Toolbox

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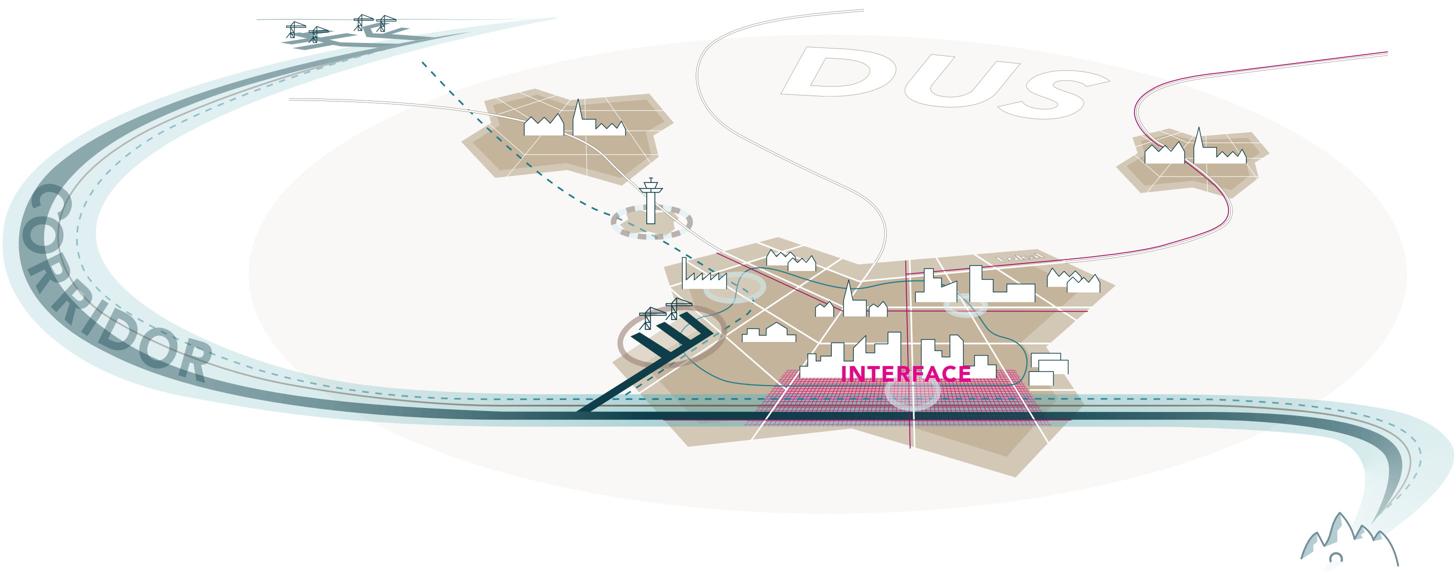

SPINdesign

SPace and INfrastructure design

Toolbox for collaborative planning

a research project of the cross-border funded joint research programme
CEDR Call 2017: Collaborative Planning

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Content

1. Introduction

National Road Authorities (NRAs) are responsible for the performance of major road networks for transport of people and freight. These authorities face fundamental challenges in their efforts to improve the robustness and connectivity of their networks. NRA's are confronted with global trends such as urbanization, regional empowerment, the rising domination of e-commerce, innovative mobility and logistical concepts, circular economies and a growing importance of sustainability, health and living quality. These trends emphasize the interrelatedness of the networks of NRA's with other parts of the transport system and with surrounding areas.

A specific challenge for NRAs is the performance of their networks in urban regions. In these areas the mobility flows of corridor traffic, regional traffic and local traffic interfere. Here the infrastructure networks of NRAs have to accomodate (inter)national, regional and local traffic flows. These combined traffic flows cause many problems in these areas, such as traffic jams, delayed public transport and freight flows, environmental damage, spatial conflicts as well as health issues.

In order to deal with a rapidly changing context and to enhance the organization of transportation at the intersection of corridor and last mile traffic, NRAs require a shift towards a **collaborative planning approach**: stakeholders in the field of infrastructure, mobility and spatial planning, all from different spatial scales, develop in in a collaborative process an integrated approach in order to optimize the performance of the transport networks and its spatial surroundings.

The objective of the SPINdesign project is to provide NRAs and other planning authorities a toolbox that helps optimizing the multi-modal performance of the transport system in the urban region. Through the development of a vision on design principles, stakeholders can build their own tailor-made design and planning processes.

2. Context

Transportation systems are the means to transport goods and people though space. It is a layered system that consist of networks at various scales. In order to build a sustainable and efficient system, connections between these different scales must be improved and combined with wider spatial developments.

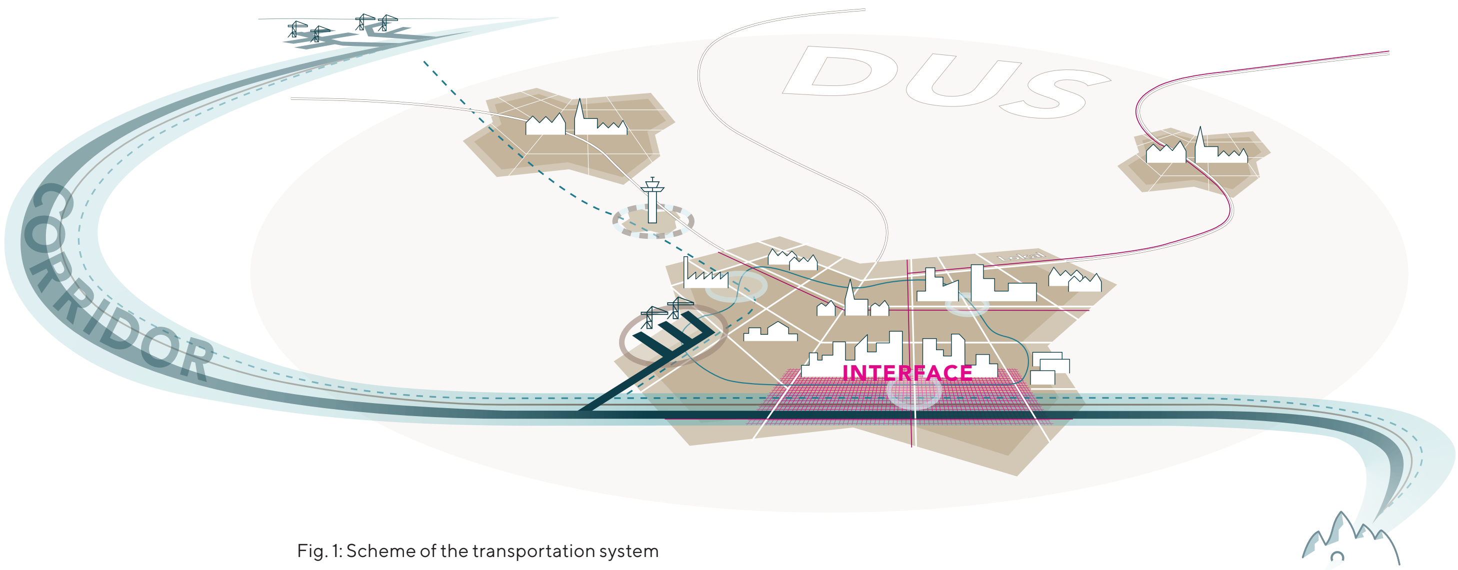


Fig. 1: Scheme of the transportation system

Spatial scales

The space and infrastructure (SPIN) system (Fig. 1) consists of three scales. The supra-regional corridor, the daily urban system (DUS) and the sub-regional last mile level. The corridor carries the long-distance transport of peolple and goods. Distinctive for the corridor is its large scale, the (inter)national flows of transport as well as high speed and capacity. Freight transport plays an important role at the corridor level. The DUS refers to the regional level around urban cores (high density areas) in which the majority of daily person trips (for work, shopping, leisure etc.) take place. The last mile level is characterised by small scale networks within cities, low speeds, smaller flows of transit aimed at the dispersion of traffic.

The interface

The interface is the area, where the (trans)national transport and local transportation ('last mile') intersect. Conflicts in the Daily Urban System flows are most pressing at the interface. At the same time, the potential socio-economic benefits of well-planned and managed infrastructure and spatial development are the highest. The interface contains the following properties:

- Massive transport infrastructures, mostly for different modes
- Corridor traffic and large amounts of regional and local traffic competing for the same infrastructure
- Part of an urban context
- Challenges due to high levels of air and noise pollution as well as issues concerning accessibility and the effect of infrastructure as a spatial barrier

Mobility is central to our society´s economic prosperity and the well-being of the individual. However, negative externalitites are also part of the transportation and accumulate in the area of the interace. Since interfaces are often located in urban context, many people are affected by the negative externalities. Furthermore, since interfaces are connected through their corridor links to distant areas, their malfunctioning can be an issue for the whole corridor. Therefore, the planning, designing and organisation of interfaces is highly complex and requires stakeholders to consider both the corridor level as well as the lower scales when taking actions. Furthermore, the spatial context of the transport system must also be included.

3. The clover scheme

A central scheme for the SPINdesign Toolbox is the „clover scheme". This scheme consists of four leaves, representing the four dimensions that are relevant for collaborative planning at the interface: infrastructure, space, nodes and mobility. The clover scheme will be applied in two ways:

- to make a SWOT analysis of the interface in a specific area
- to position the different measures for improving the interface.

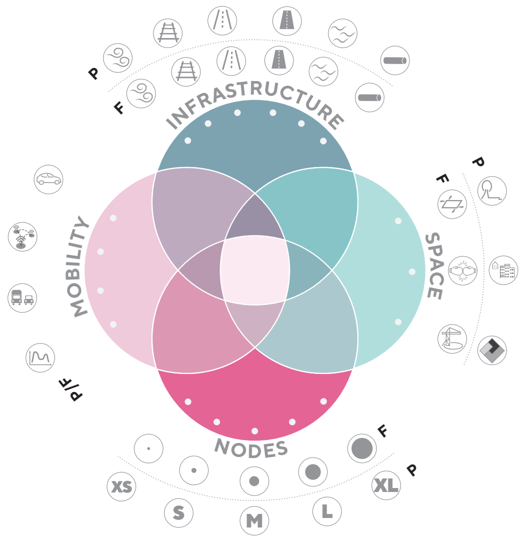


Fig. 2: The clover scheme

The dimensions

INFRASTRUCTURE

The physical links of the transport system. Infrastructure enables the transport of goods and people through space.

SPACE

The spatial locations that physically surround the infrastructure. Furthermore, space also incorporates all of the surrounding landscape of transport systems.

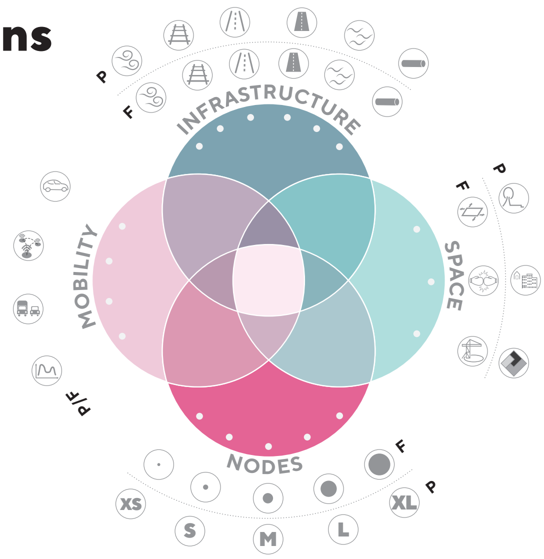
NODE

The locations where networks connect to each other, where persons and goods leave and enter the network or change modality. A node in freight transport is called terminal, a node in passenger transport is called hub.

MOBILITY

In contrast to the previously described "hardware" of the transport system, mobility represents the "software". It stands for the use of the transport system.

Aspects of the dimensions



INFRASTRUCTURE

Passenger transport (P)

- Public transportation by air
- Railway for public transport purpose
- Road infrastructure for public transport or motorized individual transport
- Biking infrastructure
- Waterways for private or public transport of people.
- Hyperloop system

Freight transport (F)

- Freight transportation by air
- Railway for freight transport
- Road infrastructure for the movement of goods
- Infrastructure for cargo biking
- Waterways for feright transport
- Pipeline system

MOBILITY

- Share of individual car traffic
- Share of freight and passenger traffic
- Propagation of smart systems
- Spread of traffic over time

NODE

Passenger transport (P)

- XS — Private homes as mobility station with storage for bikes and/or electrical charging stations
- S — HUB with bike sharing or parking facilities, as well as public transport facilities on a local level
- M — HUB with bike sharing or parking facilities, P&R and public transport facilities on a regional level
- L — Features of M-HUBs with connections on a national level
- XL — Features of L-HUBs plus long distance transport on corridor level

Freight transport (F)

- City distribution terminal, for example parcel lockers.
- Urban consolidation centers : logistic nodes for transfer to city distribution vehicles
- Regional distribution center: consolidation of larger incoming /outgoing trade avolumes - often in combination with a change in mode.
- Freight village: intermodal distribution centers with supporting services.
- Inland ports: handling of different types of freight (bulk and containers) and offer „value added servics" such as custom-services.

SPACE

Passenger transport (P)

- Quality of public space
- Built up density
- Mix of uses

Freight transport (F)

- Possibility to expand
- Competition of uses for freight/logistic spaces
- Availability of turn over space

4. Toolbox

Introduction

The SPINdesign toolbox supports infrastructure- and spatial planners in initiating an integrated (multimodal, spatial, broad scope) and collaborative (multi actor) approach. The toolbox for collaborative planning contains tools to optimize the use of multi-modal infrastructure and spatial development at the interface. It can be used in specific contexts and will help to collaborate with different authorities and other parties involved.

The Toolbox consists of 3 tools. Each tool is to be applied in a specific stage of the collaborative planning process for the interface. This is being shown in the process scheme figure 3):

Diagnosis

- The first step in the process consists of a SWOT analysis of the interface. A questionnaire can be filled out by the different stakeholders who are involved in the collaborative processs.

Measures

- The results of the inventory serve as a basis for the next step in the process: determining the measures to improve the performance of the transport networks and the surrounding at the interface. This is done in one or more workshops with different stakeholders. The measures can be seen as the ingredients for a strategy. The combination of measures is a strategy: a custom made recipe, suited for the specific needs and contexts at the interface.

Implementation strategies

- The third phase of the process focusses on how to implement the strategy for the interface. The best suited governance strategy depends very much on the local planning culture. The SPINdesign toolbox provides an overview of different kind of governance strategies.

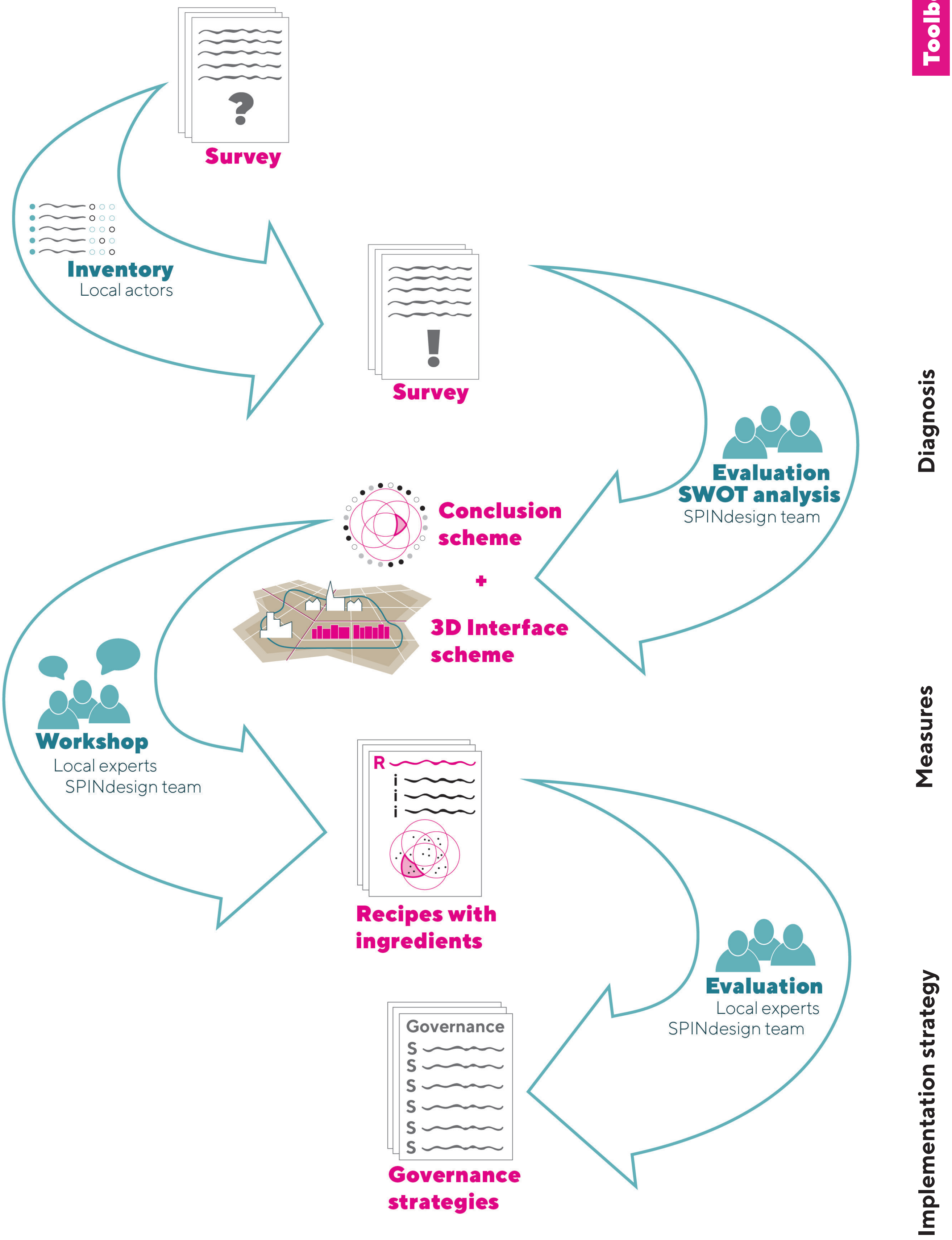


Fig. 3: Process scheme

SWOT analysis

The SWOT analysis is conducted on the basis of a comprehensive inventory of the interface. The aim of the inventory is to understand strengths, weaknesses, opportunities and threats of the interface. For the inventory a questionnaire is available that can be filled out by the stakeholders of the collaborative planning process at the inteface.

Strength
Advantageous features inherent to the interface in the present situation.

Weakness
Disadvantageous characteristics inherent to the interface in the present situation.

Opportunity
External factors that can positively enforce the funtioning of the interface.

Threat
External factors that can have a negative impact on the interface.

The questionnaire has three parts. First, the spatial dimension of the interface has to be demarcated on a map. Second, opportunities and threats have to be listed in keywords. Third, a checklist concerning the aspects of the interface has to be filled out.

An analysis and evaluation of the inventory can be consolidated in a strengths and weaknesses „clover scheme". Together with the listed opportunities and threats, a SWOT analysis is the final result.

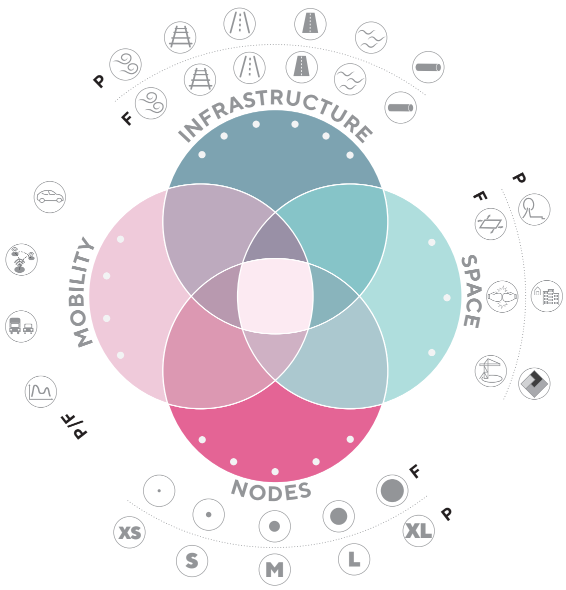


Fig. 4: „Clover scheme" for the inventory

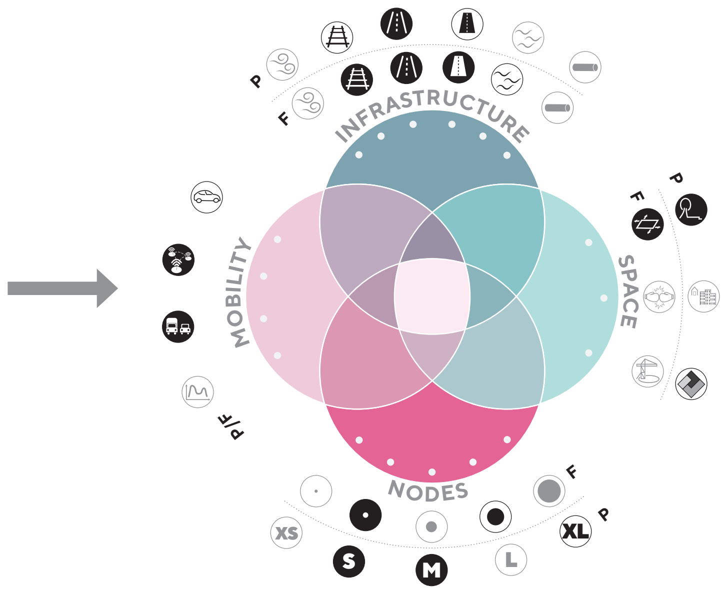


Fig. 5: Strengths (white) and weaknesses (black) „clover scheme"

The outcomes of the inventory can be used to make a map, visualizing the major issues at the interface. These issues can concern spatial developments, infrastructure and mobility challenges for person and freight transport as well as issues for different kind of nodes. Both the summarising „clover scheme" as the spatial visualisation of the interface will be used as a basis for the workshop session with the stakeholders.

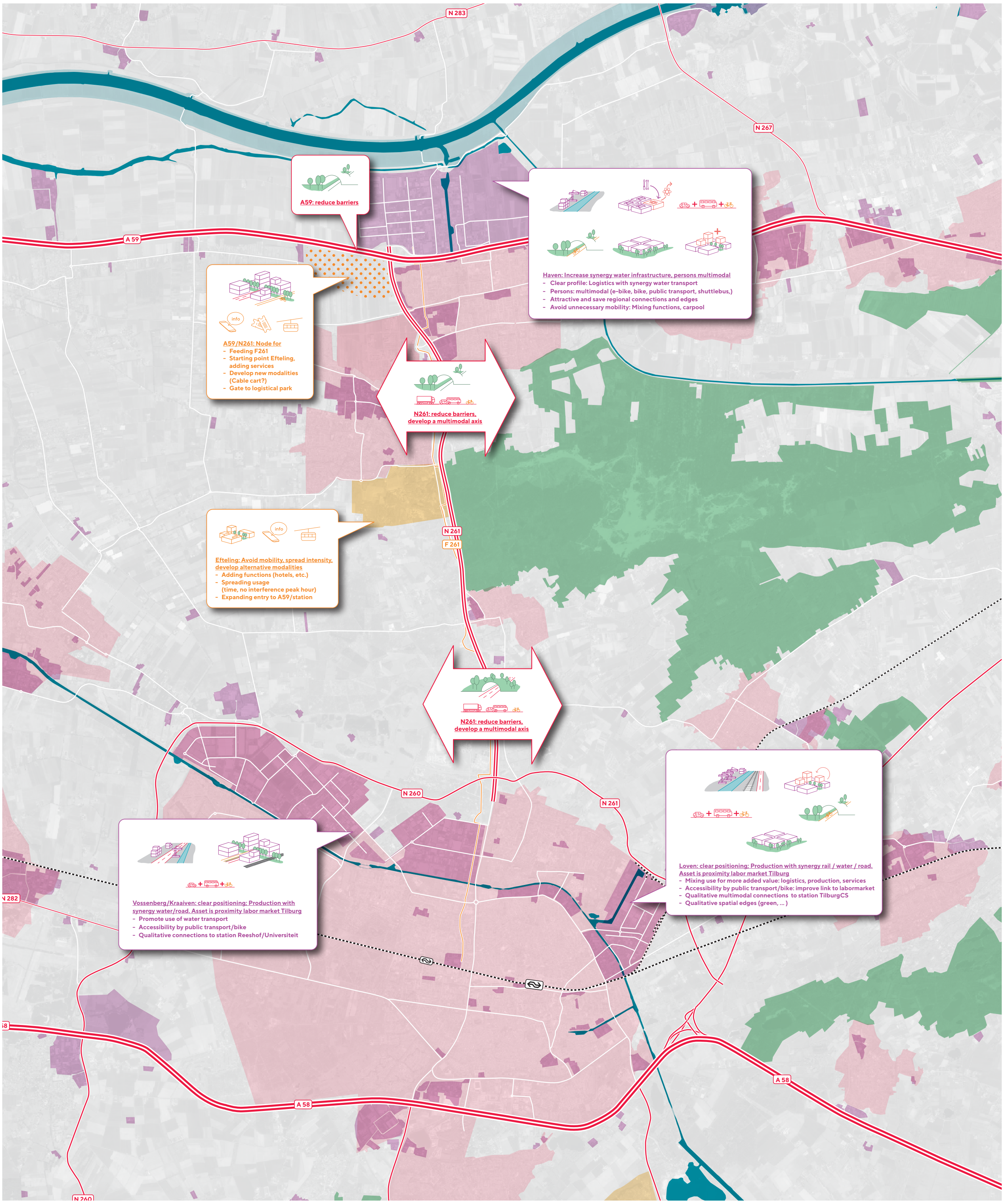
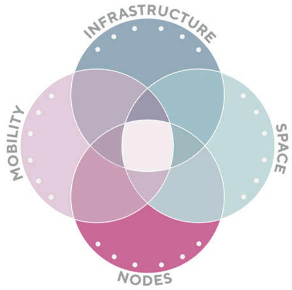


Fig. 6: Zoom-in of the inventory map of the interface Tilburg - Waalwijk

Ingredients

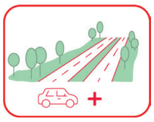
An inventory of good practises (SPINdesign report Good Practise Study) has been used to make an abstraction of principles for the integration of multi-modal infrastructure and spatial development at the level of the interface. The ingredients are measures that can refer to:

- 4 dimensions: infrastructure, space, nodes and mobility
- different scale levels: corridor, regional, local
- freight and/or person transport



INFRASTRUCTURE

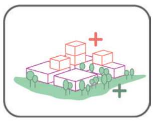
Transform infrastructure
Changing the function of 'old' infrastructure to another kind of infrastructure at the same location



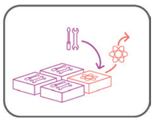
Expand infrastructure
Creating extra capacity by expanding existing networks (additional routes or adding missing links)

Add infrastructure
Stands for realizing a new physical, sustainable transport infrastructure that complements the existing infrastructure network

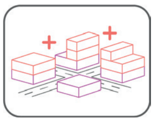
SPACE



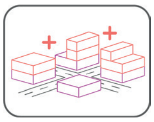
Mixing / Adding functions
Adding new uses to uni-sectoral areas in order to convert them into mixed use areas



Clustering / changing functions
Clustering same functions at same site / Replacing functions to more logic locations: 'the right function on the right location'

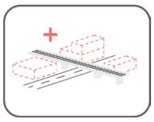


Increase density
Densification of the build area and thus densify the amounts of people or goods in the direct environment of a hub / terminal

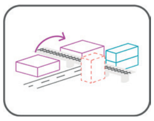


Remove bariers
Removing barriers through a better spatial configuration

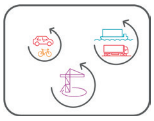
NODES



Add a hub / terminal
Adding a new transfer point to the network



Improving a hub / terminal
Improve the internal organization of a hub / terminal

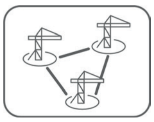


Specialization of hubs
Creating clear hub profiles, that fits the hubs location in order to avoid inefficient transport flows

MOBILITY

Information services

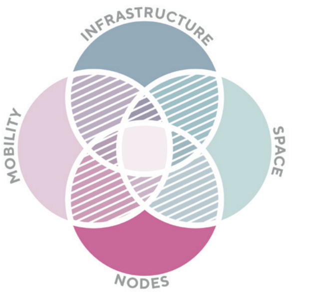
xxxx



Sharing facilities

xxxx

Recipes



The good practice studies can be positioned in the clover scheme. Figure 7 shows that good practices are rarely positioned within only one dimension. The positioning of the good practices in overlapping areas of the dimensions demonstrates that the good practises consist of a series of measures, requiring a collaborative planning approach. We call these combination of measures (ingredients) a recipe. Recipes can be tallor suited to the specific cultural and planning context at the interface.

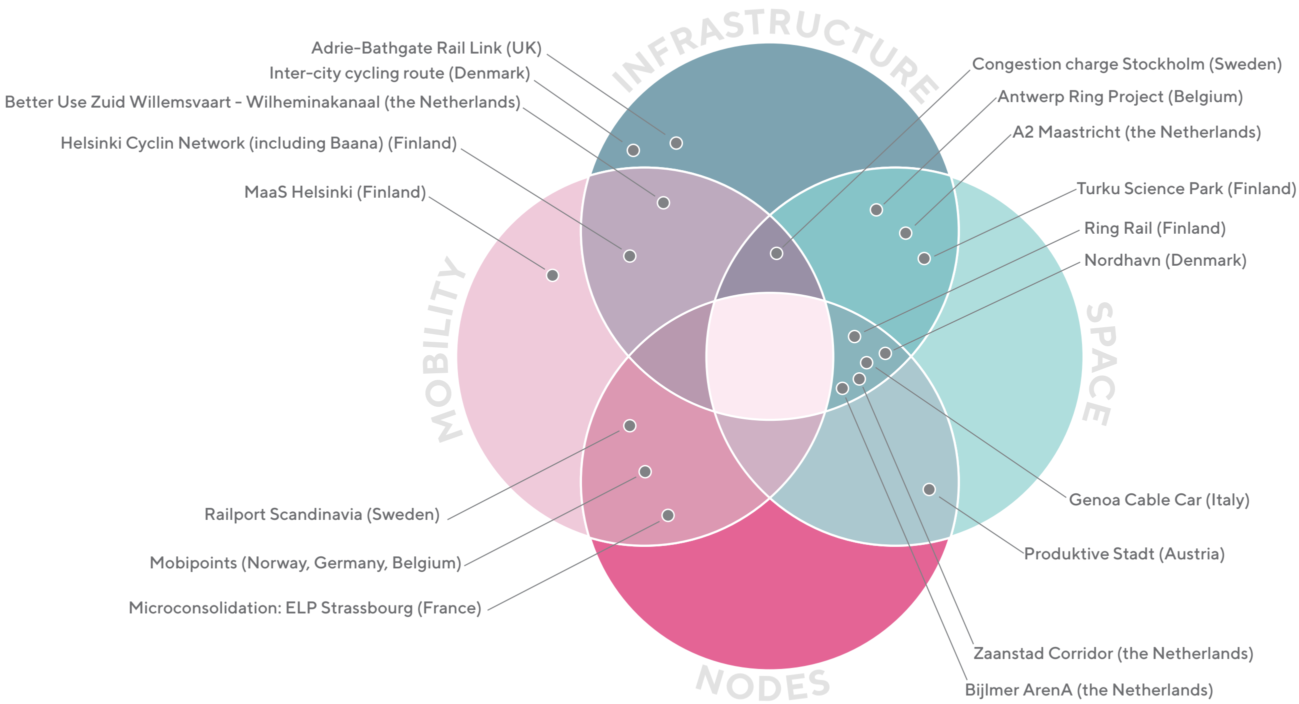


Fig. 7: Good practice studies in the clover scheme

Governance strategies

Policy
- Comprehensive regional approach
- Combining ingredients (infrastructure, mobility, nodes, spatial context)
- Determining key priorities (political)
- Multimodal studies
- Intersectoral coordination (urban design, economics, mobility)

Coalition building
- Public-private cooperation: Smart deals/convenants between public and private sector
- Public-public cooperation
- Multilevel governance
- Local stakeholder consortium/coalitions
- Participation of the local communcity

Collaboration
- Building public support
- Data-sharing
- Building trust
- Knowledge exchange
- Informal planning
- Independent quality teams/expert
- Coordination agents / boundary spanners
- Shared action plans/joint ambitions documents

Financing / contracting
- Value capturing (in the contract)
- Co-funding (public-public/public private)
- Taxation (of mobility)
- Sufficient funds

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5. Toolbox applied

Interface Tilburg - Waalwijk, The Netherlands

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Interface Linz, Austria

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6. Annex

Inventory: Pilots SPINdesign

The aim of this interactive survey is a comprehensive inventory of the interface. The basis of the inventory is the so-called „clover scheme". The „clover scheme" comprises four dimensions: infrastructure, space, nodes and mobility. All four dimensions consist of different aspects, both for freight and passenger transport.

The inventory has three parts. First, the spatial extent of the interface has to be located on a map. Second, opportunities and threats have to be listed in keywords. Third, a checklist concerning the aspects of the interface has to be filled out.

Based on the filled out inventory, the SPINdesign team analyses the findings and summarises them in a SWOT „clover scheme" and a spatial visualisation. They serve as a basis for the upcoming pilot sessions.

SWOT analysis

Strength
Advantageous features inherent to the interface in the present situation.

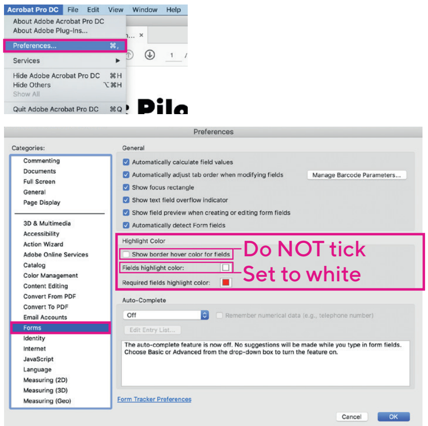
Weakness
Disadvantageous characteristics inherent to the interface in the present situation.

Opportunity
External factors that can positively enforce the funtioning of the interface.

Threat
External factors that can have a negative impact on the interface.

Instruction

1. Change the settings in Adobe Acrobat as shown below in order to guarantee an appropriate display of the document.



2. Familiarise yourself with the terminology of the interface, the four dimensions of the „**clover scheme**" and their aspects for passenger and freight transport (p. 2 & 4-5).

3. Write down the **name of the interface** (p. 3).

Name of the interface

4. Mark the **area(s) of the interface** on the map (p. 3).

5. Describe in keywords what **opportunities** and **threats** are relevant on the interface (p. 3).

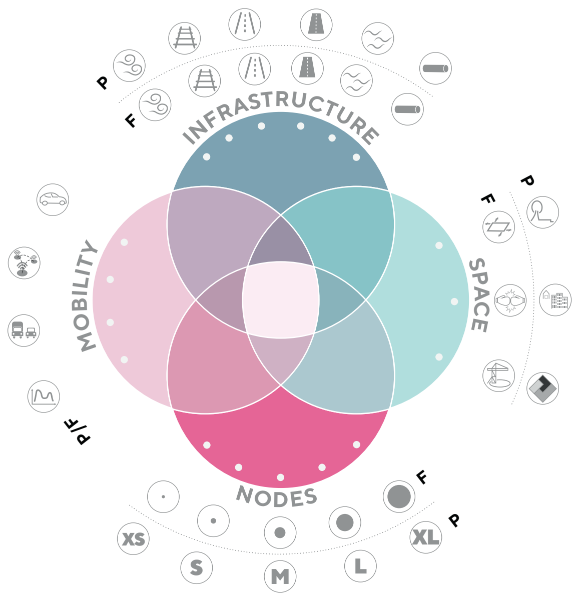
6. Fill out the checklist for the **aspects** of the four dimensions (p. 4 & 5).

7. When finished, **return** the survey to the SPINdesign team via mail: mail@must.eu.
If possible, the „return questionnaire" button below can be used to do so.

return questionnaire

Project terminology

Clover scheme



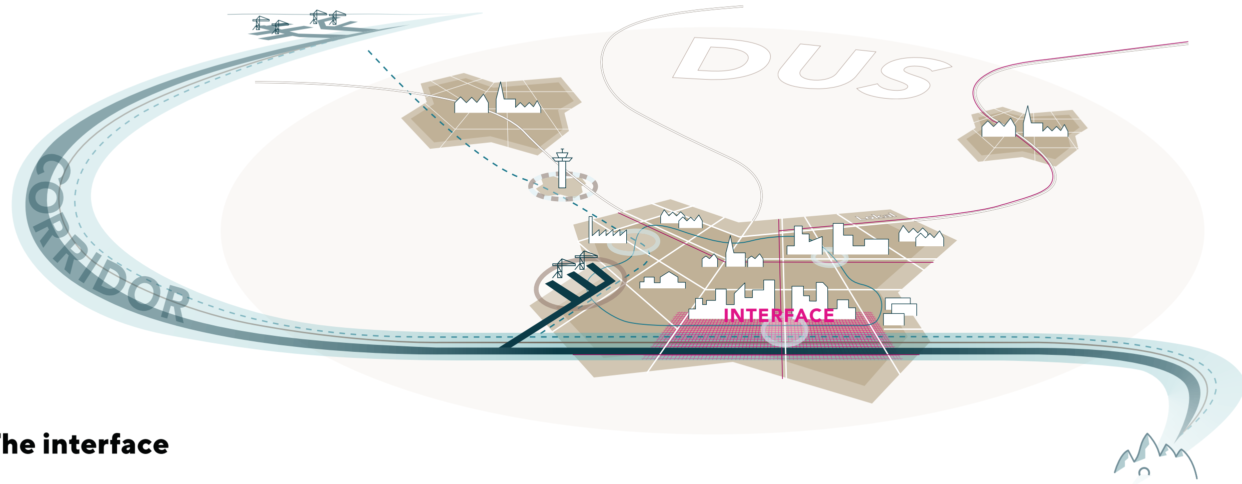
Dimensions of the „clover scheme"

INFRASTRUCTURE
The infrastructure is the physical manifestation of the transport system. It allows the transport goods and people through space.

SPACE
Space represents the places of origin or target destinations of transport movements. Furthermore, space also incorporates all of the surrounding landscape of transport systems.

NODES
Nodes link the infrastructures together and can be either uni-modal or multi-modal. A node in freight transport is called terminal, a node in passenger transport is called hub.

MOBILITY
In contrast to the previously described "hardware" of the transport system, mobility represents the "software". It stands for the manner as well as the degree of efficiency of the transport system.



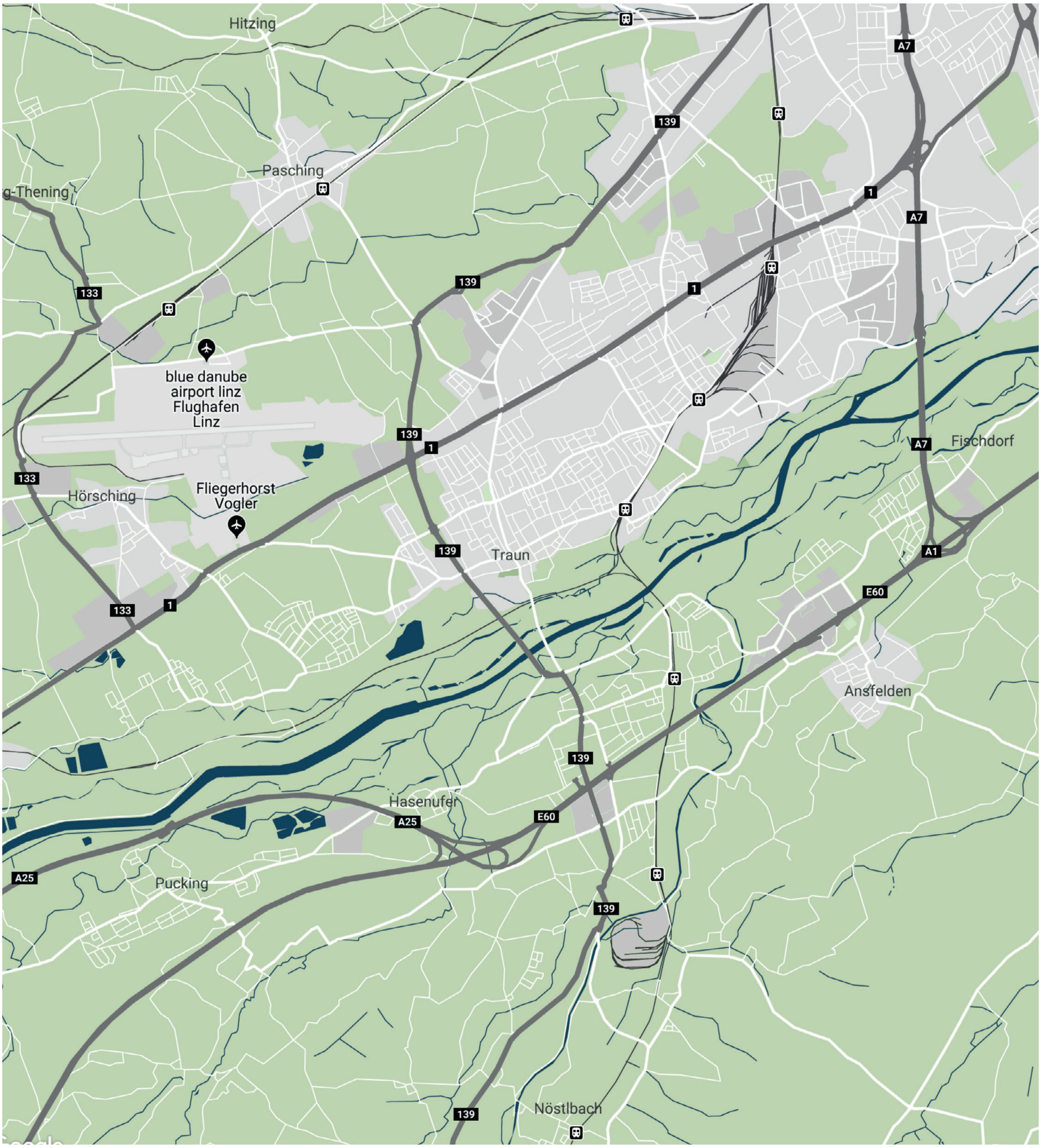
The interface

The interface is the area, where the corridor infrastructure and the regional Daily Urban System (DUS) intersect in a local situation. This complex overlap of transport infrastructure and transport flows from different levels of scale are characterised by the following properties:

- Massive transport infrastructures, mostly different modes
- Competition between corridor traffic and large amounts of regional and local traffic for the same infrastructure
- Part of an urban context
- Challenges due to high levels of air and noise pollution as well as issues concerning accessibility and the effect of infrastructure as spatial barrier

(2) SPINdesign

MAP of the interface



OPPORTUNITIES

THREATS

NODE

Passenger transport (P)

XS	Private homes as mobility station with storage for bikes and/or electrical charging stations	Yes	No
S	HUB with bike sharing or parking facilities, as well as public transport facilities on a local level	Yes	No
M	HUB with bike sharing or parking facilities, P&R and public transport facilities on a regional level	Yes	No
L	Features of M-HUBs with connections on a national level	Yes	No
XL	Features of L-HUBs plus long distance transport on corridor level	Yes	No

Freight transport (F)

City distribution terminal, for example parcel lockers.	Yes	No
Urban consolidation centers : logistic nodes for transfer to city distribution vehicles	Yes	No
Regional distribution center: consolidation of larger incoming /outgoing trade volumes - often in combination with a change in mode.	Yes	No
Freight village: intermodal distribution centers with supporting services.	Yes	No
Inland ports: handling of different types of freight (bulk and containers) and offer „value added servics" such as custom-services.	Yes	No

INFRASTRUCTURE

Passenger transport (P)

Public transportation by air	Yes	No
Railway for public transport purpose	Yes	No
Road infrastructure for public transport or motorized individual transport	Yes	No
Biking infrastructure	Yes	No
Waterways for private or public transport of people.	Yes	No
Hyperloop system	Yes	No

Freight transport (F)

Freight transportation by air	Yes	No
Railway for freight transport	Yes	No
Road infrastructure for the movement of goods	Yes	No
Infrastructure for cargo biking	Yes	No
Waterways for feright transport	Yes	No
Pipeline system	Yes	No

MOBILITY

Share of individual car traffic	Local:____%	Region:____%	Corridor:____%
Share of freight and passenger traffic	Freight:____%	Passenger:____%	
Propagation of smart systems	High	Medium	Low
Spread of traffic over time	High	Medium	Low

SPACE

Passenger transport (P)

Quality of public space	High	Medium	Low
Built up density	High	Medium	Low
Mix of uses	High	Medium	Low

Freight transport (F)

Possibility to expand	High	Medium	Low
Competition of uses for freight/logistic spaces	High	Medium	Low
Availability of turn over space	High	Medium	Low

Good Practise examples

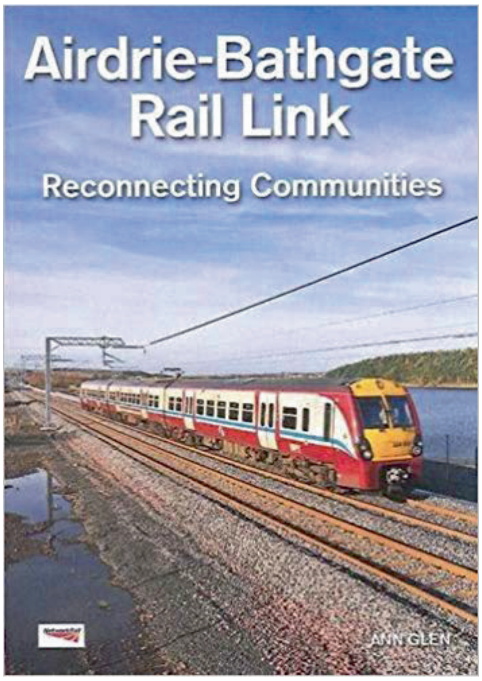
Airdrie-Bathgate Rail Link

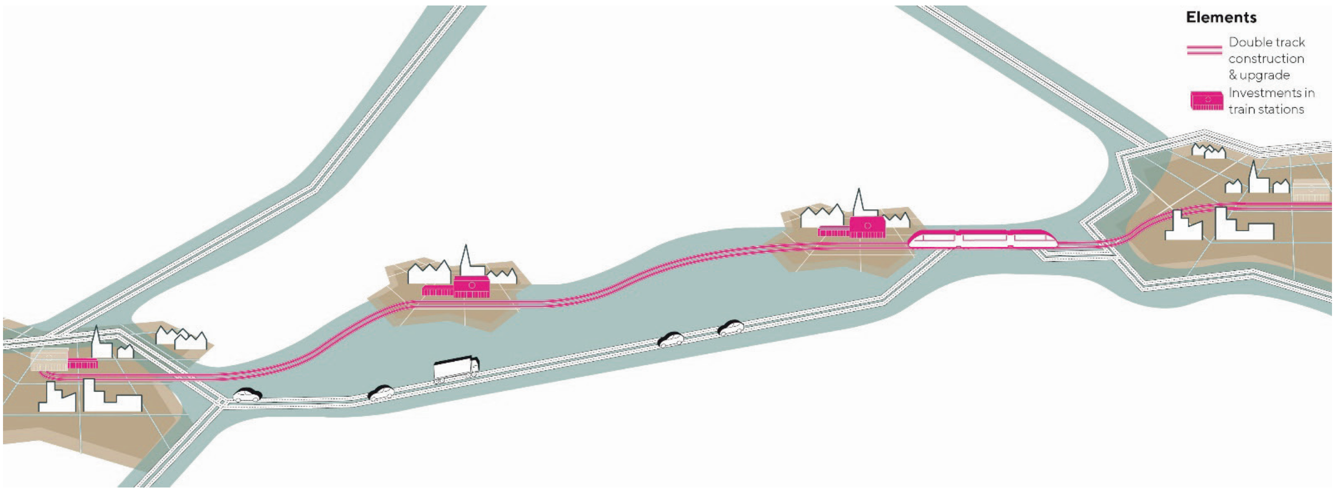
United Kingdom

Ingredients	Traffic type	Traffic scale
✓ Infrastructure	✓ Person	☐ Local
☐ Mobility	☐ Freight	✓ Regional
✓ Hubs/terminals		☐ Transit
☐ Spatial context		

Background

The Airdrie to Bathgate rail link improvement project originated from the Central Scotland Transport Corridor Study which was carried out from 2001 until 2003 to assess solutions for easing transport problems in central Scotland. One of its objectives was to offer a sustainable public transport alternative to the M8 between Glasgow and Edinburgh and therefore reduce road congestion. In 2003, the Scottish Ministers decided to introduce a 15 minute frequency rail service between Glasgow and Edinburgh, via Airdrie and Bathgate. The Airdrie to Bathgate Rail Link Improvement Project was created and became fully operational by May 2011, at a cost of £300 million. 2012 was the first calendar year of full services. One of the goals of the project was to assist enhancing social inclusion of the areas between Edinburgh and Glasgow (North-Lanakshire and West-Lothian).





Ingredients

The Airdrie-Bathgate rail link links several towns between the urban areas of Glasgow and Edinburgh to the rail systems of these cities. This was achieved through various **infrastructural works** and investments in train stations (**hubs**). The works included reopening 22km of closed route from Drumgelloch, near Airdrie, to Bathgate as an electrified, double track railway. A second track was constructed for 2km between Airdrie and Drumgelloch and for 10km between Bathgate and Newbridge Junction. The existing 26km between Bathgate and Haymarket East Junction was electrified.

The service was designed to deliver a double-track electrified railway with a nominal minimum design speed of 80mph, although where reasonably practical 90mph is the target speed. The line was intended to be capable of supporting a minimum operation of four passenger trains per hour in each direction using modern electric multiple unit rolling stock. On the eastern section of the line, the number of trains increased from 2 to 4 per hour, on the western sections from 4 to 6 trains per hour.

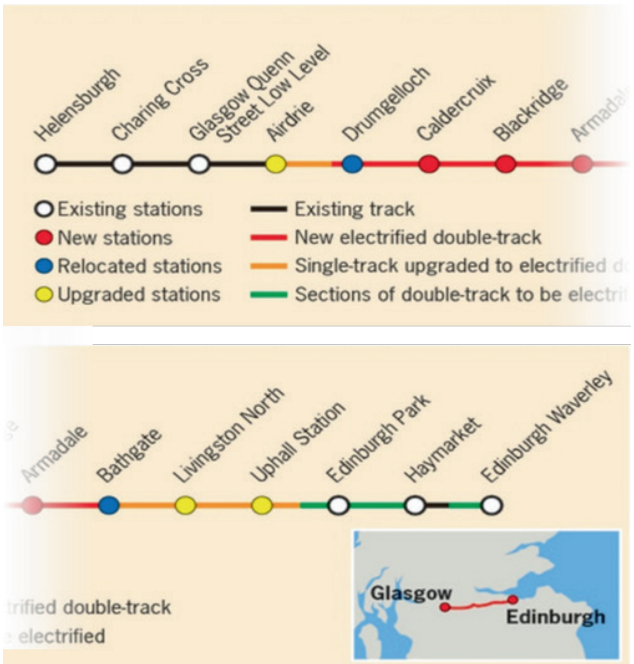
Success factors

(Re)construction of the Airdrie-Bathgate Rail Link started after a relatively short plan period. Catalyst for the project came from a key recommendation of the Central Scotland Transport Corridor Studies in 2002, which primarily focussed on examining trunk road links. However, the **multi-modal study** also championed championed several complimentary rail-based schemes, including the Aidrie-Bathgate link. On this basis, Scottish executive agreed to support the project and provide funding. The project became part of the Scottish Infrastructure Investment Plan, which made **large funds** available. In the plan the project is mentioned as a **key priority** for the Scottish Government. From that point a **strong and decisive planning process** was started. An important pillar of the process was the **participation of local communities**. Communities were invited to share ideas and concerns about implementation of the project. This has resulted in the realization of additional stations and relocation of startions to locations that better suit local spatial development.

Interface impacts

Transport impacts	Area impacts
☒ Connectivity	☐ Spatial quality
☒ Robustness	☒ Social quality
☐ …	☐ Environmental quality

By offering an additional form of transportation the effects of the Rail Link includes an expansion of the capacity of the transport system in the Glasgow-Edinburgh area and it allows for modal shift. Measured results include, for example, 31% mroe passengers at existing stations along the route (compared to 14% UK-avarage growth). With regard to social impact, impacts are not fully clear, but the rail inks is considered to provide an improved means of travel for more disadvantaged members of society and, as such, may improve accessibility and, more generally,assist in promoting social inclusion.



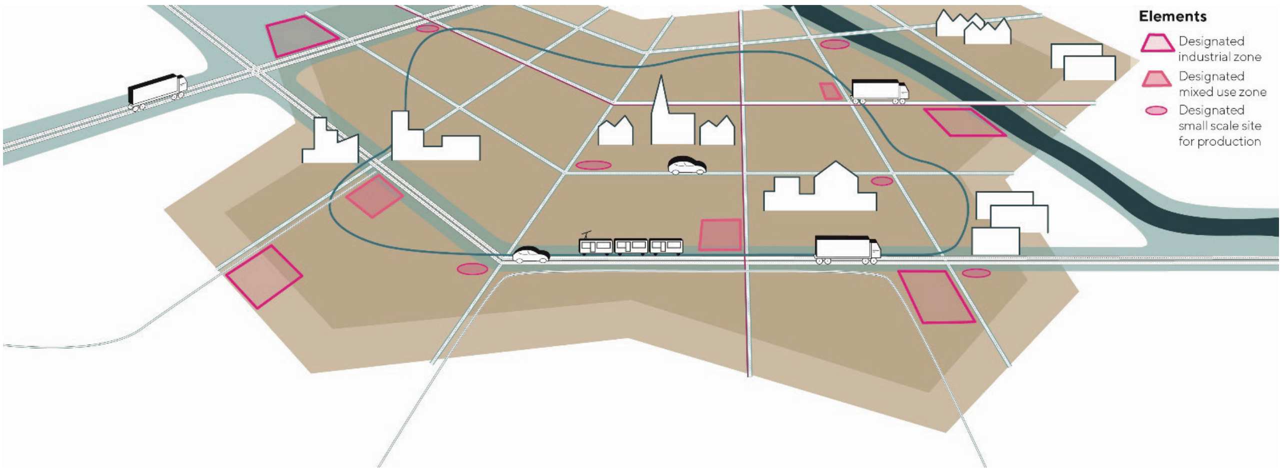
Produktive Stadt - Vienna

Austria

Ingredients	Traffic type	Traffic scale
☐ Infrastructure	✓ Person	✓ Local
☐ Mobility	✓ Freight	☐ Regional
✓ Hubs/terminals		☐ Transit
✓ Spatial context		

Background

The productive sector is one of the drivers of Vienna's economy. However, the sector lacks room to grow (and to keep up with population growth) within the city. In order to maintain it's position as a productive city Vienna has launched the 'Produktive Stadt'-strategy. The underlying concept of the strategy defines the conditions under which growth of different types of production locations is possible. This includes ideas about transportation, mobility and logistics in order to combine a liveability with economic growth. Under these conditions the city plans to add 300 ha of production space within the boundaries of the city. The strategy is branded as a paradigm change: from displacement to integration.



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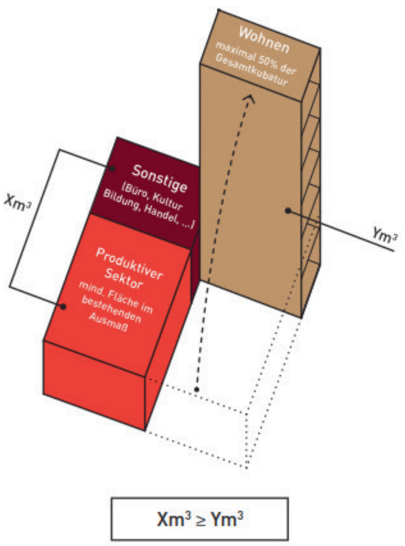
Ingredients

The Produktive Stadt-concept is primarily a **spatial strategy**. The central idea of the strategy is the designation of three types of production areas. The first type are the industrial zones. These zones are meant for large scale production businesses that have a big impact with regard to emmission, transportation etc. This type is developed in dedicated zones with good transport accessbility (not only road, also rail and water). However, attention is also paid to a mobility change for the staff. To encourage the use of public transport, the connections fo these zones to public transport networks are improved and attention is paid opportunities for biking and walking in the zones. The second type is mixed use production zones. In these zones production locations and housing are developed next to each other. These locations are centrally located and well-connected to public transport. The physical adjecency of living and working decreases the need for many local trips. A third type are a group of single small scale sites of production. Like the second type, these locations are offered new smart logistical concepts. The Produktive Stadt-strategy, for example, includes a city-wide plan for the development of large and small **hubs and depots**.



Success factors

The Produktive Stadt-strategy is part of Vienna's urban development policy. It is implemented as an **intersectoral cooperation** between the city's department of urban development and the department of economic development. This provides the city with a double opportunity to steer development: with economic incentives and by means of the designation of specific spatial zones.

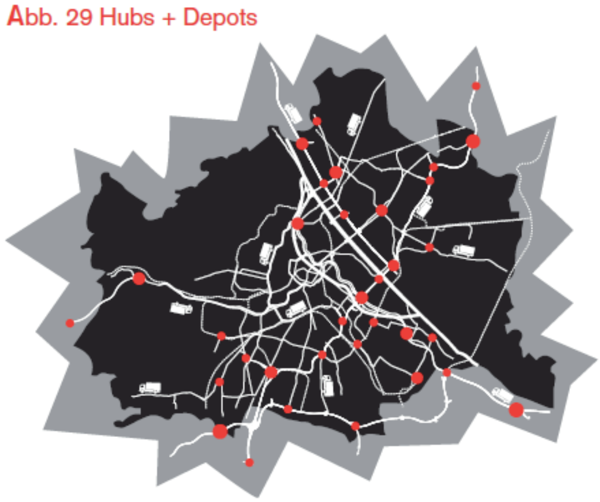
The underlying concept was development by the city of Vienna in close cooperation with industrial and economic interest groups (such as the chamber of commerce and the local business agency). This form of **public-private cooperation** ensures the societal support to the strategy.

Interface impacts

Transport impacts	Area impacts
☒ Connectivity	☒ Spatial quality
☒ Robustness	☒ Social quality
	☒ Environmental quality

The Produktive Stadt-strategy is a long-term project for Vienna. It is currently rolled. Various impacts on the interface may be expected from the strategy. Smart location choices in combination with improved public transport and innovations in smart logistics eventually enhance the robustness of the network as well as the connectivity within te city. Moreover, less urban (car) mobility may be expected to improve the spatial, social and environmental quality in the city.

Abb. 29 Hubs + Depots



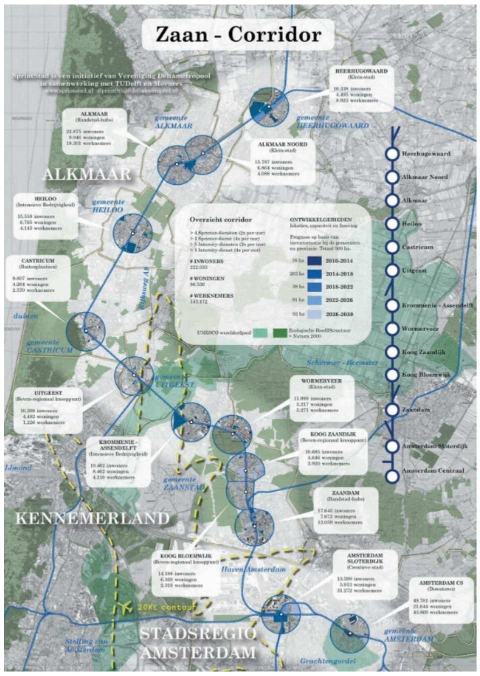
Zaanstad corridor

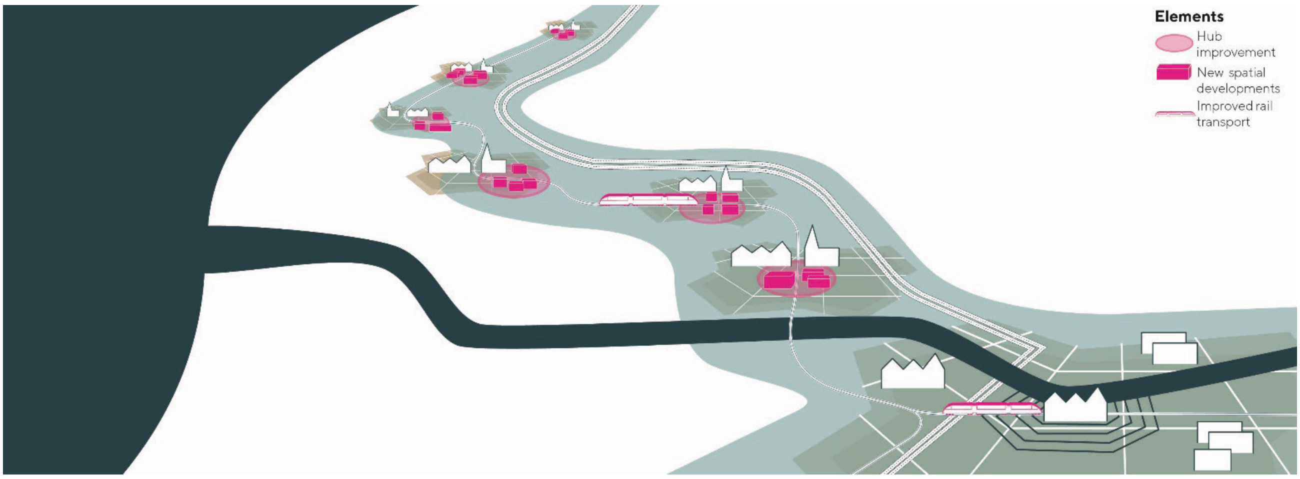
The Netherlands

Ingredients	Traffic type	Traffic scale
☐ Infrastructure	✓ Person	☐ Local
✓ Mobility	☐ Freight	✓ Regional
✓ Hubs/terminals		☐ Transit
✓ Spatial context		

Background

Cities are coping with growing numbers of inhabitants. Amsterdam is likewise growing. The demand for houses is predicted at 230.000 additional houses within the next 20 years. These will be developed in the metropolitan region of Amsterdam.
Accessibility is already one of the biggest challenges for the metropolitan region Amsterdam, and this will be increasingly difficult in the future. To ensure accessibility on the long term, a set of measures is being developed that do not only include infrastructural modifications to the motorway's, but also to the local roads, public transport, the bicycle infrastructure and multimodal transport.
The Zaancorridor links several major economic and residential regions in Noord-Holland with Amsterdam. To accommodate all the new people in the Amsterdam metropolitan area, new houses and businesses are developed adjacent to public transport hubs.





Ingredients

Accessibility, spatial design and traffic are intertwined and co-dependent. Therefore, the connection between infrastructural developments is integrated into the **spatial context**. A set of measures is developed that include mobility, urban design and liveability into a comprehensive strategy for the challenges along the Zaancorridor. To accommodate all the new people in the Amsterdam metropolitan area, new houses and businesses are developed adjacent to public transport hubs. Along the Zaancorridor, about 16.800 additional houses will be developed. The ambition is to develop more than 50% in close proximity of public transport **hubs**. This will persuade people to change their **mobility** from car usage to public transport. The area next to the train stations will receive an update. Functions will be in close proximity features like coffee houses will give an impulse to some of the train stations. To ensure a change in mobility, measures are taken to enhance the connection between public transport and the first/last mile. The bike network will be upgrated by solving missing links, bike parking places are added near hubs to increase the connection between train en bike, and mobility management will encourage employers to change the mobility of their employers.

Success factors

The project is part of a **comprehensive approach** to ensure accessibility in the region. The national government set the ambition and objectives. To create a layered and widespread supported plan, the regions constructed three regional objectives that contributes to the main objective. The province Noord-Holland coordinated the whole process. Each region had their own interests with a common goal. During **participative workshops**, the three objectives were divided into three regional strategies. These were all aimed to increase liveability.
The Zaancorridor has a disbalance in the route people take. In the morning, most people travel south towards Amsterdam and in de afternoon the other way around. At the moment, six trains depart in each direction an hour. With all the developments, an increase of 10 to 20% in train travellers during the peak hours is expected. Measures are taken to accommodate longer trains (extent platforms) and to ease the speed limit for trains are considered to make the journey more efficient.

Interface impacts

Transport impacts	Area impacts
☒ Connectivity	☒ Spatial quality
☒ Robustness	☐ Social quality
	☐ Environmental quality

The pre-conditions to develop houses and offices near public transport hubs and all the additional measures, will accommodate the growing population and provide them with sustainable and efficient alternatives to cars. Furthermore, this project provides a method to translate a major challenge into smaller comprehensive objectives.

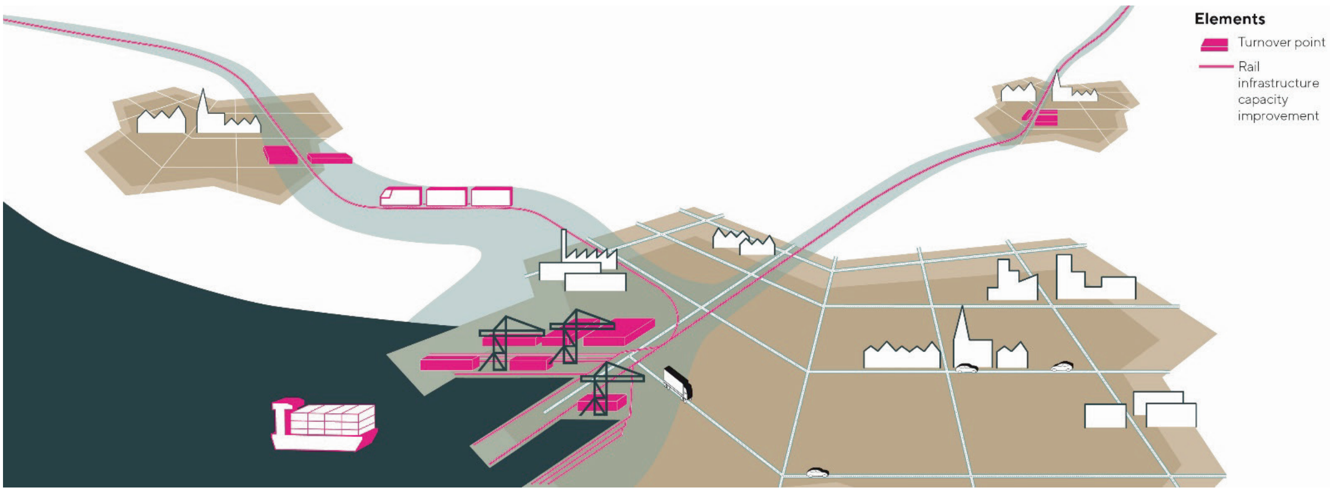
Railport Scandinavia – Gothenburg

Sweden

Ingredients	Traffic type	Traffic scale
☐ Infrastructure	☐ Person	✓ Local
✓ Mobility	✓ Freight	✓ Regional
✓ Hubs/terminals		✓ Transit
☐ Spatial context		

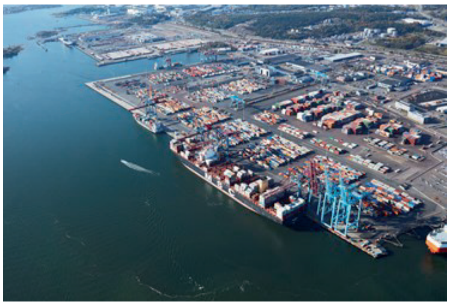
Background

Gothenburg is the second largest city in Sweden (with a population of almost 600.000), it has a large manufacturing industry and the biggest port of Scandinavia. Moreover, seventy percent of the Nordic industry and population are within a 500 kilometer radius of Gothenburg. Nevertheless, the important manufacturing and transportation industries also have a few downsides. These industries have a serious negative environmental impact on the city, the road freight transport lead to congestion in the city, and the industries make a large contribution to the overall CO_2 emission. That's why the Port of Gothenburg (PoG) sought ways to lower its environmental impact by developing a network of rail shuttles to increase the modal shift of the port.



Ingredients

To encourage this **modal shift** the Port of Gothenburg decided in 2000 that half of the growth in the container segment should enter or leave the port by rail in 2020. To reach this goal PoG realized that it had to set up an effective system of inland terminals throughout Sweden and Norway. Untill then the development of inland terminals in Sweden has been a bottom-up development. Inland terminals were developed and owned by municipalities eager to reap the benefits of having a direct link with a seaport. PoG decided to take more control of its hinterland network and thereby strengthen its own position.That’s why PoG signed deals with inland terminals to control container positioning and promote their services. In 2002 the development of the hinterland network gained momentum when the Swedish Ministry of Transport, the PoG and the Västra Götaland Region started to co-finance investments in the **rail infrastructure capacity**. To support the **modal shift from road to rail**, it was decided to decentralize customs. With customs operating at the inland terminals, it became much easier for goods to be quickly transported from and to the port of Gothenburg. In addition, the efficiency of rail freight from the Port of Gothenburg was enhanced by its **integration into broader urban development plans** of the city of Gothenburg, strengthening its coherence.



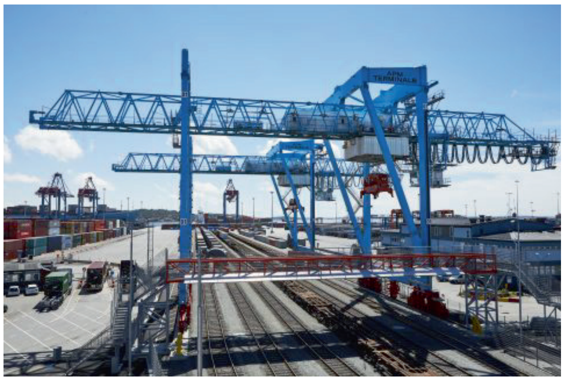
Success factors

The success of the railport Scandinavia can be explained by serveral factors. First, the PoG has played a crucial role of setting its own **ambitious target** for a fifty percent modal shift and has played a key role in **managing the network of stakeholders** (both public and private) involved in the development of the hinterland network. Secondly, the success of the hinterland network can be explained by the **support of multiple public actors (local, regional and national) both financially and in terms of policies and regulations**. Gothenburg is known internationally for its innovative policy practices. Finally, the rail port is a success because of the **efficiency** by which goods can be transported from and to the port of Gothenburg. The reduced transportation costs and innovative planning have made rail a viable and **reliable mode of transportation**, even on relatively short distances. Moreover, the railport system is organized to provide the best service possible for all types of cargo, ensuring **flexibility** and capacity where needed.

Interface impacts

Transport impacts	Area impacts
☒ Connectivity	☐ Spatial quality
☒ Robustness	☐ Social quality
☐ …	☒ Environmental quality
	☐ …

The system currently offers rail shuttles to more than 25 destinations, with the most operating on a daily basis. More than 50 percent of the containers now enter and leave the port by rail, which saves around 60,000 tons of carbon dioxide emissions and 360 truck per day in the city. the system also eases Gothenburg’s traffic congestion, reduces air pollution from trucks and the industries’ transportation costs have been reduced.



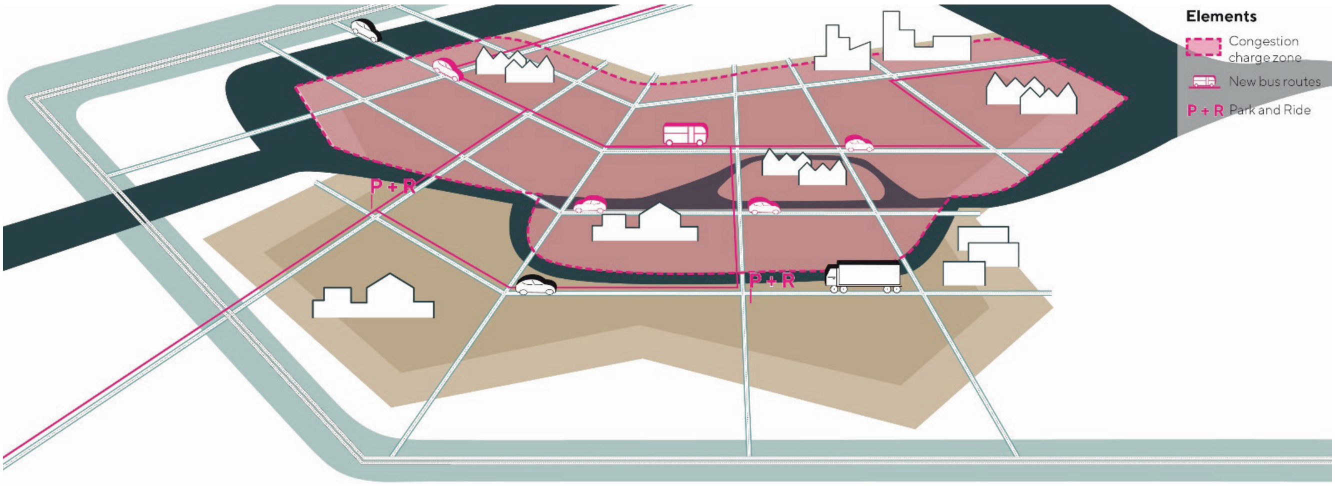
Congestion charge - Stockholm

Sweden

Ingredients	Traffic type	Traffic scale
☐ Infrastructure	✓ Person	✓ Local
✓ Mobility	✓ Freight	✓ Regional
☐ Hubs/terminals		✓ Transit
☐ Spatial context		

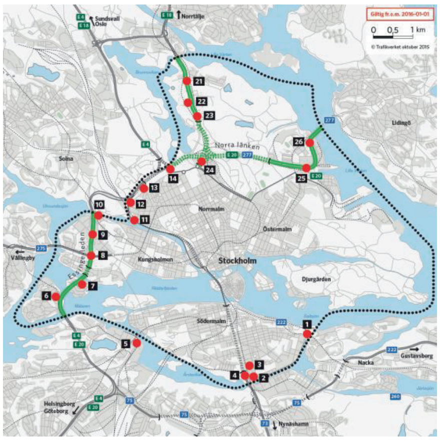
Background

The population in the Stockholm metropolitan area grows by more than 20 000 per year. This rises traffic in the area and inevitably lowers the service for drivers, and increases several environmental and liveability problems. To reduce traffic and improve the (perceived) environment, the Stockholm City council initiated a trial for congestion tax. At 18 exit and entry locations of the city centre, cameras were installed to register the vehicle registration plate.
The trial took place between January and July 2006. Afterwards, a public referendum was held to gauge the public opinion. 51,5% voted for a permanent implementation of the congestion tax. In August 2007 the permanent congestion tax was implemented.
Although, the charge is a national tax that flows into the countries coffer, the Stockholm regional Politian's secured a ten-year infrastructure package of around 10 milliard euro's.



Ingredients

The goal of the congestion tax is to change the **mobility** from car traffic by 10-15% to other modes, times or places. As part of the trial, the public transport system was extended with 18 new regional bus routes, the adding of 2 800 park-and-ride places and over 600 bike-and-park places. These were however implemented half a year prior to the trial, while the major increase of passengers in public transport came into effect only after the introduction of the congestion tax.
The taxes are charged during the daytime at each entry and exit location of the city centre on weekdays between 6:30 and 18:29. No tax is charged in the weekends, public holidays nor the day before, and in July. Camera's register the vehicle registration plate. The prices vary between different times, with the highest charges during the periods and places where the traffic is heaviest. The exact amount is displayed on screens at the control points and is between SEK 11 and SEK 35 (€1,07-3,43). In January 2016 the tax was increased by 75% with an especially higher differentiated charge for peak hours. The goal of the increased tax was to steer traffic towards other periods than the peak hours and to help financing infrastructure services in the Stockholm region.



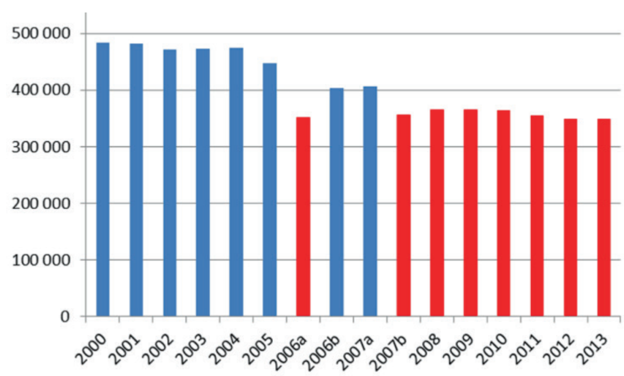
Success factors

Before the trial, the public attitude towards the tax was negative. Over two-thirds of the Stockholm region population was against the charge. Public support increased however substantially during the trial period. When the referendum was held, 51,5% voted in favour of the congestion tax. Public support has continued to grow with a level of over 70% in 2013.
Since the first day of the trail, the congestion tax has successfully reduced a remarkable number of car traffic. The number of cars during the peak hours has decreased by more than 20%. Since the permanent implementation, the reduction is stable with 20% less cars on the roads compared to 2005.
Public transport passengers increased by 4-5%, and due to less congestion, busses improved their punctuality. Cycling numbers increased by 16% during the trial period, though the relationship with the congestion tax cannot be proven. There was no negative effect on retailers, and their business increased by 6% in line with the predictions and the rest of the country.

Interface impacts

Transport impacts	Area impacts
☐ Connectivity	☒ Spatial quality
☒ Robustness	☒ Social quality
☐ …	☒ Environmental quality
	☐ …

The congestion tax reduced car traffic by over 20%, of which only approximately 1% rerouted via a new passage. Furthermore, it reduced the number of traffic accidents and improved the air quality in the city centre. Congestion decreased by 30-50% all over the city. Furthermore, due to the lower levels of car traffic, traffic is perceived safer. Pedestrians, cyclist and children that live in the inner city feel safer.



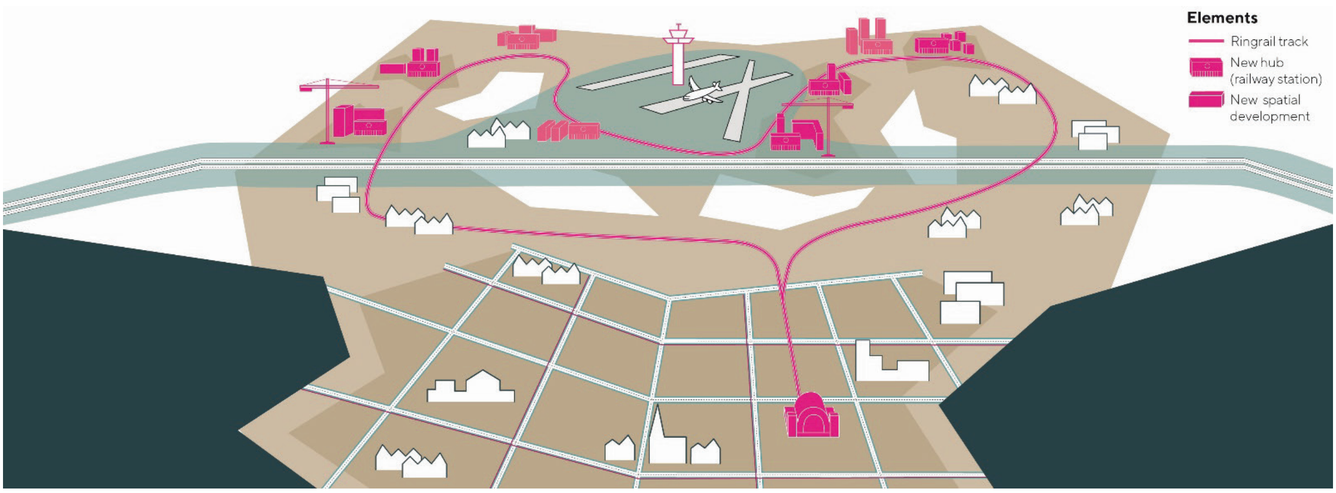
Ringrail - Helsinki

Finland

Ingredients	Traffic type	Traffic scale
✓ Infrastructure	✓ Person	✓ Local
✓ Mobility	☐ Freight	✓ Regional
☐ Hubs/terminals		☐ Transit
☐ Spatial context		

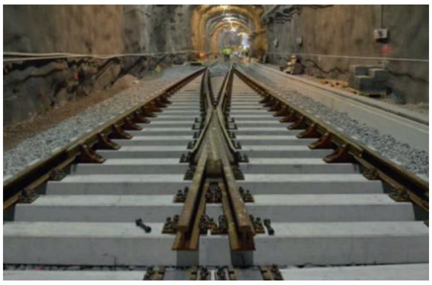
Background

Since 2000, the number of railway passengers has been growing by approximately 40%. One of the challenges the city of Helsinki identified was to create a comprehensive rail network around the cities, connecting all the major economic and residential areas. A major missing link was between two centres in the City of Vantaa, and no rail connection between the city and the Helsinki-Vantaa airport.
Since July 2015 this missing link has been solved by adding a new part of the rail network between the northern ends of the main line and the airport. The new route connects air travel with the local Helsinki network as well as regional and national rail networks.



Ingredients

The added **infrastructure** to solve the northern missing link in de rail network in de Greater Helsinki Metropolitan Area of Finland, connects two main residential and commercial centres in the metropolitan area, provides a new transport link between the city centre of Helsinki with the airport and the rest of the country. People can reach the city centre from the airport within approximately 30 minutes.
Along the route, five new metro stations have been opened and three more are being developed. These are spacious and well-lit designed. Apart from the infrastructural developments, the urban areas for residential, commercial and office buildings are being developed close to the metro stations. New park-and-ride places can accommodate 700 cars and 840 bicycles near the metro stations.
The network is mainly aimed at flight passengers and commuters from residents in new districts in the metropolitan area. The connection provides people with different types of **mobility** at their disposal, thus reducing the need for bus and car traffic.



Success factors

The railway is used by approximately 200.000 commuters, and it 14.000 passengers are expected to use the new stations in 2025. During day-hours, the train runs in 10-minute intervals and the capacity is maximally utilised because the train runs in a loop.
The additional infrastructure created a comprehensive rail network in the Helsinki region, thus enabling development in the **spatial context**. Several new housing, commercial, work and leisure areas have been developed along the Ringrail and other stations.
The Tikkurila Travel Centre became a major **hub** in the Helsinki network. People can change to the national train network, Helsinki rail network and to the airport. The station offers a pleasant environment for doing business and shopping and houses mixed facilities like businesses and leisure.

Interface impacts

Transport impacts	Area impacts
☒ Connectivity	☐ Spatial quality
☒ Robustness	☐ Social quality
☐ …	☒ Environmental quality
	☐ …

The comprehensive rail network provides people with a good alternative to car and bus traffic. This has a positive effect on environmental impacts.