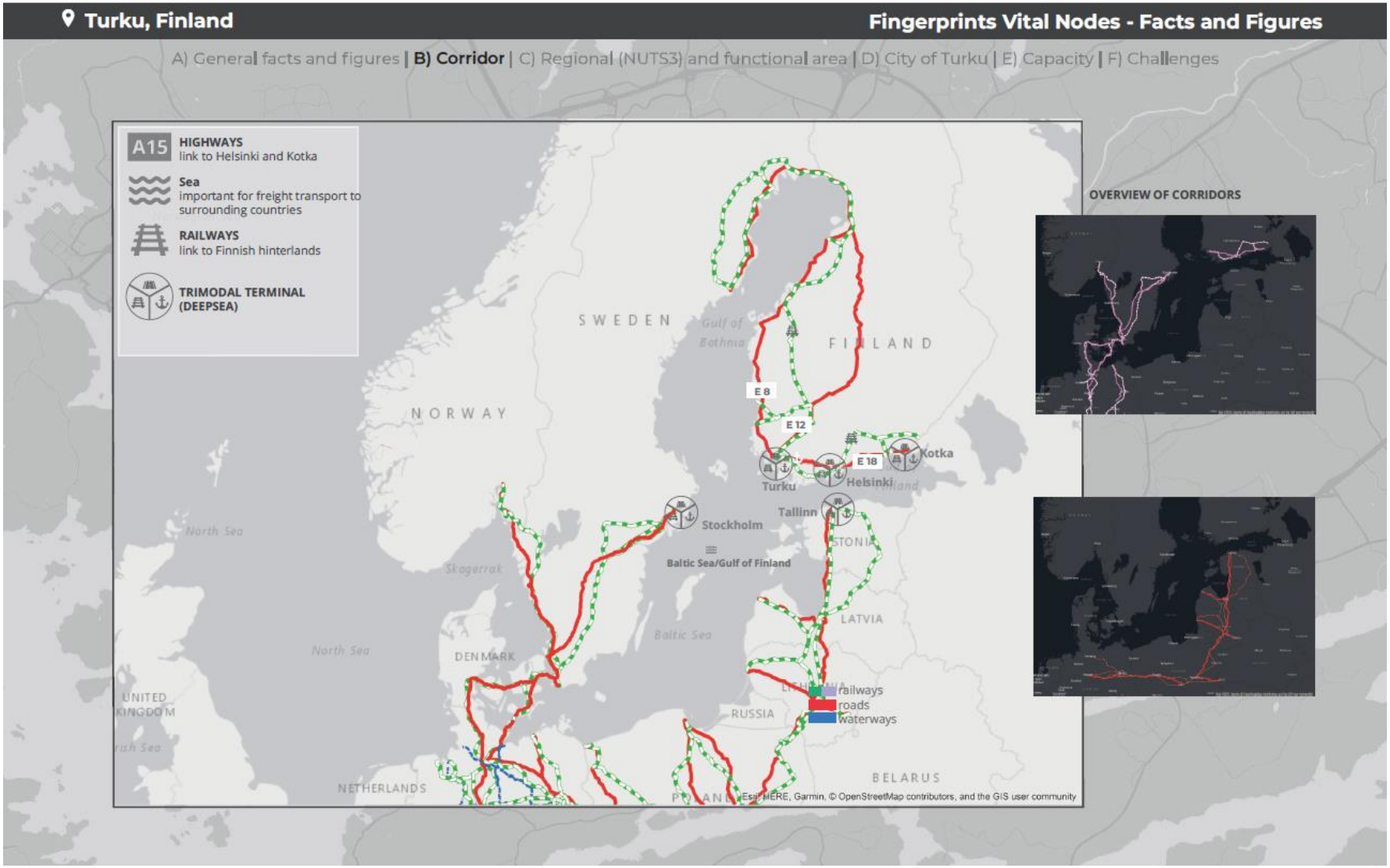

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ECORYS

Rijkswaterstaat
Ministry of Infrastructure and Water Management

VITAL NODES

Turku, Finland

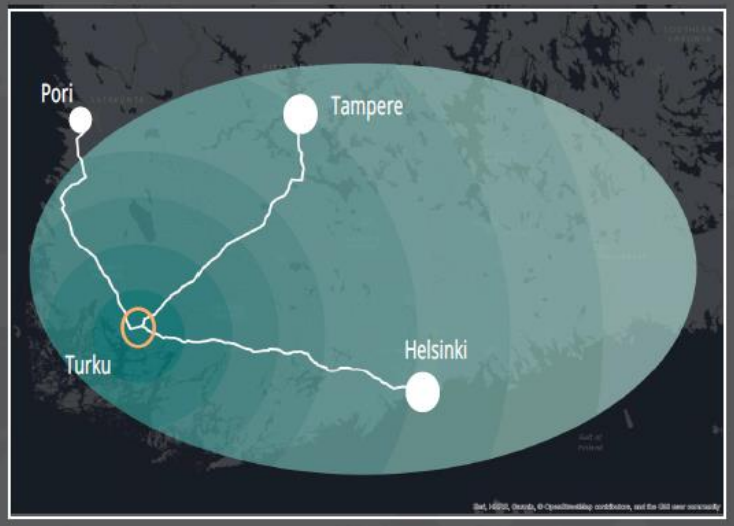
Fingerprints Vital Nodes - Facts and Figures

A) General facts and figures | B) Corridor | **C) Regional (NUTS3) and functional area** | D) City of Turku | E) Capacity | F) Challenges

IMPORTANT CHARACTERISTICS:

Southwest Finland (Varsinais-Suomi) is Finland's leading agricultural area and a significant food producer. Other important industries: **shipyards, automobile manufacturing, metal and electric industries,** bio cluster, medicine development. The region is moving from traditional to service-oriented.

INDICATIVE FUA



FREIGHT INFRASTRUCTURE
baseyear 2016

	Number	ha	mton	TEU
Road-Rail terminal	1 =	na	0.18	na
Air terminal	1 =	na	0.37 ˅	na
Trimodal terminal (deepsea)	1 =	95 =	2.5 ^	2.300 ^

increase ^ neutral = decline ˅

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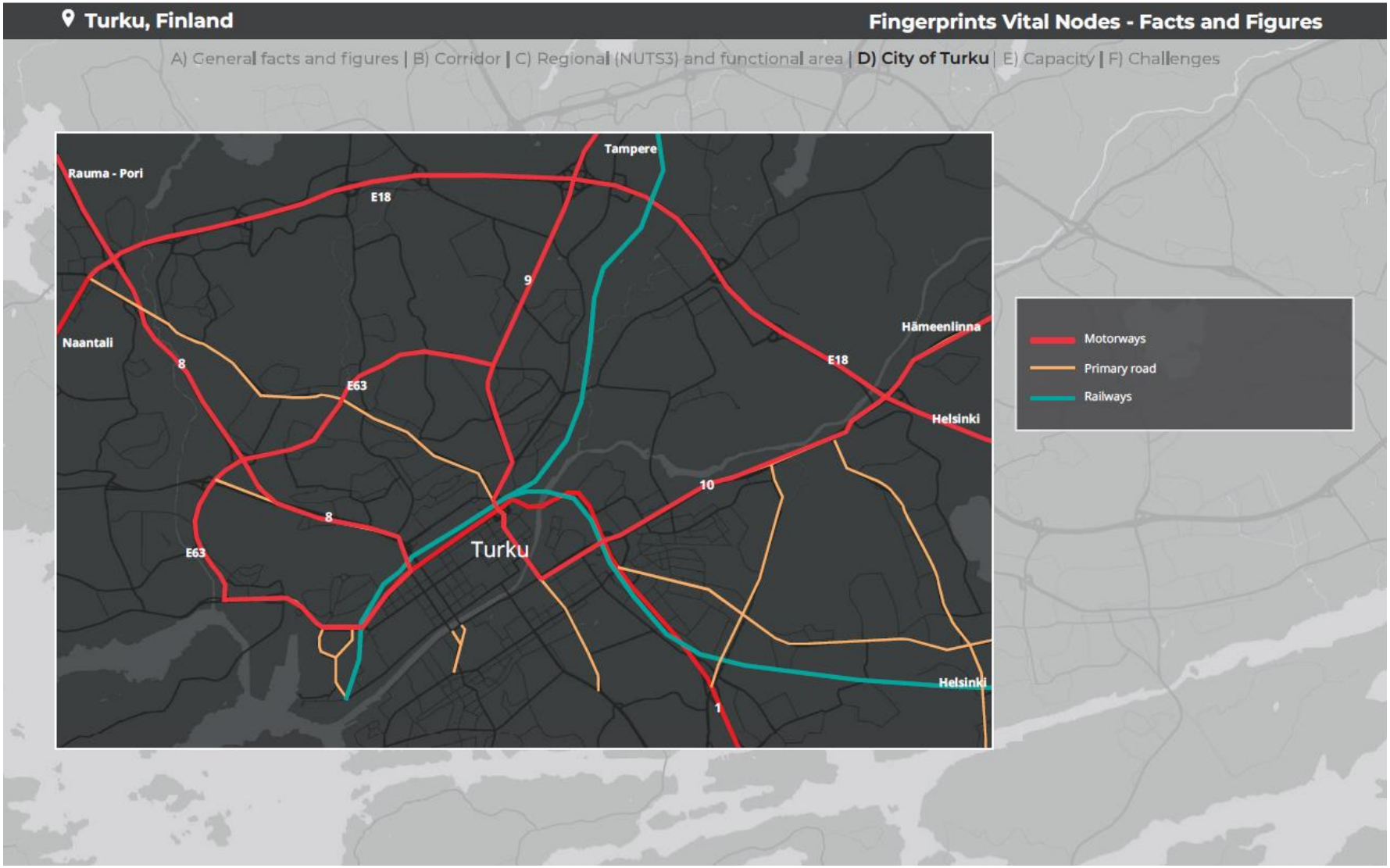

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Turku, Finland

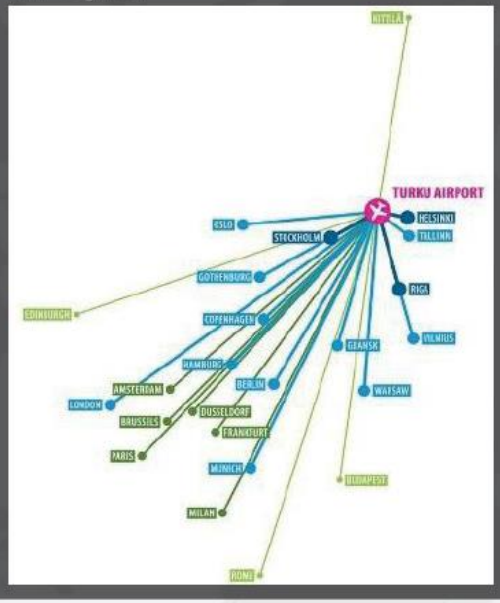
Fingerprints Vital Nodes - Facts and Figures

A) General facts and figures | B) Corridor | C) Regional (NUTS3) and functional area | D) City of Turku | **E) Capacity** | F) Challenges

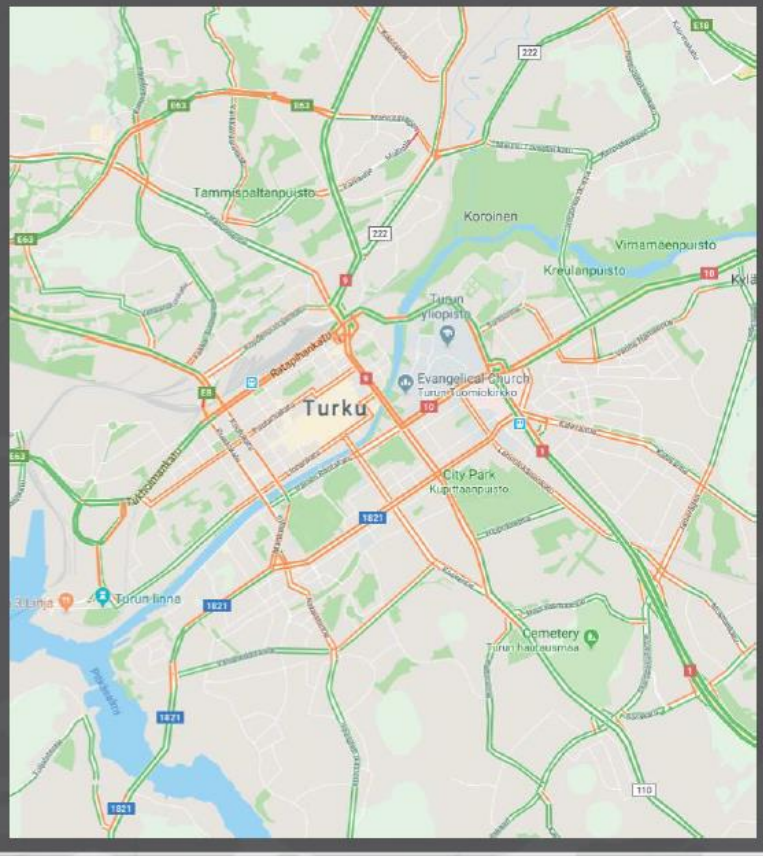
CAPACITY RAIL
There are no regional trains, but there is great potential

CAPACITY WATER
Pilotage fees are an issue for the competitiveness of the harbour

CAPACITY AVIATION
It is vital for the strong export industry in the region.



CAPACITY ROAD
Average intensity road on evening peak:



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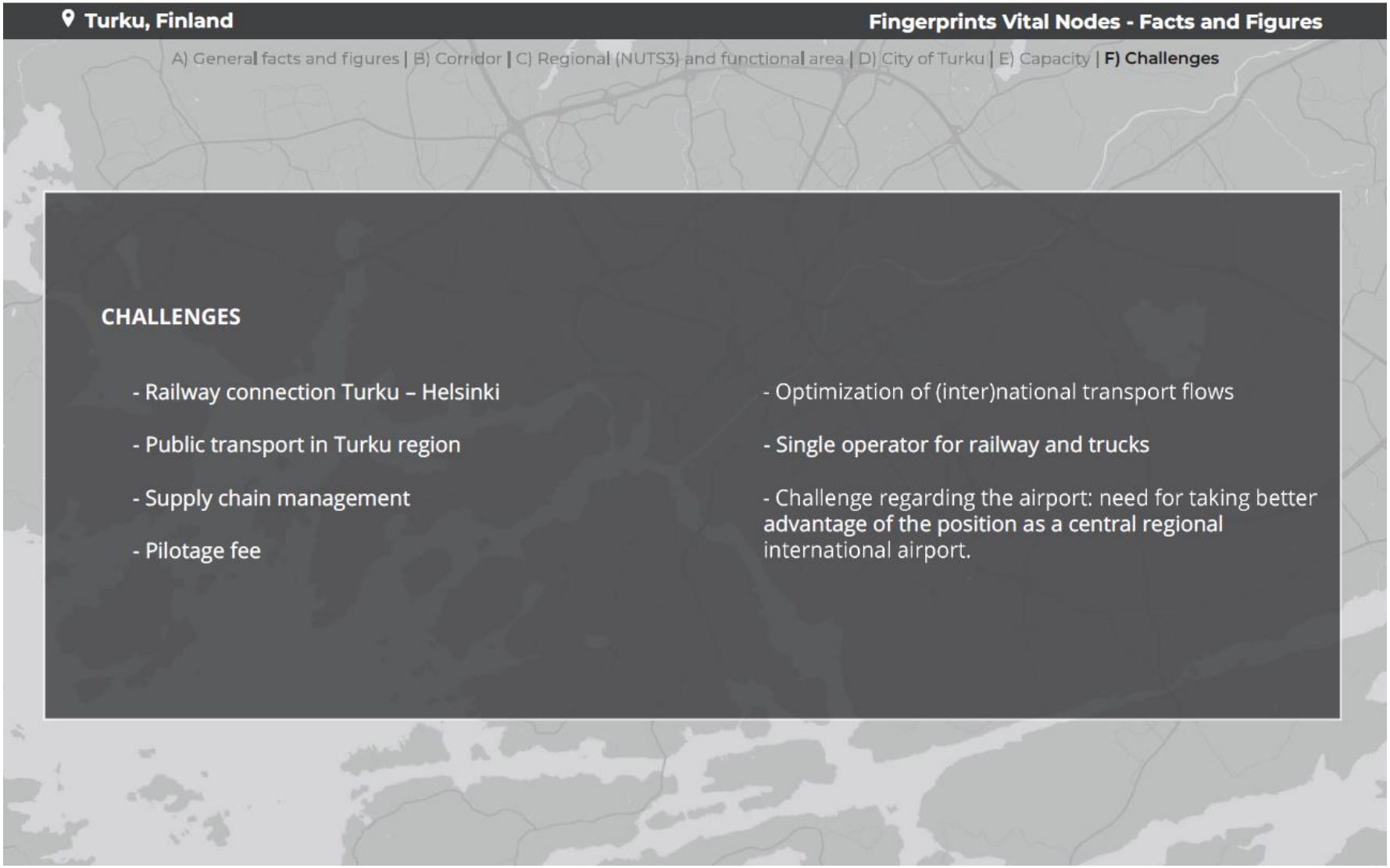

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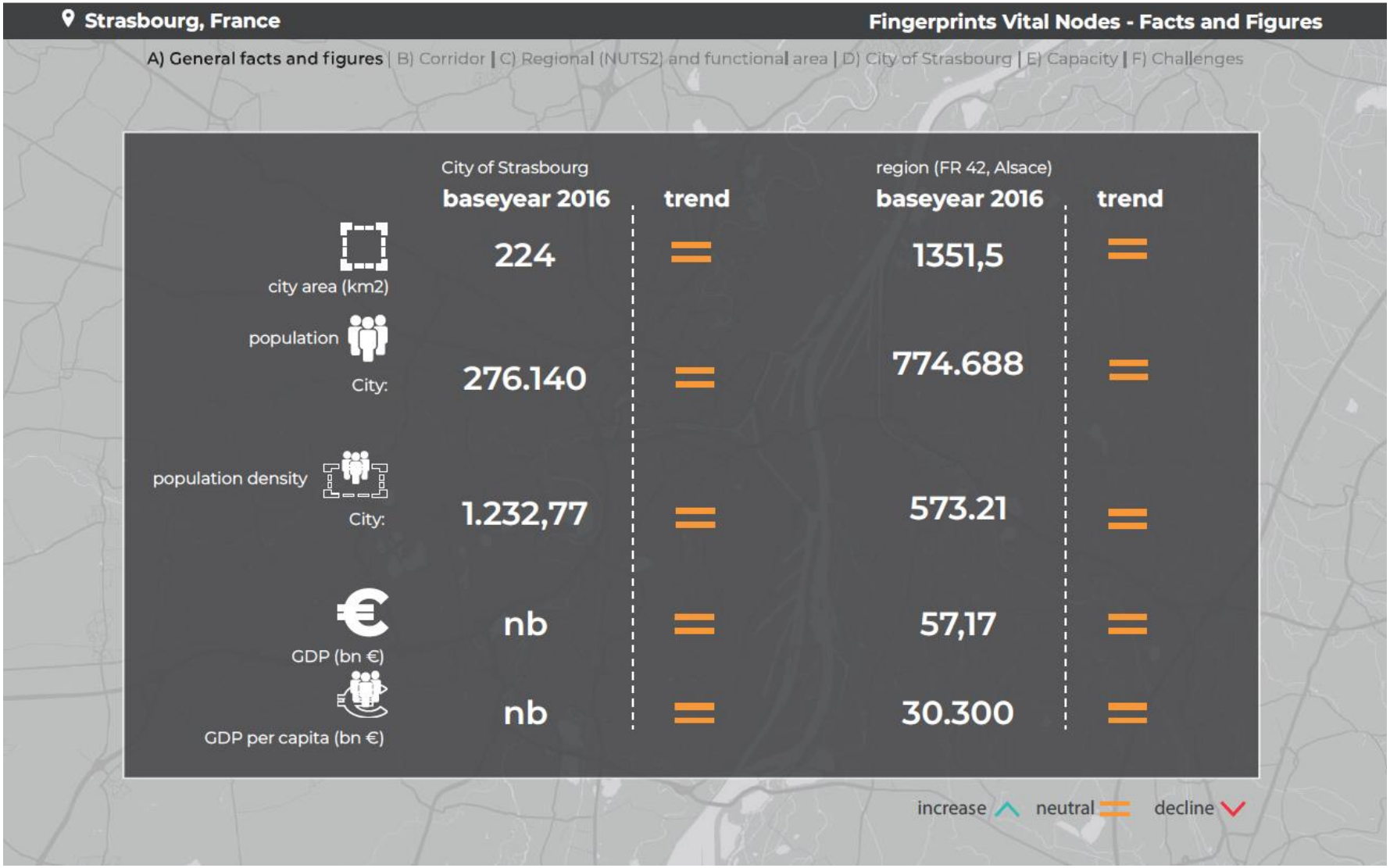
Factsheet Strasbourg



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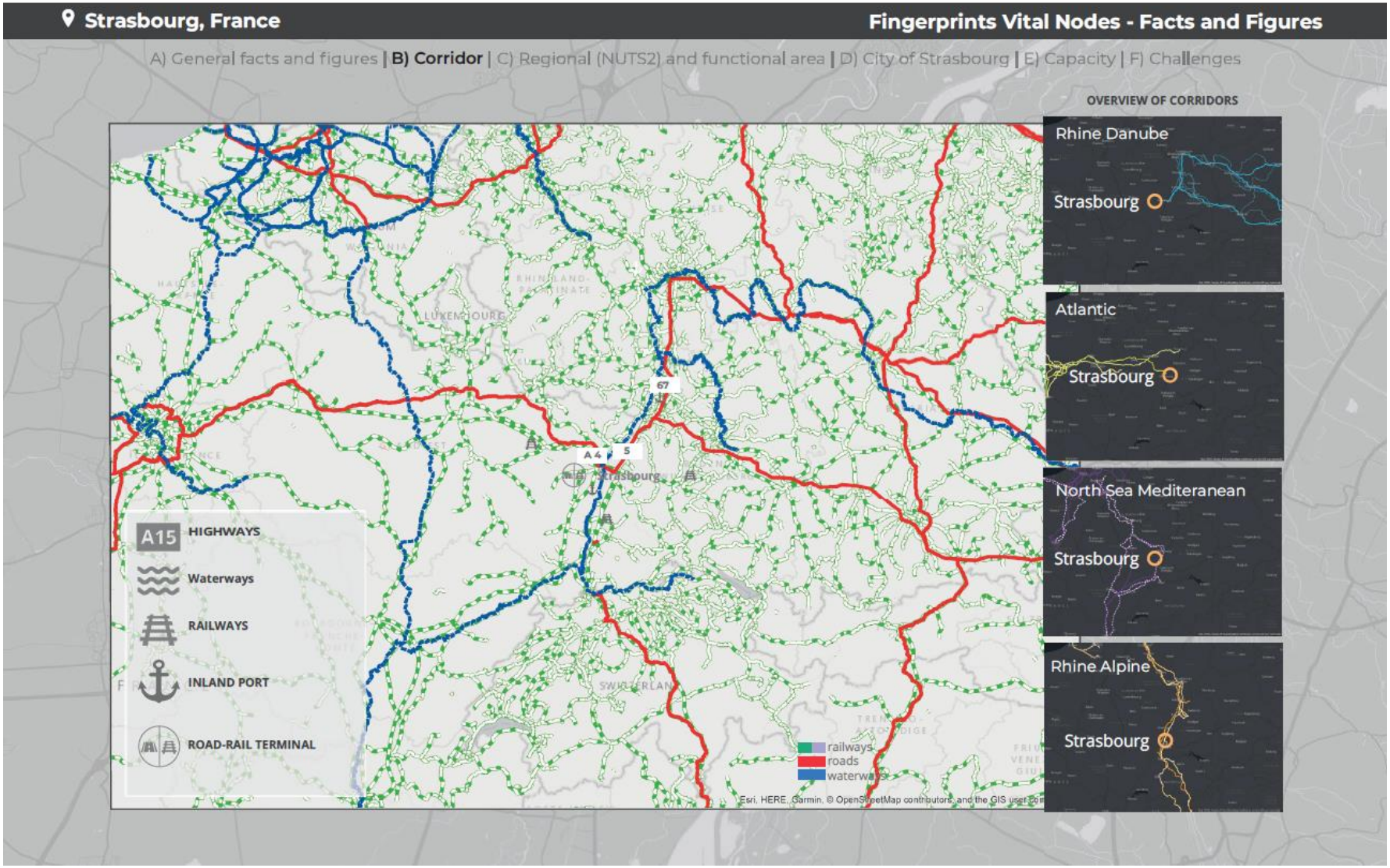

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ECORYS

Rijkswaterstaat
Ministry of Infrastructure and Water Management

VITAL NODES

Strasbourg, France

Fingerprints Vital Nodes - Facts and Figures

A) General facts and figures | B) Corridor | **C) Regional (NUTS2) and functional area** | D) City of Strasbourg | E) Capacity | F) Challenges

IMPORTANT CHARACTERISTICS:

The Alsace rail network is not a major rail freight corridor in terms of traffic and suffers from a weakness related to its structure, both from national and international point of view. Rail transport networks are directed towards the West and less to Germany and the South. The north-south axis is heavily used for passenger traffic, to its capacity limit, limiting the development of rail freight. In addition, the containers can not pass on the axis Mulhouse-Dijon because of the lack of gauging of the tunnels too narrow. This lack of a direct route to the south and the disappearance of marshalling yards in Alsace requires the processing of goods transported by regular shuttles within a marshalling yard located in Lorraine, Woippy.

INDICATIVE FUA

FREIGHT INFRASTRUCTURE
baseyear 2016

	Number	ha	mton	TEU
Road-Rail terminal	0 =	0	0	0
Air terminal	1 =	0	na	na
Trimodal terminal (deepsea)	5 =	22	na	na

increase ^ neutral = decline v

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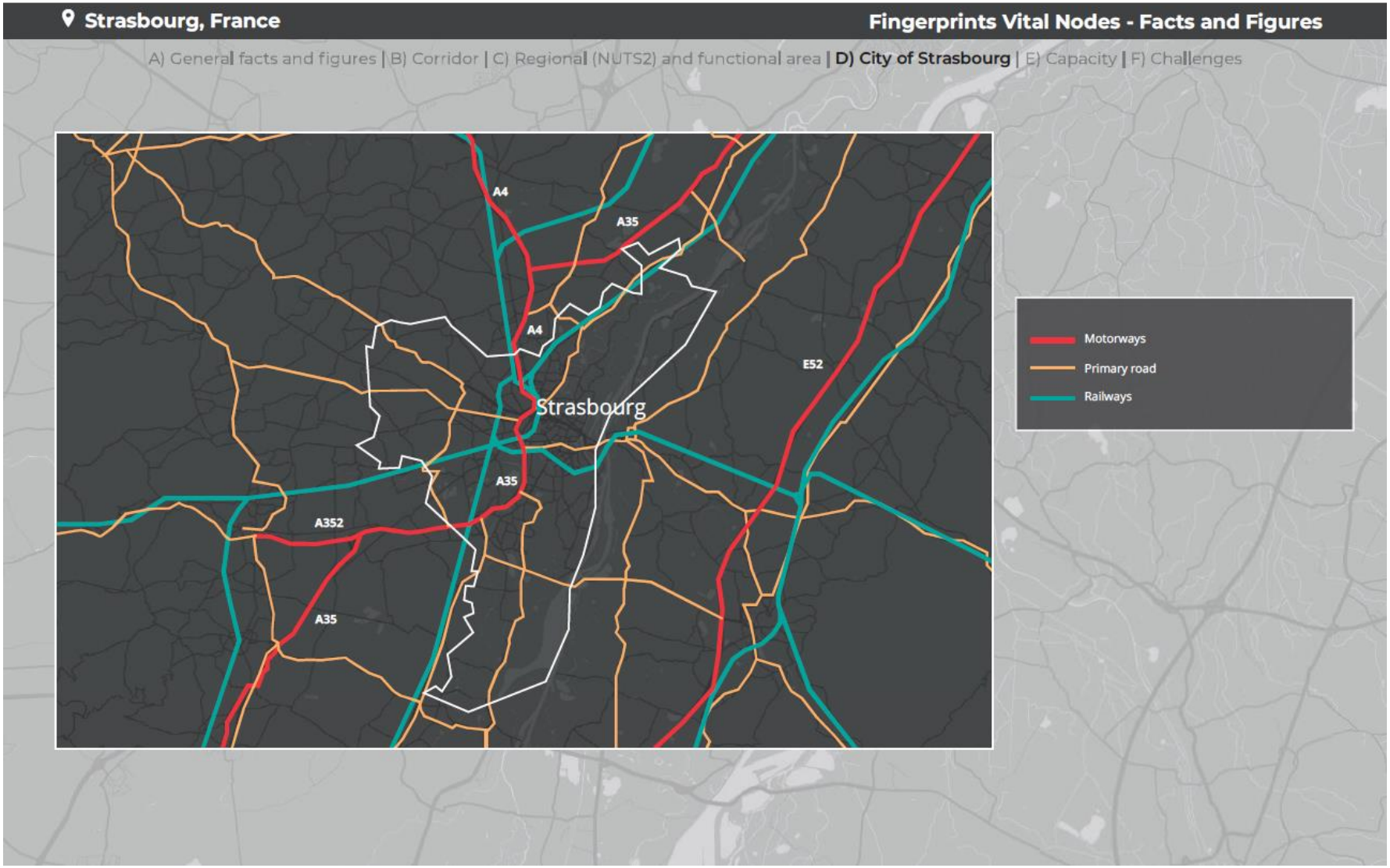

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ECORYS

Rijkswaterstaat
Ministry of Infrastructure and Water Management

VITAL NODES

Strasbourg, France

Fingerprints Vital Nodes - Facts and Figures

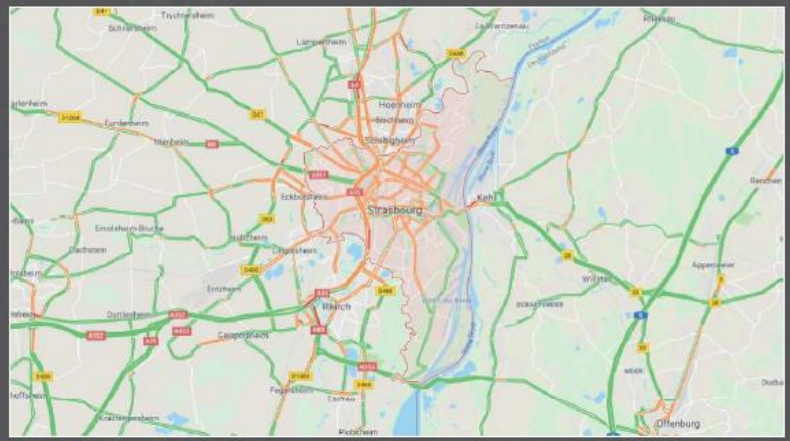
A) General facts and figures | B) Corridor | C) Regional (NUTS2) and functional area | D) City of Strasbourg | **E) Capacity** | F) Challenges

CAPACITY RAIL
The Alsace rail network is not a major rail freight corridor and suffers from a weakness related to its structure. Rail transport networks are directed towards the West and less to Germany and the South.

CAPACITY WATER
No major capacity issues observed

CAPACITY AVIATION
Strasbourg Airport is a minor international airport

CAPACITY ROAD
Average intensity road on evening peak:



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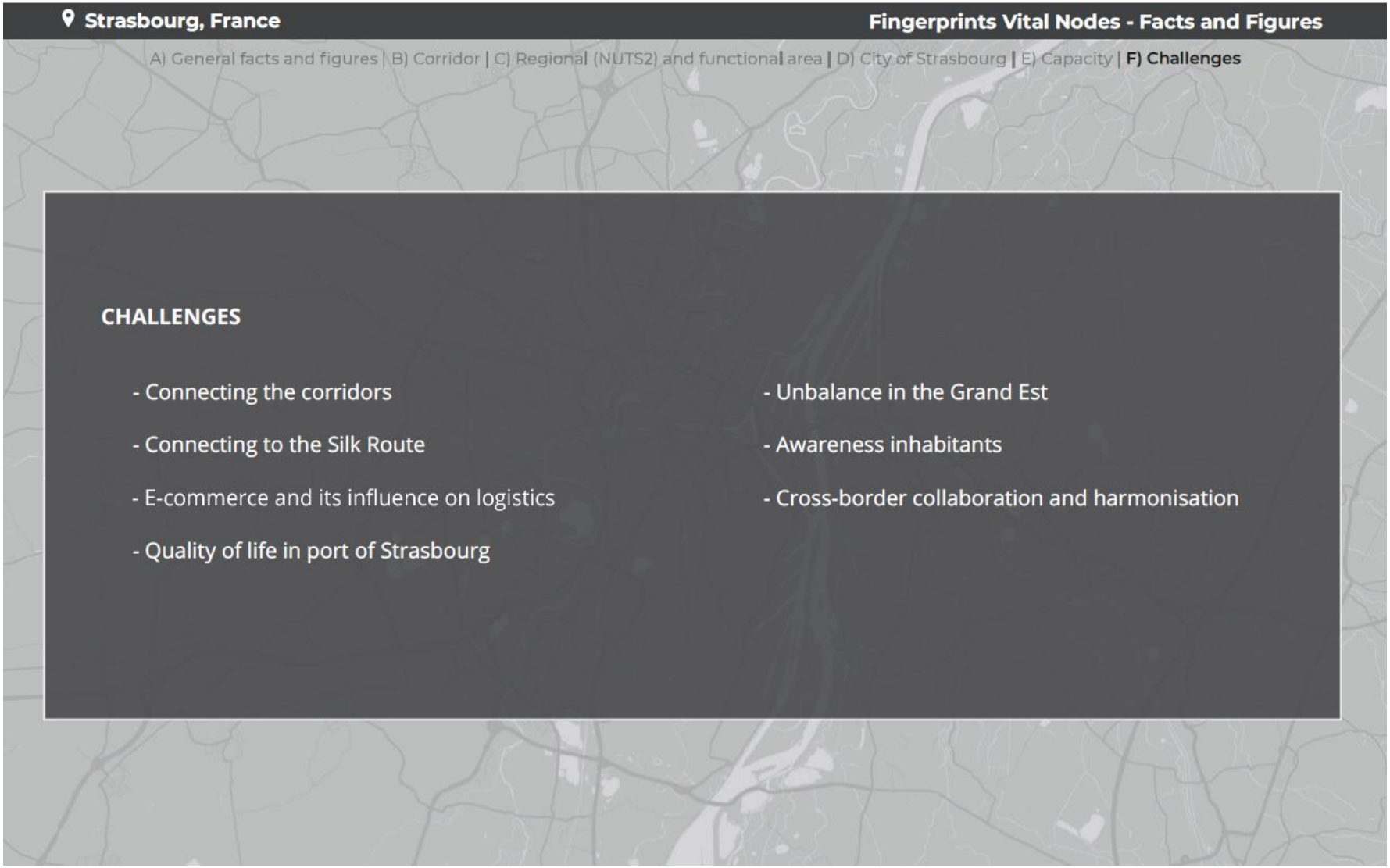

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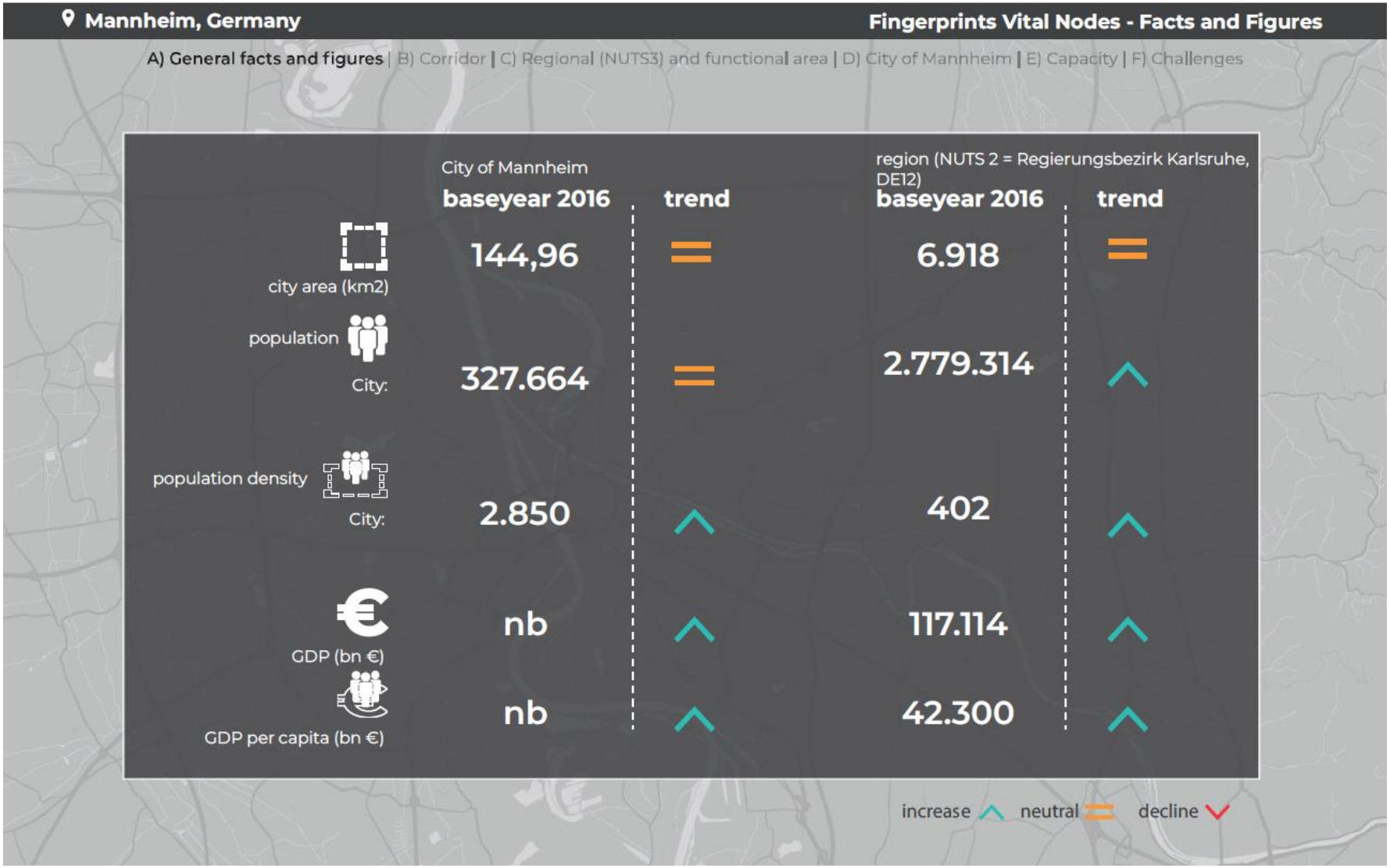
Factsheet Mannheim

ECORYS

Rijkswaterstaat
Ministry of Infrastructure and Water Management

VITAL NODES



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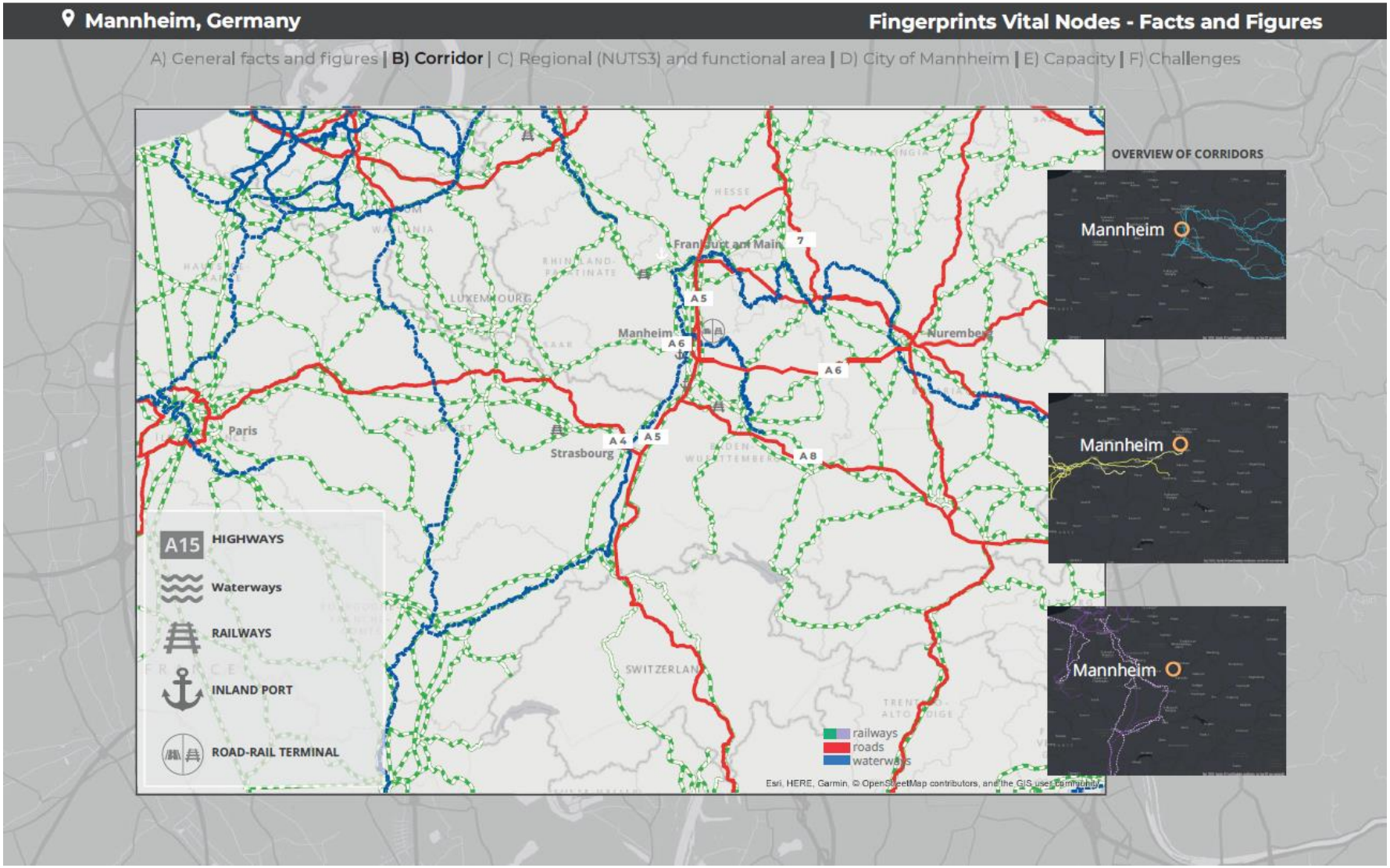

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ECORYS

Rijkswaterstaat
Ministry of Infrastructure and Water Management

VITAL NODES

Mannheim, Germany

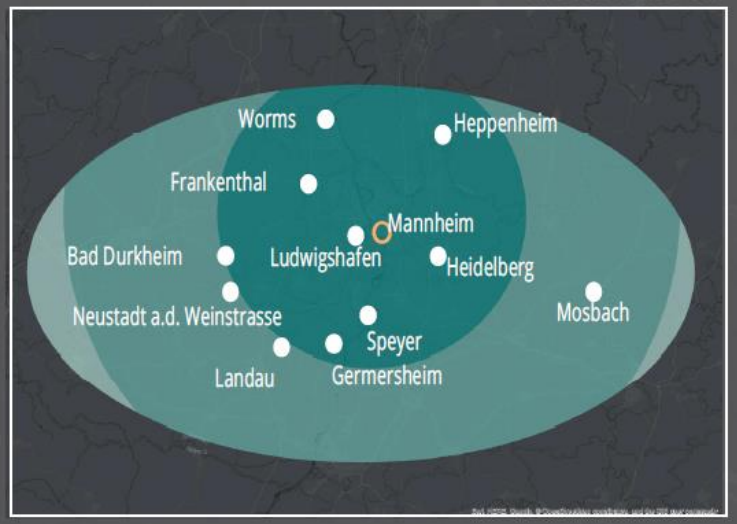
Fingerprints Vital Nodes - Facts and Figures

A) General facts and figures | B) Corridor | **C) Regional (NUTS3) and functional area** | D) City of Mannheim | E) Capacity | F) Challenges

IMPORTANT CHARACTERISTICS:

As Mannheim is located close to the border of Baden Wurttemberg with the states of Hessen and Rheinland Pfalz policy coordination on this level is essential as well as with the neighbour city of Ludwigshafen to succesfully tackle joint challenges.

INDICATIVE FUA



FREIGHT INFRASTRUCTURE
baseyear 2016

	Number	ha	mton	TEU
Road-Rail terminal	1 =	119 ^	^	100.000 ^
Air terminal	0 =	0 ^	0 ^	na ^
Trimodal terminal	2+2* ^	1+11 ^	1,1 ^	117.000 ^

*2+2 = Four inland terminals, of which two trimodal (Marshalling yard is no terminal (with for instance loading of containers or trailers) as such so not included)

increase ^ neutral = decline v

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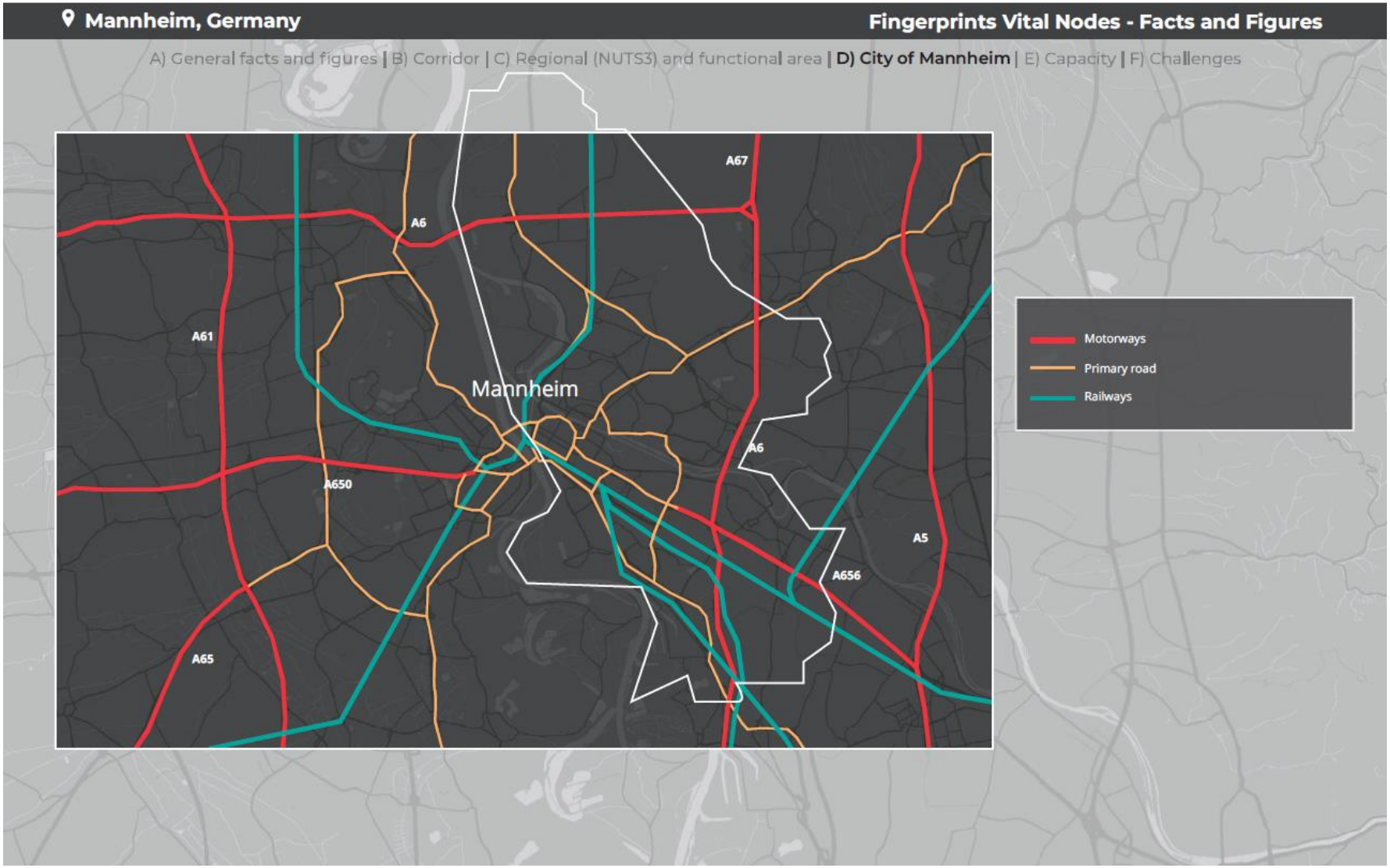

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Mannheim, Germany

Fingerprints Vital Nodes - Facts and Figures

A) General facts and figures | B) Corridor | C) Regional (NUTS3) and functional area | D) City of Mannheim | **E) Capacity** | F) Challenges

CAPACITY RAIL
Expansion of railway capacity in- and around Mannheim is listed among the major

CAPACITY WATER
No major capacity issues observed

CAPACITY AVIATION
Mannheim City Airport sees no major air freight movement

CAPACITY ROAD
Average intensity road on evening peak:

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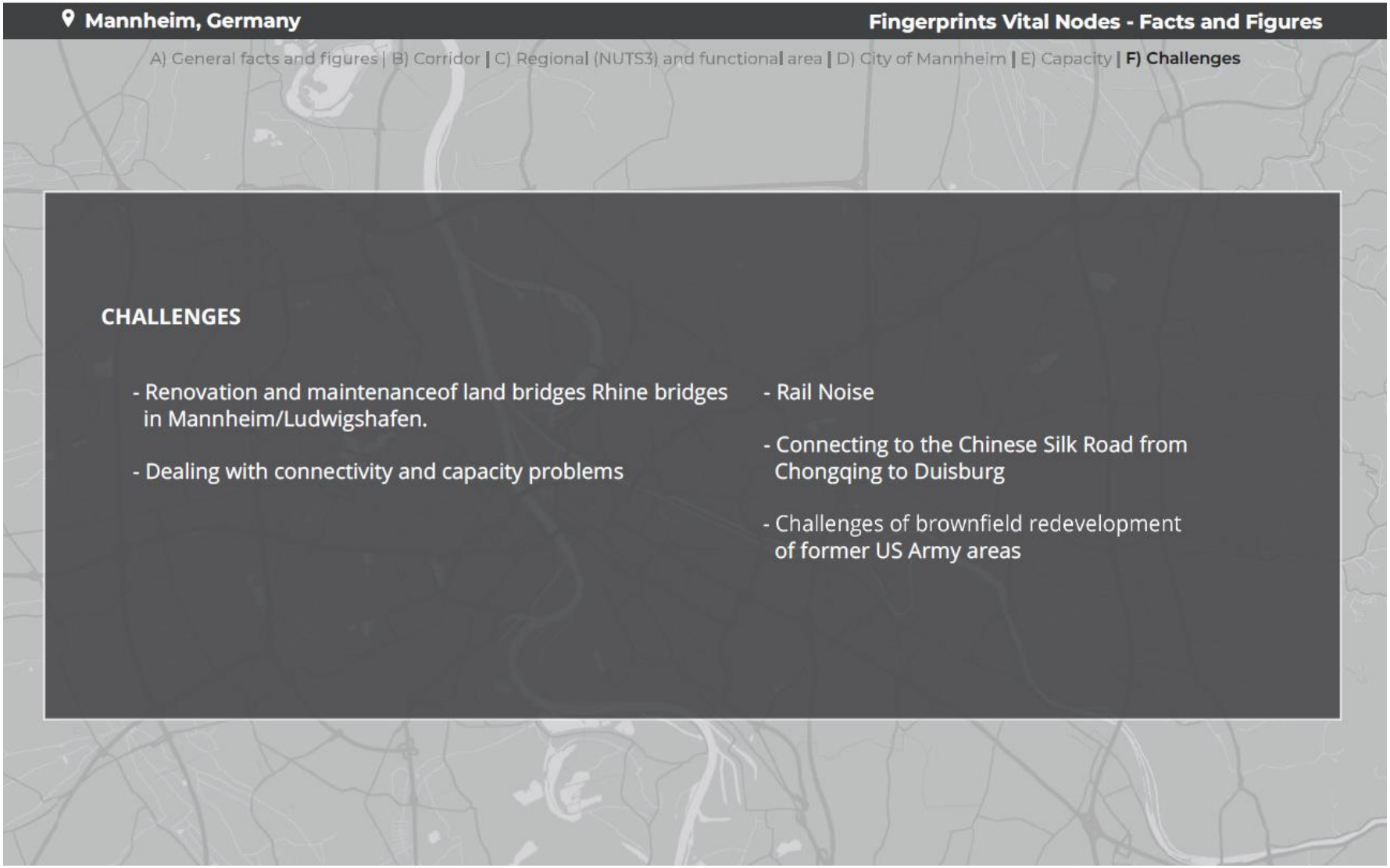

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2. Lists of participants workshops

Vienna, 16 November 2017

Name	*Organisation*
Mr Jos Arts	Rijkswaterstaat (moderator)
Mr Martin Böhm	Austriatech
Mrs Andrea Faast	Chamber of Commerce Vienna (Wirtschaftskammer Wien)
Mr Tertius Hanekamp	Temah
Mr Simon Hartl	National Waterway Administration (viadonau)
Mr Rainer Müller	UIV Urban Innovation Vienna
Mr Vincent Neumayer	Wiener Linien
Mrs Petra Reiter	ASFiNAG (National Road Administration)
Mr Peter Rojko	Vienna Port Authority
Mr Jürgen Schrampf	ECONSULT Betriebsberatungsgesellschaft m.b.H.
Mr Gregory Telepak	City of Vienna – Department Urban Development and Planning (MA18)
Mr Josef Zitzler	Austrian Ministry for Transport, Innovation and Technology (BMVIT)
Mr Karl Zöchmeister	RailCargo Austria
Vital Nodes Organisation	
Mr Mitchell van Balen	Ecorys
Mr Daniel Franco	Rupprecht Consult
Mr Kevin van der Linden	Rijkswaterstaat
Mr Raymond Linssen	Rijkswaterstaat
Mr Ricardo Poppeliers	Ecorys

Vienna, 17 January 2018

Name	*Organisation*
Mr. Jos Arts	Rijkswaterstaat (moderator)
Mr. Gerhard Bogner	Railway Infrastructure Manager (ÖBB)
Mr. Martijn De Bruijn	Omgeving Vlaanderen
Mr. Roman Dangl	Regional Government of Lower Austria
Mr. Michael Fastenbauer	National Waterway Administration (ViaDonau)
Mr. Dieter Häusler	City of Vienna, Department Urban Development and Planning
Mr. Dieter Hintenaus	ASFINAG (National Road Administration)
Mr. Franz Jöchlinger	Vienna Airport
Mr. Wolfgang Khutter	City of Vienna, Environmental protection
Mr. Rainer Müller	UIV Urban Innovation Vienna
Mr. Vincent Neumayer	Wiener Linien
Mr. Christian Obermayer	Railway Infrastructure Manager (ÖBB)
Mr. Martin Posset	Thinkport Vienna
Ms. Petra Reiter	ASFINAG (National Road Administration)
Mr. Michael Rosenberger	City of Vienna, Department Urban Development and Planning
Ms. Petra Schaner	UIV Urban Innovation Vienna
Mr. Gerald Tranz	UIV Urban Innovation Vienna
Mr. Josef Zitzler	Austrian Ministry for Transport, Innovation and Technology (BMVIT)
Mr. Karl Zöchmeister	RailCargo Austria
Vital Nodes Organisation	
Mr. Kevin van der Linden	Rijkswaterstaat
Mr. Raymond Linssen	Rijkswaterstaat
Mr. Ricardo Poppeliers	Ecorys

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

Rotterdam, 29 March 2018

Name	*Organisation*
Dolf Booij	Gemeente Rotterdam – planologie
Donald Broekhuizen	Provincie Zuid-Holland
Frank Bus	Havenbedrijf Rotterdam
Aldo Dorsman	Gemeente Rotterdam - economie
Michel Duinmayer	Ministerie van Infrastructuur en Waterstaat
Martin Guit	Gemeente Rotterdam – verkeer en vervoer
Tertius Hanekamp	TEMAH (moderator)
Marco den Heijer	Gemeente Rotterdam - stadsontwikkeling
Igor Heller	Rijkswaterstaat
Arjan Hoefnagels	Havenbedrijf Rotterdam
Hans ten Hoeve	Ministerie van Binnenlandse zaken en Koninkrijksrelaties
Raymond van Keerberghen	Gemeente Rotterdam – verkeer en vervoer
Marlies Langbroek	Havenbedrijf Rotterdam
Ingrid van Leeuwen	Provincie Zuid-Holland
Coen Mekers	Provincie Gelderland (EGTC Rhine Alphine corridor)
Jasper Nagtegaal	Deltalinqs
Gert Jan Polhuijs	Gemeente Rotterdam – verkeer en vervoer
Einar Schuch	Trafikverket
Jan Top	Rijkswaterstaat
Kirsten Verbeek	ProRail
Joop Verdoorn	Havenbedrijf Rotterdam
Richard van der Wulp	Gemeente Rotterdam – verkeer en vervoer
Vital Nodes Organisation	
Onno de Jong	Ecorys
Kevin van der Linden	Rijkswaterstaat
Raymond Linssen	Rijkswaterstaat
Ricardo Poppeliers	Ecorys

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

Gothenburg, 12 April 2018

Name	*Organisation*
Patrik Benrick	Trafikverket, regional
Karin Björklind	Region Sjuhärad/Boråsregionen
Nicklas Blidberg	CLOSER
Michael Browne	University of Gothenburg, School of Economics
Alice Dahlstrand	Trafikverket, national
Jörgen Einarsson	City of Gothenburg - traffic planning
Johanna Ek-Pettersson	City of Gothenburg - traffic planning
Stefan Ekström	City of Gothenburg - real estate (Fastighetskontor)
Max Falk	Region Västra Götaland, Department of public transportation & infrastructure
Arvid Guthed	Gothenburg port authority
Joachim Karlgren	City of Gothenburg - traffic planning
John Nilsson	Swedavia, Landvetter Airport
Markus Ottemark	Chamber of Commerce
Staffan Sandberg	City of Gothenburg - traffic planning
Torbjörn Suneson	RM Landskap (Moderator)
Anna Wildt-Persson	Trafikverket (Moderator)
Per Wingqvist	City of Gothenburg - traffic planning
Henrik Yngve	City of Härryda
Henrik Zetterquist	Trafikverket, national
Vital Nodes Organisation	
Britt Doornekamp	Ecorys
Kevin van der Linden	Rijkswaterstaat
Steven Meijlof	Rijkswaterstaat
Ricardo Poppeliers	Ecorys

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

Budapest, 3 May 2018

Name	*Organisation*
Orsolya Béres	Mobilissimus Kft.
Tamás Bíró	National Government/NFM/Ministery of National Development
Balász Fejes	BKK - Mobility Strategy - Strategy and Innovation
Soóki-Tóth Gábor	Budapest Airport Region Cluster / Városfejlesztés21
Viktor Győri	Municipality of the City of Budapest Mayor's Office Department of Urban Planning
Dávid Hentz	Belváros-Lipótváros Városfejlesztő Kft
Valler Imre	Budapest Közút
Hunyadi István	XVIII. District
László Sándor Kerényi	BKK - Mobility Strategy - Strategy and Innovation
Dóra Kókai	Municipality of Budapest
Berzlánovich Krisztián	Budapest Közút
Máté Lénárt	BKK - Mobility Strategy - Strategy and Innovation
Edit Nemes-Imricskó	Eurodite
Judit Sánta	Municipality of the City of Budapest Mayor's Office Department of Urban Planning
Hanna Szernzo	MRI
Joep de Roo	Eurodite (moderator)
Kilián Zsolt	Hajtás Pajtás Kft. / freelancer
Vital Nodes Organisation	
Onno de Jong	Ecorys
Kevin van der Linden	Rijkswaterstaat
Raymond Linssen	Rijkswaterstaat

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Hamburg, 30 May 2018

Name	*Organisation*
Mrs Susanne Böhler	Rupprecht Consult – Forschung & Beratung GmbH
Mr Stefan Breitenbach	Hafen Hamburg Marketing (HHM) – Leiter Projektleitung
Mr Tomas Holmlund	Trafikverket – Swedish Transport Administration
Mr Jan Ninnemann	HSBA Hamburg School of Business Administration – Studiengangsleister Logistics Management
Mr Sicco Rah	Freie und Hansestadt Hamburg, Behörde für Wirtschaft, Verkehr und Innovation (BWVI) – Verkehrspolitik
Mr Carsten Schürmann	Transport Consulting Partners (TCP) – MORO Project
Mrs Dana Vornhagen	Freie und Hansestadt Hamburg, Behörde für Wirtschaft, Verkehr und Innovation (BWVI) – Verkehrspolitik
Mrs Tina Wagner	Freie und Hansestadt Hamburg, Behörde für Wirtschaft, Verkehr und Innovation (BWVI) - Verkehrsentwicklung
Vital Nodes Organisation	
Mrs Britt Doornekamp	Ecorys
Mr Kevin van der Linden	Rijkswaterstaat
Mr Raymond Linssen	Rijkswaterstaat
Mr Ricardo Poppeliers	Ecorys

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Genova, 12 June 2018

Name	*Organisation*
Mrs Margherita Marre Brunenghi	Regione Liguria – Economic Development Department
Mrs Sara Canevello	IIC
Mrs Silvia Capurro	Comune di Genova - Port and Sea Department (Director)
Mr Paolo Castiglieri	Comune di Genova – Planning and International Project Department
Mr Giorgio Conforti	Confindustria Genova
Mrs Ilaria Delponte	Genoa's University – Logistics Transport and Infrastructures Center
Mrs Tiziana Delmastro	Siti Polito - Higher institute on territorial Systems for Innovation
Mr Roberto Ferrazza	Infrastructure and Transport Ministry - Provveditore Opere Pubbliche Liguria, Piemonte, Valle d'Aosta
Mrs Monica Garibaldi	IIC
Mrs Hanne van Gils	Omgeving Vlaanderen
Mrs Laura Ghio	Western Liguria Sea Port Authority – Ports of Genoa
Mrs Prisca Haemers	Rijkswaterstaat (moderator)
Mr Giancarlo Laguzzi	Associazione FerCargo
Mrs Alessandra Maestro	Comune di Genova, Port and Sea Department
Mr Enrico Melloni	Mercitalia Rail (national railway freight operator)
Mr Guido Nicolini	Assofer - Association of intermodal freight transport operators)
Mrs Noriko Otsuka	ILS (Institut für Landes- und Stadtentwicklungsforschung gGmbH)
Mr Francesco Pellegrino	Comune di Genova – Transport Department
Mrs Nicoletta Poleggi	Comune di Genova, Port and Sea Department
Mr Alberto Pozzobon	Ports of Genoa
Mr Pier Giuseppe Naso Rappis	IIC
Mr Jacopo Riccardi	Regione Liguria – Infrastructure and Transport Department
Mrs Iolanda Romano	Infrastructure and Transport Ministry - Governement Commissioner for "Terzo Valico" realisation
Mr Antonio Rossa	Comune di Genova – Transport Department
Mr Alberto Selleri	Autostrade per l'Italia
Mr Marco Toccafondi	RFI – Rete Ferroviaria Italiana
Mrs Ilaria Tosoni	Politecnico di Milano, Dipartimento di Architettura e Studi Urbani
Vital Nodes Organisation	
Mr Kevin van der Linden	Rijkswaterstaat
Mr Raymond Linssen	Rijkswaterstaat
Mr Ricardo Poppeliers	Ecorys

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Turku, 20 June 2018

Name	*Stakeholder/organization*
Juha Aaltonen	Finavia
Kirsi Ahlman	Centrum Balticum
Björn Grönholm	UBC - Union of the Baltic Cities
Magnus Gustafsson	Åbo Akademi (PBI)
Tiina Heinikainen	Silkkitie
Lotten Herrman	Trafikverket
Samu Hirvonen	Posti
Lassi Hilska	LVM
Timo Hintsanen	Urban research
Ari Hurme	Matkahuolto
Martti Husu	Silkkitie
Niko Kyynäräinen	City of Turku / Science Park
Kaisa Leiwo	Turku Chamber of Commerce
Hanna Lindholm	Centre for Economic Development, Transport and the Environment in Southwest Finland
Jaakko Nirhamo	Port of Turku
Sampo Ruoppila	Urban research
Heikki Saarento	Regional Council of Southwest Finland
Seppo Serola	Finnish Transport Agency
Tero Siitonen	SKAL - Länsi-Suomen Kuljetusyrittäjät ry
Mari Sinn	Regional Council of Southwest Finland
Anna-Mari Sopenlehto-Jokinen	City of Turku - 6aika
Jonas Spohr	Åbo Akademi
Arto Tevajärvi	Finnish Transport Agency
Mira Tuominen	PBI
Marjo Uotila	Turku City and Northern Growth Zone
Risto Veivo	City development group, urban planning, city of Turku
Jussi Vira	City of Turku
Kim Wikström	Åbo Akademi (PBI)
Vital Nodes Consortium	
Britt Doornekamp	Ecorys
Kevin van der Linden	Rijkswaterstaat
Raymond Linssen	Rijkswaterstaat
Ricardo Poppeliers	Ecorys

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Strasbourg, 27 June 2018

Name	*Stakeholder/organization*
Mr Antoine BEYER	Université de Cergy-Pointoise
Mr Julien BOURSIER	SYVIL
Mr Romuald DELEMER	DB Schenker
Mrs Emilie GRAVIER	Port autonome de Strasbourg
Mr Norbert KRIEDEL	CCNR (Central Commission for the Navigation of the Rhine)
Mrs Delphine KRIEGER	Eurométropole de Strasbourg
Mr Hervé KRIEGER	Eurométropole de Strasbourg
Mr David LOMBARD	DREAL (Direction régionale de l'environnement, de l'aménagement et du logement)
Mr Nicolas BOIDEVIZI	DREAL (Direction régionale de l'environnement, de l'aménagement et du logement)
Mrs Alexia MEYER	BD Schenker
Mrs Céline OPPENHAUSER	Eurométropole de Strasbourg
Mrs Marion PEREZ-LAUGEL	Eurométropole de Strasbourg
Mrs Laure THIBAULT	Région Grand Est
Mr Manfred RAUSCH	Port autonome de Strasbourg
Mrs Catherine TRAUTMANN	Port autonome de Strasbourg
Mr Norbert KRIEDEL	CCNR - Commission Centrale pour la navigation sur le Rhin
Vital Nodes Consortium	
Mrs Melanie LEROY	EUROCITIES
Mr Kevin VAN DER LINDEN	Rijkswaterstaat
Mr Raymond LINSSEN	Rijkswaterstaat
Mr Jochen MAES	Ecorys

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Mannheim, 11 July 2018

Name	*Stakeholder/organization*
Mr Christian Specht	Stadt Mannheim
Mr Alexandre Hofen-Stein	Stadt Mannheim
Mr Georg Pins	Stadt Mannheim
Mrs Melanie von Castell	Hafen Mannheim
Mr Thomas Satzinger	Verband Region Rhein-Neckar
Mr Michael Schröder	DHWB Mannheim
Mr Jörg Saalbach	EGTC (also part of the Vital Nodes consortium)
Mr Eberhard	BASF
Mrs Dagmar Bross	Industrie und Handelskammer
Vital Nodes Consortium	
Mr Raymond Linssen	Rijkswaterstaat
Mr Kevin van der Linden	Rijkswaterstaat
Mr Steven Meijlof	Rijkswaterstaat
Mr Onno de Jong	Ecorys
Mr Michel Arnd	Polis

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