Findings Report
October 2015

Action WP6A29:
Integrated Feasibility Assessment:
Feasibility of tram extension Brugge-Zeebrugge
Sustainable transport for North-West Europe’s periphery

Sintropher is a five-year €23m transnational cooperation project with the aim of enhancing local and regional transport provision to, from and withing five peripheral regions in North-West Europe.

INTERREG IVB North-West Europe is a financial instrument of the European Union’s Cohesion Policy. It funds projects which support transnational cooperation.
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Introduction

This Findings Report describes the summary findings from technical and economic feasibility studies commissioned by Sintropher project partner De Lijn West Flanders as part of their contribution to the Sintropher transport project funded by the EU’s North West Europe transnational cooperation programme under INTERREG IVB.

The study reports on the action WP6A29 “Feasibility study of tram extension Brugge-Zeebrugge”. This is one of the five demonstration regions seeking to test and demonstrate exploitation of recent low-cost technology developments for LRT (tram-train and tram-based systems), and at the same time demonstrate how investment in these innovative transport links can help unlock economic development and regeneration benefits, and how better integration with territorial planning can help capture these benefits.

Parts 1 and 2 provide the background and context to the work, and how this fits in to the overall work of Sintropher, while Part 3 presents the findings and conclusions. Part 4 sets out the next steps for De Lijn in order to utilise the results. Part 5 highlights the wider transnational relevance of these findings in relation to knowledge transfer within the Sintropher Project Partnership and wider target audiences. The main audiences are (a) decision-makers and politicians at regional, national and EU levels; (b) Transport agencies and operators; (c) Practitioners in transport, regional development, and planning across North-West Europe and the EU; and (d) Professional organisations and their members, managers, consultants and technical experts.

Part 6 gives contact details and links to De Lijn’s main Report, which provides more detail (in Flemish). Part 7 summarises the nature and content of the overall Sintropher project.
Part 1
Context of Sintropher project

This Findings Report is about one of the Actions undertaken for the SINTROPHER project funded under the INTERREG IVB North West Europe programme - part of the project extension work implemented in 2014/2015.

The central objective of SINTROPHER has been to use innovative transport links to connect peripheral regions of NWE with the core European transport network of high-speed trains, via effective interchange hubs.

Results from the initial project in 2009-2013, covering pilot investments and actions in 5 regions in five countries (mainly feasibility and marketing assessments - see part 7 What is Sintropher) show that weaker cities/regions are not receiving the investment because they cannot demonstrate adequate economic returns, mainly because current appraisal approaches do not adequately take account of wider potential regeneration and growth benefits. It is in the weaker cities and regions of NWE that the case for transport investment is very important, alongside wider policy initiatives, for economic growth; yet perversely difficult to make through the current appraisal process as the ‘user benefits’ and ‘wider economic benefits’, as presently calculated, appear too low. The problem has been exacerbated in the bleak fiscal climate following the 2008 crisis, which has led to delays and cuts in public expenditure programmes.

So three key topics for further work in a Sintropher project extension 2014-2015 were identified:

**Low-cost technologies and new service patterns for transport links:** Test and demonstrate the innovative low-cost solutions examined in Sintropher, in different city/regional contexts, including new developments in technical solutions and radical improvements in service patterns, bringing major enhancements in accessibility and increased patronage. Demonstrate how lower costs can transform the business case for investment in these transport links.

**Capturing the wider urban and economic benefits of innovative transport links:** Strengthen and demonstrate a much more proactive approach to investment in these innovative transport links as part of a positive integrated territorial strategy for the city/region e.g. master plans or “corridor” plans. There is a parallel need to develop a new Framework for project development and decision-making for these links (including a practical operational decision support tool) in order to better measure and take account of wider city/region regeneration and growth benefits.

**Innovative financing of transport investments:** demonstrate new ways to assemble finance for investment in innovative transport links, especially in the current period of economic austerity and cuts in public expenditure.
These topics have been addressed in 5 further regional test-cases: Saar-Moselle (France-Germany) Fylde Coast (UK) North Hesse/Kassel (Germany) West Flanders (Belgium) and Arnhem-Nijmegen (Netherlands): use 5 regional test cases to test and demonstrate a new approach to exploitation of recent low-cost technology developments for LRT (tram-train and tram-based systems) for new/upgraded transport links in 5 peripheral European regions). In parallel, develop a series of cases, to demonstrate how investment in these innovative transport links can help unlock economic development and regeneration benefits, and how better integration with territorial planning can help capture these benefits.
Part 2
Background and objectives
West Flanders region

Project scope

The starting point of the study was the question of the Flemish and Federal government to evaluate the public transport connection between the city centre of Brugge and the harbour city Zeebrugge at a distance of about 19 km.

This PT-connection is actually realised by a train connection with a poor frequency.

The demand of both governments was to investigate how to ameliorate and strengthen the accessibility of the lesser dense populated region of the harbour community of Zeebrugge to the main city of Bruges.

Three possible ways of a durable and CO2 low-emission PT connection where stipulated as possible PT- inks:

- The existing train connection owned and operated by the Belgian railway company
- A light train connection operated by De Lijn on the tracks of the Belgian railway company
- A tram connection on a separated track owned and operated by De Lijn

This could connect to the existing Kusttram (Coastal Tram) which runs along the entire coast of West Flanders, as part of the regional transport network.

West Flanders - strategic context

The connection between Bruges and the Coast Tram was already mentioned in the Neptune Plan that was presented in September 2007 by De Lijn. This Neptune Plan is the plan for the future of De Lijn West Flanders, which is an integral part of the 2020 Mobility Vision, a future-orientated plan that is firmly anchored in reality. The Neptune Plan was the first step towards a co-ordinated and integrated public transport policy for West Flanders.

The Neptune Plan is a plan for the future for integrated and sustainable public transport in the province of West Flanders and serves as the purview for the 2020 Mobility Vision of the Province. It sets out a framework of nodes and relations. It stands as a strategic policy vision with the ultimate aim of providing more and better public transport that is used by a greater number of travellers.
In a comprehensive process of consultation, the local councils, the RESOCs (Regional Socioeconomic Consultative Committees), the NMBS (National Belgian Railway Company) and other parties were given the opportunity to respond to the measures as tabled. The Plan was subsequently adjusted in response to their demands and observations, and modified on the basis of further (potential) research. In the same way as applies to comparable plans from other provinces, the new version of the Neptune Plan is an integral part of the 2020 Mobility Vision.

The Neptune Plan therefore constitutes the framework for future extensions of and modifications to public transport in West Flanders. The Plan has been devised setting out from an integral approach to (public) transport, whilst factoring in the general objectives of the Flemish mobility policy and the Mobiliteitsplan Vlaanderen (Flanders Mobility Plan), together with the rules and criteria set out under the network management decree and involving the connexity and mutual impact of the various policy areas, modes of transport, etc.

A structural analysis of the existing public transport offered a due understanding of the strengths of the offering and the shortcomings of the network. Setting out from this analysis, network optimisations were elaborated under Neptune at every level of the public transport network.

One of the aims put forward in the Neptune Plan is to build the Brugge - Zeebrugge tramway extension. This tramway extension is part of the desired structure at interurban level, under which the interregional Brugge Railway Station node is linked up with the existing coastal urban network, in which Zeebrugge is already served.

West Flanders has a number of specific set of features that distinguish it from the other Flemish provinces. For one thing, West Flanders is home to 4 regional towns that are widely scattered across the province’s territory, with the seaside considered as a metropolitan/urban region. The ports of Zeebrugge and Ostend give West Flanders two economic gateways of international stature, with the regional airports of Bruges-Ostend and Wevelgem equally serving as major gateways.

These characteristics require the public transport offering to be given a structure that is different from elsewhere. This is why De Lijn West Flanders designed a plan for the future tailored to the specific situation of the province.

**Strategic objectives**

The point of departure for De Lijn West Flanders’ Plan for the Future obviously rests with the Flemish mobility policy. The Neptune Plan is a strategic policy vision, the aim of which is to optimise the bus and tram network, in order to be able to serve a greater number of travellers. In a concrete sense, this aim is accomplished by way of network management, as one of the duties that has been assigned to De Lijn by decree. In consideration of the demand for transport, a due focus of attention is made to seek to achieve maximum accessibility of residential areas and poles of attraction. Depending on the
type of journeys involved, network management imposes a set of quality requirements, in terms of comfort, commercial speed and frequency for instance.

The Neptune Plan puts forward a framework of nodes (places where two or more modes of transport, scale levels, lines, etc. meet) and connections between these nodes.

a) Public transport as an integrated, hierarchically configured system

A public transport network that comprises various modes of transport and scale levels only comes into its own when switching transport modes and connections is made as easy as possible for travellers. These constitute the main links of an integrated public transport network.

The smooth operation of nodes is crucial to the performance of the network as a whole. This explains why the plan for the future focuses considerable attention on the quality, the selection and the equipment of these nodes.

The selection of nodes was made to occur based on the Ruimtelijk Structuurplan Vlaanderen (Flanders Spatial Structure Plan). In addition, a further number of nodes were selected based on a variety of different criteria, including geographic siting, the available connections at various scale levels and the existing demand for public transport. So as to ensure the evenly balanced configuration of the network, a number of specific nodes have also been added to the basic network that are of structural (in consideration of the network configuration) of economic interest.

Quality public transport provides for direct public transport connections between the nodes selected. Depending on the scale level of the relation, various target values have been put forward in the areas of frequency and the desired minimum commercial speed.

This has resulted in a framework of nodes and connections, specifically adapted to the structure and the needs and requirements of the province of West Flanders.
b) Extending the Coastal network

The Coastal Tram is De Lijn’s showpiece in West Flanders. This is also reflected in the constantly rising number of travellers that use the Coastal Tram during the summer months, and increasingly outside of the holiday season as well.

This is exactly why De Lijn West Flanders is anxious to adopt a forward-looking approach. This means we need to continue to work at the further improvement of the quality of the existing Coastal Tram (tracks, stops, timetables, etc.), but also continue to invest in the further extension of the Coastal Tram (higher frequency rate at peak times, high-speed tramways, etc.). Moreover, De Lijn is looking to play a steering role in the economic, tourist and traffic engineering development of the coastal region as a whole.

As such, the issue of upgrading the current Coastal Tram and the need to reflect on infrastructure extensions imposed itself a few years ago. With the “Toekomststudie Kusttram” (Coastal Tram Forward Study) De Lijn was looking to stake out the policy to prepare the Coastal Tram for the challenges of the next few decades ahead and beyond. The Flemish-Dutch Traject - Movares - AGV consortium was approached to shepherd the Coastal Tram Forward Study. The main conclusions and recommendations from the study were factored in in the way the Neptune Plan was elaborated.

All the more so as the Coastal Tram is an important structuring element in the development of the seaside, then and now. For future reference too, an appropriately developed public transport network, with the Coastal Tram as its backbone, is needed to continue to ensure the liveability at and accessibility to
the seaside. Moreover, the popularity of the seaside is continuing to grow as a destination that is now attracting visitors all year round, both in terms of tourism and leisure and in an economic and commercial sense.

c) A fast interurban connection

The Neptune Plan supplies a framework of connections that factors in the various scale levels in the province. The interurban connections in West Flanders largely consist of the conventional railway network. Because of its specific character (wide-ranging appeal, significant degree of internal travel, especially during the holiday season), the urban coastal network too needs a fast interurban connection. This connection can be provided by a (new) Coastal Tram. As such, De Lijn is committed to further developing the Coastal Tram into a fast interurban connection between the seaside resorts themselves and with the nearby (inter)national centres.

d) The Coastal Tram tomorrow and beyond

The Flemish seaside and the adjoining hinterland play a unique role by virtue of a series of different features. The seaside is a leading tourist attraction. The number of visitors is continuing to rise, including outside of the summer holiday season. In addition, the seaside is proving to be a growing, urban development alongside the Koninklijke Baan (N34) trunk road and the Coastal Tram line. Finally, with the ports of Zeebrugge and Ostend, the seaside holds a number of major economic gateways and in Plassendale has one of the biggest economic development projects in this corner of the Flemish Region.

An appropriately developed public transport network will prove a necessity in order to be able to accomplish and manage these different developments.

The quality improvement and extension of the Coastal Tram network is intended to lend impetus to the entire coastal region:

In terms of tourism:

The Coastal Tram is part of the overall seaside experience for holidaymakers. Which is why it is important for the current positive image of the Coastal Tram to be preserved and perpetuated and a level of quality to be achieved that is geared to the wishes and needs of today’s seaside residents and visitors alike. The pressure brought to bear on the seaside by tourism is continuing to rise. The trend towards more (shorter duration) holiday breaks and the rising number of second homes is prompting a continuing increase of the demand for mobility, throughout the year. But the tourist appeal of the seaside is under threat unless we are able to contain (motor car) mobility by developing and putting in place a state of the art alternative.

In an economic sense:

It is part of De Lijn’s remit to help unlock the economic hubs along the coast (tourist industry, the hotel, restaurant and licensing trade, etc.) and the development hubs in the hinterland (Plassendale, business parks around Bruges, the new hospital in Westkapelle, etc.) in sustainable fashion. The available labour force in the coastal region needs to be able to swiftly reach
the employment hubs (to be developed) along the seaside and the hinterland. The development of a high-quality rail system, grafted onto the current Coastal Tram offer the best guarantees to achieve this aim.

In terms of town and country planning:

The Provinciaal Ruimtelijk Structuurplan (Provincial Spatial Structure Plan) describes the seaside as a string of beads in which the Koninklijke Baan (N34) trunk road and the Coastal Tram make up the string and the seaside resorts are the beads. As the desired spatial structure, the PSSP posits that further developments along the seaside are bound by the existing population centres (urban areas and main villages). A quality Coastal Tram (e.g., a high-speed tramway that links the residential hubs) will be able to underpin and steer this desired town and country planning developments. The extensions of the tram network can also sustainably firm up the existing relations between the seaside and the hinterland. On the East Coast, it is the relation between the seaside and Bruges more than anything else that needs to be beefed up further. For the West Coast, a quality public transport connection with Veurne is a matter of priority for socioeconomic and tourist reasons.

In terms of mobility to the seaside:

The overwhelming majority of all day trippers/holidaymakers travel to the seaside by car. This evidently results in congestion and parking problems. The NMBS is successfully managing to get an increasing numbers of seaside visitors on the trail, but the role the Coastal Tram can play in this respect should not go underestimated. From the interior, holidaymakers can directly travel by rail to Ostend, Knokke, Blankenberge, Zeebrugge and De Panne. Other seaside resorts, such as the fast developing seaside towns of Nieuwpoort and De Haan can only be reached by transferring onto the Coastal Tram which obviously adds a fair length of time to the total travel times by public transport. A Coastal Tram that ensures a fast connection between the NMBS railway stations and the seaside resorts in-between significantly steps up the appeal of public transport for journeys to the seaside.

In terms of mobility at the seaside:

The current Coastal Tram serves both a connecting purpose and a role in providing access to resorts along the seaside. The proximity of the tram in every municipality along the seaside is a major strong suit. However, if we mean to effect a modal shift in the (functional) travel between the seaside resorts and by extension of the tram network to the hinterland, the swiftness and reliability of the Coastal Tram will need to be raised. In addition, enhancing the quality offered by the current Coastal Tram is crucial in order to contain private motoring and to raise the liveability and road safety in the seaside resorts by doing so.

What is essential is the mobility structure which the Coastal Tram is set to achieve as part of a KustNet (Coast Network) as a light transit system. The connection alongside the coast acts to produce a quality cross connection on the comb structure to the coast that remains to be further developed. The proposal is to put in place a network that will further concretise both the linear
structure along the seaside (e.g., through the combination of high-speed trams and slow trams) as well as the connections with the hinterland. These connections are best developed on a rail and a light transit structure that is complementary to and acts in support of the traditional rail network in order to produce a coherent whole. In doing so, priority should be made to go out to the connections to Bruges, Veurne and Westkapelle.

**Brugge - Zeebrugge tram extension option**

Taking the main objective of De Lijn in consideration, providing a good and low carbon public transport, the connection between Brugge and Zeebrugge was investigated with a rail-based connection.

Initially three possible ways of a durable and CO2-low emission PT-connection where stipulated as possible PT-links:

- The existing train connection owned and operated by the Belgian railway company
- A light train connection operated by De Lijn on the tracks of the Belgian railway company
- A tram connection on a separated track owned and operated by De Lijn

These could connect to the existing Kusttram (Coastal Tram) which runs along the entire coast of West Flanders, as part of the regional transport network.

The three options that were asked to investigate by the both governments, were reduced to one, namely the tramway connection. The reasons for this reduction of options are the following:

- The train connection, as exists today, is poorly used because the stops are very limited, only 2 stops remain on that line between Zeebrugge and Brugge. The third stop in the community of Zwankendamme is closed for the extension of the forming station for the heavy-rail. So the inhabitants of Zwankendamme do not have a good pt-connection anymore. Furthermore expansion plans for heavy-rail tracks are for the moment on hold due to the economic situation, so expanding heavy-rail traffic of goods have to realised on the existing tracks what makes that an upgrade of the frequency of passenger trains on this track is not the best option
- The light rail option exploited by De Lijn on the tracks of the Belgian railway company is due to the higher mentioned reasons neither a good solution, not only as a result of the high frequency of the heavy rail transport and the security-issues that it implicates to the rolling stock, but also because the problem of service-stops away from the housing-blocks is not solved

With a new, high-quality public transport connection, De Lijn is anxious to optimise the accessibility of the urban network along the East Coast, in
specially the region of Zeebrugge with the public transport network in the interior.

Siting of the project area

The tramway connection that is investigated, is a connective tramway connection, this means that the connection has to have a high commercial speed (above 30km/h), has a limited number of stops and a track without a lot of obstacles that the reduce the commercial speed. For this reason a track in his own zone, without other transport modes is preferred and necessary.

The new connection can be seen strategically as part of the territorial corridor bruges-Zeebrugge. The most important zones to connect with this tram extension are:

- The Coast Tram-network
- The municipality Zeebrugge
- The community Zwankendamme
- The community Lissewege
- B-park, a commercial area with a number of major retailing shopping centres
- A planned major sports complex, football stadium for one of the bigger clubs in Belgium with a big parking that can be used as a park & ride to enter the city centre of Brugge and other service-providing companies.
- The regional hospital AZ Sint-Jan
- The railway station of Bruges
Map of the region with the indication of housing and attraction poles
Part 3
How the choice of route was made: procedure and results

Investigation of the area

A preliminary investigation into the route variants for the Brugge - Zeebrugge tram connection was made on maps and on the field. In doing so, a comparative assessment was made of 4 main zones on the trajectory, which had specific area conditions:

Zone of transport: near the connection with the Coast Tram, the zone is heavily used for transport operations of goods

Zone Lissewege: is the area where the community of Lissewege is situated along the main road connection between Brugge and Zeebrugge

Zone Brugge West: the West side of Brugge, where the most of the residential housing and some education centres are situated

Zone Brugge centre: the historical city centre of Brugge, also the actual public transport node for the whole region.

In these zones different track options were defined, with the premise that the options in two adjacent zones had to be connectable, so that a complete track could be realized between the two extremities of the connection.
Funnel study

The funnel study enabled us to look into all potential connections, which we subsequently filtered out according to the aims, the requirements and the legal framework in place so as to arrive at a feasible choice of route. In doing so, the following steps were made:

Stage 1: Determination of objectives

- Connect the interregional traffic HUB Brugge with Zeebrugge and the Coast Tram
- Sustainable public transport connection
- Commercial speed high enough
- Usable for a one-directional Tram on single track (same technical specs as the Valenciennes tramway extension)
- Use of the existent trams of the Coast Tram network
- Bundle maximal with other line infrastructure
- Stops at of nearby the most important attraction-poles
  - Railway station Brugge
  - Medical centre AZ St. Jan
  - B-park / multifunctional sports park
  - Community Lissewege
  - Community Zwankendamme

Stage 2: Gathering information

Traffic structure & Public domain

Due to the objective to bundle as maximal as possible the tram trackway with the existing line-infrastructure and to avoid maximally the purchase of private property an analysis is made of the public domain and the width of the roads.
White areas are the public domain
Spatial legal framework

Region plans (Flemish level): A spatial execution plan is a plan in which the authorities lay down the designated use of the land in any given area. Spatial execution plans or ‘SEPs’ have come to replace the regional development plans, thereby very clearly defining what is permissible and what is impermissible for all plots of land in a given area.

Spatial structure plans

The municipal spatial structure plans reflect the vision of the local councils as to where they want to be headed in the future in designing their territory. An important conclusion for this funnelling study is that the development prospects of the road structure and categorisation as outlined act to support and further strengthen the existing orthogonal road structure.
Listed heritage and UNESCO heritage (buildings and landscape)

West Flanders has a number of designations and Brugge is of international importance as a heritage city.
European & Flemish listed areas

The Birds and Habitat Directives are directives from the European Union that specify which species and which types of natural areas (habitats) must be protected by the member states. In order to safeguard the open space in future, the Flemish Government is in the process of building a Vlaams Ecologisch Netwerk (VEN) (Flemish Ecological Network) whilst having promulgated the dune decree.

Natura 2000 area’s

Flemish Ecological Network
Consultation with local authority and non-local stakeholders

These bodies put forward a number of limiting conditions that were particularly important to the project design investigation. We obtained a better understanding of the vision of the local authorities as to where they are headed in designing the public space and the planned developments in infrastructure and constructions in the investigated area.
Future vision N31

Study Oude Maarslandpolder

Connection new highway A11 to N31

Multifunctional Sports park

Developpement plans housing projects - Molenerf
Stage 3: Determination of 15 possible routes – component variants

Setting out from all of the information thus gathered all potential route-components were subsequently defined: 15 route-components in total. (3 for the Transport zone, 3 for the Lissewege zone and 9 options for the centre of Bruges.)
Stage 4: Analysis & filtering of the potential routes

Route options were assessed and filtered using criteria for exclusion criteria and criteria for desirable features:

Technical system requirements of out rolling stock: Coastal Tram

Width: 2.5 m Length: 32 m
Minimum curve radius: 30 m
Slope: maximum 4°
One directional tram
Electric overhead wire

Spatial Criteria

The idea is to cluster the new tram track bed as widely as possible with the existing transport infrastructure. From a spatial perspective and because of the limited public support, no route variants can be put in place in very narrow residential streets whose gauge is too restricted (less than 10 m in width between the building lines).

Route variants need to be able to be designed in a way that is safe from a road traffic perspective. The route needs to offer the possibility of effecting a readable and safe road profile for the various types of road users.

An appealing catchment area – with sufficient traveller potential – is crucial for the route variants. In this sense, no route variants are to be selected that call in on an inadequate number of residential hubs and poles of attraction.

Legal criteria

Routes that require modifications to existing line infrastructure or line infrastructure that has been designated on a land use plans or a spatial execution plan, can be built only if they are not executed in areas deemed to be vulnerable in a spatial planning sense or if they do not have an significant impact on areas deemed to be vulnerable in from a spatial planning perspective, in cases where they are situated in such an area.

As few as possible private expropriation

In order to ensure the highest possible chances of success of the project, it has been decided to take up as little private land as possible.

Structural complexity

In order to keep the cost of the construction and maintenance as low as possible, the aim is to keep the structural complexity as simple as possible. Due to the surroundings, crossing with the connection-complex A11 and other
Primary Roads that has to be non-level crossed in the project zone, the following items had to be studied: tunnels, trenches/grooves, bridges.

**Funnel study results**

The results of the verification of all prospective routes have been recorded in a spreadsheet for each route-component.

<table>
<thead>
<tr>
<th>Service of necessary stops</th>
<th>Commercial speed</th>
<th>Potential of customers</th>
<th>Operational quality</th>
<th>Spatial integration</th>
<th>Integration of traffic</th>
<th>Juridical conformity</th>
<th>Constructional complexity</th>
<th>FINAL SCORE</th>
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Because not all evaluated elements are evenly important, the results were submitted to an evaluation factor. The result of this weighting of importance is shown in the spreadsheet below.

<table>
<thead>
<tr>
<th>Objectifs</th>
<th>Transportzone 2d</th>
<th>Transportzone 2c</th>
<th>Lissewege_1</th>
<th>Lissewege_2</th>
<th>Brugge_2a_1</th>
<th>Brugge_2a_3</th>
<th>Brugge_2b_1</th>
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<td>Necessary stops serviced (15%)</td>
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</tr>
<tr>
<td>commercial speed (15%)</td>
<td>0.00</td>
<td>1.00</td>
<td>0.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>-2.00</td>
<td>-2.00</td>
<td>-2.00</td>
<td>-2.00</td>
<td>1.00</td>
<td>1.00</td>
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<table>
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<tr>
<th>Operational Quality (20%)</th>
<th>Transportzone 2d</th>
<th>Transportzone 2c</th>
<th>Lissewege_1</th>
<th>Lissewege_2</th>
<th>Brugge_2a_1</th>
<th>Brugge_2a_3</th>
<th>Brugge_2b_1</th>
<th>Brugge_2b_3</th>
<th>Brugge_2c_1</th>
<th>Brugge_2d_3</th>
<th>Brugge_2f</th>
<th>Brugge_2g</th>
<th>Brugge_2h</th>
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<tbody>
<tr>
<td>Potential of customers (10%)</td>
<td>-2.00</td>
<td>-2.00</td>
<td>-2.00</td>
<td>-2.00</td>
<td>-2.00</td>
<td>-2.00</td>
<td>2.00</td>
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<td>2.00</td>
<td>2.00</td>
<td>1.00</td>
<td>1.00</td>
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<tr>
<td>Call at attractionpoles (10%)</td>
<td>0.67</td>
<td>0.67</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.33</td>
<td>0.00</td>
<td>0.33</td>
<td>1.00</td>
<td>0.33</td>
<td>0.67</td>
<td>0.00</td>
<td>0.67</td>
<td>0.00</td>
</tr>
<tr>
<td>Spatial strength (20%)</td>
<td>Transportzone 2d</td>
<td>Transportzone 2c</td>
<td>Lissewege_1</td>
<td>Lissewege_2</td>
<td>Brugge_2a_1</td>
<td>Brugge_2a_3</td>
<td>Brugge_2b_1</td>
<td>Brugge_2b_3</td>
<td>Brugge_2c_1</td>
<td>Brugge_2d_3</td>
<td>Brugge_2f</td>
<td>Brugge_2g</td>
<td>Brugge_2h</td>
</tr>
<tr>
<td>Integration of traffic (10%)</td>
<td>-0.25</td>
<td>0.25</td>
<td>-0.25</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
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<td>0.75</td>
<td>-0.50</td>
<td>1.00</td>
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<td>Spatial integration (10%)</td>
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<td>1.60</td>
<td>1.00</td>
<td>1.60</td>
<td>0.80</td>
<td>0.40</td>
<td>-0.60</td>
<td>-0.20</td>
<td>-0.60</td>
<td>-0.20</td>
<td>-0.20</td>
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<table>
<thead>
<tr>
<th>Juridical conformity (15%)</th>
<th>Transportzone 2d</th>
<th>Transportzone 2c</th>
<th>Lissewege_1</th>
<th>Lissewege_2</th>
<th>Brugge_2a_1</th>
<th>Brugge_2a_3</th>
<th>Brugge_2b_1</th>
<th>Brugge_2b_3</th>
<th>Brugge_2c_1</th>
<th>Brugge_2d_3</th>
<th>Brugge_2f</th>
<th>Brugge_2g</th>
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<tbody>
<tr>
<td>Constructional complexity (15%)</td>
<td>0.36</td>
<td>0.00</td>
<td>0.33</td>
<td>0.00</td>
<td>0.83</td>
<td>0.83</td>
<td>-1.00</td>
<td>-1.00</td>
<td>-0.50</td>
<td>-1.00</td>
<td>0.00</td>
<td>0.67</td>
<td>0.33</td>
</tr>
<tr>
<td>TOTAL (without % weighing)</td>
<td>0.25</td>
<td>3.52</td>
<td>-1.42</td>
<td>-1.43</td>
<td>1.47</td>
<td>1.40</td>
<td>-1.80</td>
<td>0.47</td>
<td>0.15</td>
<td>0.88</td>
<td>-0.87</td>
<td>1.10</td>
<td>-1.78</td>
</tr>
<tr>
<td>TOTAL (with % weighing)</td>
<td>0.07</td>
<td>0.50</td>
<td>-0.15</td>
<td>0.16</td>
<td>0.22</td>
<td>0.22</td>
<td>-0.28</td>
<td>-0.02</td>
<td>-0.05</td>
<td>0.02</td>
<td>-0.20</td>
<td>0.05</td>
<td>0.23</td>
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With this result, the best scoring route-components were combined to two feasible preferred tram tracks that will be further on investigated in CBA methodology.

Final result technical feasibility:
Main: Transportzone_2C - Lissewege_2 – Brugge_2d_3
Alternative: Transportzone_2c – Lissewege_3 – Brugge_2b_3
Cost Benefit Analysis

After defining the preferred track-option, an estimation of investment cost, a preliminary definition of exploitation manors and exploitation costs were defined. The investment cost is estimated at 100 million Euros without the cost of eventual expropriation. The frequency of service that is taken into account is a half hour service in both directions.

First results on CBA are less than 1, which indicates that a tram connection would not be an economic viable project. This result is due to the obliged methodology by the Flemish Government in which no third financial gains can be integrated, and the touristic impact on use of the tram is not integrated.

The main factors of input in the CBA methodology are:

- Investment costs (infrastructure and rolling stock)
- Exploitation costs for public transport
- Results of the base traffic model that indicates the estimated use of the different transport modes in the prognosed year (2020)

All modelling of use and modal shift is based on a normal, inland traffic system with no impact of seasonal tourist use. The reference measuring of traffic is done on a Tuesday in October and a Thursday in April. This means that for touristic regions, the impact of mass tourism is not integrated in the output.

The benefits were calculated and weighted on the following items:

- Impact on employment caused by realisation of the project, the maintenance and the exploitation of the project
- The raise of possible labour time due to the increase of transport time
- The increase of transport cost due to the increase of transport time
- The impact of noise production
- The impact on the number of traffic-accidents
- The impact on the environment (CO2-emission and the loss of function of ecosystems)

To make the result of the CBA more appropriate several elements should be included, such as:

- The social benefit (or social cost reduction) resulting of the termination of the existing poor train-connection (2 or 3 hour frequency) - a cost reduction actually benefiting the national railway company
- The benefit of the gain of more windows for heavy-rail freight flows and the increase in freight capacity to support plans for expansion of the Port of Zeebrugge
• The touristic component in the passenger demand estimation on the different traffic modes, which actually occurs during more than 30% of the year
• The growth in touristic possibilities for both the coast and the city centre of Brugge.
• The benefit of spatial development such as housing, commercial zones that will have a better accessibility, the realisation of the sports stadium, and the realisation of a new and bigger cruise-liner terminal in Zeebrugge.
• The higher value of properties that are adjacent to the public transport connection stops.

We are convinced that when the above-mentioned items are taken into account, the result of the CBA will be much closer or even higher than 1, which proves that the investigated tramway connection will be an economically viable and preferred project, in order to realise a good public transport connection between Brugge and Zeebrugge.
Part 4
Next Steps

The feasibility study that was undertaken in this case, was to identify the best favourable new tram route in the Brugge-Zeebrugge project area, in due consideration of the route’s technical feasibility, but also aimed to raise the support of this new tram connection among the general public and the policy-makers.

Now that the final route choice has been made, the collaboration with the National Railway Company has to be intensified to obtain their information on the benefit of closing down the heavy-rail railway service for passengers, so that they can raise the use of the heavy rail link for freight - and then incorporate these results in the CBA. Similarly, the impact of the touristic component needs to be reflected in the CBA, requiring information on modal shift.

With these results the final decision to finance and build this connection can be taken and preparations can get underway.

In broad outlines, the timing schedule for accomplishing the project is as follows:

- Presentation of the Funnel-study results to the main stakeholders of the region in February 2016
- Finalizing the CBA by the end of April 2016
- Presenting the CBA results to the Flemish Government before summer holidays 2016
- Principal decision of the Flemish Government to continue the study to realise the tramway connection between Brugge and Zeebrugge : Q3 2016
- Public tendering for an engineering office to execute an environmental impact assessment and to make the technical designs and estimations : Q4 2016
- Environmental impact assessment : 2017
- Technical design and estimation : mid 2017 – end 2017
- Final Decision by Flemish Government on realisation, budget and financing by the end of 2017
- Tendering procedure for contractor and expropriation : 2018
- Building the infrastructure : 2019-2024
- Tramway extension in use: beginning 2025
Part 5  
Wider transnational relevance to the Sintropher partnership and external audiences

A key part of the INTERREG concept is learning from one another. This section we outline some of the main transferable lessons learned.

Assessing route options - funnel study

Adopting the funnelling study method to determine a route appears to be a particularly convenient and practical method which, for one thing, marks out all the prospective options, but by the same token also provides an in-depth background enabling those concerned to consult with all possible parties in due course.

It compels the investigator to factor in all possible limitations from the very outset in his study, and forces the client to produce a clear project definition that covers all desirables and requirements relating to the new route.

It creates the opportunity to objectify what is usually a subjective appreciation of route alternatives.

The method also proved its worth in that, when looking for a route, the purely financial arguments, such as the investment cost and the operational running cost, are left out of the equation. When these factors are factored in, the open mindset to consider options among those involved is soon seen to vanish. It is not until after all other aspects in the areas of planning, potential, spatial integration and considerations of traffic engineering, legal and technical nature have been duly assessed, that the aspect of cost may be used to strengthen or change a given choice.

Involve local authorities in the investigation from the outset

As building a new tram connection usually has a major impact on the land-take and mobility within a local community or town, it is important to create local support for the new project. For another thing, the local authorities are able to provide a wealth of useful information in the analysis of the various possibilities.
Adapt existing appraisal procedures (CBA methodology) to arrive at a considered decision - a wider territorial perspective

CBA methodology cannot be narrowed to only direct impacts (benefits and costs) directly related to the foreseen realisation of an investment and the finances of the lead agency. As a public organisation, the wider benefits, even if they are not resulting directly to benefits for the lead agency, should be integrated in the results because they can and will generate an indirect benefit in the future. For example opportunities for more housing projects, economic growth, and commercial activities.

These should be taken into account, in the context of (a) the regional mobility plan - in the case of West Flanders the Neptune Plan - page 7 (b) the territorial plans for the region - for West Flanders the regional spatial execution plan and municipal structure plan - pages 19/20 (c) the development opportunities and benefits in the corridor of the transport link (pages 23/24).

When a project provokes a cost reduction in another public sector organisation, then these benefits should also be included in the CBA, because they generate possibilities to invest in other projects where benefits will be created.

CBA only takes into account impacts and benefits that occur for longer periods in the year, and so the touristic use of public transport, which is strongly seasonal nature, is not well reflected in the passenger demand/modal shift modelling methods.

When these impacts are taken into account, a higher use of the transport link investment can be factored in. This has a positive effect on increased passenger revenue, and also reduction in car use in the touristic season, which generates a much higher CO2-emission reduction.

The assessment of a project based on CBA methodology, should be a lot wider than the obliged economic methodology we actually use, so that the social benefits and costs are much more detailed and provide a better basis to make wider structural decisions.

Do not lose sight of reality

Theoretical studies and regulations sometimes combine to produce a framework that is very narrow, or act to impose obligations and guidelines that see all creativity vanish, leaving those involved thinking only in terms of a confined set of established lines of thought that act as a straight jacket.

It is important to keep an open mind, and maintain a healthy dose of common sense and sense of reality, so as to not include absurd route variants for too long in the process of project development.
It is much more sensible to discard certain technical or route aspects from the feasibility investigation from the outset, based on duly argued and founded considerations, rather than generate options at the end of the investigation that prove to be unfeasible or do not have the support of the local population or the policy-makers.
Part 6
Further Information

Detailed findings - Main Report

These are available on request with Bart De Vylder, De Lijn West-Vlaanderen or online at www.sintropher.eu/publications/reports

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Part 7
What is Sintropher?

The Sintropher transport project (Sustainable Integrated Transport Options for Peripheral European Regions) is funded by the EU’s North West Europe transnational cooperation programme under INTERREG IVB.

The overall project aim is to develop sustainable, cost-effective solutions to improve connectivity to, from and within poorly connected regions in North-West Europe. There are four objectives:

- promote possible cost-effective technology-based solutions
- assess the appraisal procedures used by different counties for investment in regional tram systems and improve the development process for a positive business case
- promote high-quality, effective interchange between regional tram systems and regional rail and air hubs
- promote and market the benefits of regional tram-based systems to users and stakeholders

There has been a particular focus on tram-train systems which allow local trams to run on to national rail networks, pioneered in Germany, firstly in Karlsruhe and developed in Kassel, which allow urban tram systems to extend over national rail tracks to serve extensive city regions. The project has also looked at other innovative forms of tram systems such as single-track tramways as well as high-quality transport interchanges that link such systems to major national or transnational rail or air hubs.

The project began in late 2009, with fourteen partner agencies in five EU Member States, and lead partner University College London (UCL): Valenciennes (France); the Fylde Coast (UK); West Flanders (Belgium); North Hesse (Germany); and Arnhem-Nijmegen (Netherlands). Participants include public transport operators, local authorities, regional transport agencies, and universities.

They have worked together on a series of feasibility evaluations, pilot investments and demonstration projects, as well as comparative analyses of EU best practice. The total budget is more than €23m, with funding part-financed by the EU’s INTERREG IVB Programme.

A €1.5m project extension in 2014, covers follow-on work to capitalise on results from the initial project, and added a fifth objective:

- to test technologies for low cost transport links in different territorial contexts, plus integrated territorial corridor plans that help these links unlock wider economic and regeneration benefits; and better recognise these in business cases (this also covered innovative fainting to fund
investment cases in such schemes)

This includes two new partners (total now 16) and two extra demonstration regions (total now 7) in West Flanders Brugge-Zeebrugge (Belgium) and Saar-Moselle (a cross-border region France-Germany).

The project officially ends in October 2015 and work will continue by partners beyond this, to capitalise on results and generate impacts in terms of influencing transport and territorial development policies and investment programmes in their regions, and respective national approaches to appraising and deciding investment in such links.

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Partners

Sintropher is coordinated by

In partnership with

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