



CIVITAS INSIGHT

Linking intermodal services better

Many European cities face increasing congestion. A high-quality, modern, energy-efficient public transport system that integrates well with other modes is key to reducing car traffic and creating an appealing urban environment. Convenient, efficient and clean collective passenger transport is an essential part of an urban sustainable transport system. To maintain or increase the modal share of collective passenger transport, services need to be more attractive to use, safe, and punctual.



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Making interchanges as seamless as possible

Road transport is the dominant mode in Europe, claiming 73.4 percent of passenger transport, and 71.8 percent of the hinterland freight transport, excluding sea transport¹. This dominance has impacts on congestion, the environment and safety, and limits the use of more resource-efficient modes, impeding their growth and competitiveness. An efficient transport system is a prerequisite to the development of a Single European Transport Area and improvement of EU competitiveness².

Intermodal transport has the potential to contribute to a cleaner, smarter and more sustainable transport, shifting the mobility of passengers and goods from the road, making the optimal use of infrastructure and reducing costs. This requires developing integrated solutions, linking vehicles and infrastructure, and creating an interface between users and multimodal services. Moreover, it requires promoting strategies for people and organisations to embrace the concept.

Intermodality has its challenges³. Europe's passengers have all been there: trying to navigate through a city when one form of transport will not accept another operator's ticket. Or when a delayed train pulls in just too late to meet a connecting bus; struggling to drop off a loved-one; or docking your bike with difficulty because stations' pull-ins or docking-stations are just so badly designed or even unavailable. Fortunately, improving intermodality is increasingly on the agenda of authorities across Europe, for reasons including consumer demand, environmental factors and mobile technology.

The EU has supported the development and deployment of multimodal transport under the FP6 and FP7 programmes with various research projects.⁴ It supports member states through setting the policy framework (for example via the Urban Mobility Package), funding (the CIVITAS Initiative), and raising awareness (European Mobility Week and the Sustainable Urban Mobility Plan Award). Moreover, it will continue to do so under Horizon 2020, for example, with the Theme Analysis Reports that review the essential policy, infrastructure and development needs required to fill gaps in capacity and meet the EU's transport needs. The first in the new series of Research Theme Analysis Reports produced under the new Transport Research & Innovation Portal (TRIP), covers urban mobility. The purpose of the report is to provide an overview of research performed (mostly) in the EU, collated by TRIP, providing a view across many projects that fall under the theme. It assesses the reported results from the research projects, giving scientific and policy perspectives.⁵

1 European Commission. EU transport in figures. Statistical pocketbook 2013

2 European Commission. White Paper, Roadmap to a Single European Transport Area, Towards a competitive and resource efficient transport system, COM (2011)

3 Eurotransport, Volume 14 – Issue 2, 2016, accessed May 17, 2016, <http://www.eurotransportmagazine.com/19159/past-issues/issue-2-2016/issue-2-2016-digital-version/>

4 Thematic Research Summary. Multimodal transport, 2014, accessed April 18, 2016, http://www.transport-research.info/sites/default/files/thematic-analysis/20150430_165442_15840_TRS13_fin.pdf

5 European Union, 2016. Theme Analysis Report on Urban Mobility, accessed May 17, 2016, http://www.transport-research.info/sites/default/files/TRIP_Urban_Mobility_brochure-12.04.2016.pdf



Cosimo Chiffi from the CIVITAS Initiative’s Support Action CIVITAS WIKI said: “Intermodality is a key element of every ambitious urban mobility strategy. From past efforts such as Park-and-ride schemes or renovating railway nodes, the focus is now more on planning and integrating open data and services.’

This CIVITAS Insight focuses on intermodal passenger transport only. To learn more about sustainable urban freight transport, please see CIVITAS Insight 03 - Cleaner, safer and more efficient freight transport in cities, available free from the CIVITAS website.⁶

“Intermodality” refers to integrating two or more transport modes on the same journey. However, switching transport can be a nuisance for travellers. Therefore, the aim is to make this interchange as seamless as possible with common information,⁷ an integrated ticket⁸ and a multimodal station where passengers feel safe, secure and comfortable. Intermodal passenger transport is often used to combine the strengths (and offset the weaknesses) of various transport options. A major goal of modern intermodal passenger transport is to reduce people’s dependence on cars as the major mode of ground transport and increase use of public transport. To assist the traveller, various intermodal journey planners (such as Rome2rio⁹ and Google Transit¹⁰) help travellers to plan and schedule their journey.

Intermodal passenger transport often centres on one type of rapid transit, such as regional rail, to which low-speed options (such as bus, tram, or bicycle) connect at the beginning or end of the journey. Trains offer quick transit from a suburb into an urban area, where passengers can choose a way to complete the trip. Most people use transport modes intermodally, for example, when taking the road or urban railway to an airport or inter-regional railway station.

Passenger transport has always been intermodal, both for urban and inter-regional commuting. Public transport systems such as train or metro systems have the most efficient means and highest capacity to transport people around cities.

Urban commuting	
Nodes linking cars and public transport	Although the conventional use of cars is as a single-mode form of transport, they are also present in a variety of mixed-mode scenarios, such as Park-and-ride.
Nodes linking buses to public transport	Many cities link their railway and bus network. This enables commuters to get to places often considered too far for walking and not serviced directly by rail.
Bike-and-ride	All around the world people use bicycles to get to and from train and other public transport stations.
Bikes on buses	Carrying bicycles onboard public transport vehicles is not only limited to the tram and metro, or restricted to folding bikes. Buses can also take them.
Train/car on boat	A train ferry is a ship designed to carry railway vehicles. While usually used to carry freight vehicles, it can also carry passenger cars.

6 CIVITAS Insights available on <http://www.civitas-initiative.eu/content/key-publications>
 7 See also CIVITAS Insight 14 - Real-time information for public transport
 8 See also CIVITAS Insight 12 - Integrated ticketing and fare policy for public transport
 9 Rome2rio official website, accessed April 18, 2016. <http://www.rome2rio.com/de/>
 10 Google Maps Transit official website, accessed April 18, 2016. <https://maps.google.com/landing/transit/index.html>



Inter-regional commuting	
Nodes linking airports and public transport	Many cities have extended subway or rail services to major urban airports. This provides travellers with an inexpensive, frequent and reliable way to get to their flights as opposed to driving or being driven, and contending with full parking lots, or taking taxis and facing traffic jams on the way to the airport.
Car to train	Several passenger rail systems offer services that allow travellers to bring their cars with them. These usually consist of wagons that carry cars attached to normal passenger trains. Some special trains operate solely to transport cars.
Train/car on boat	A train ferry is a ship designed to carry railway vehicles. While usually used to carry freight vehicles, it can also carry passenger cars.

Research has identified tools and support mechanisms to promote multimodal solutions:¹¹

- **Multimodal infrastructure and vehicle equipment:** Effective multimodal transport requires linking infrastructure for transferring and operating vehicles on different modes. Whereas infrastructure creates multimodal connections, bridging the gap between different modes in ports and terminals, multimodal vehicle equipment requires compatible, transferable loading units between modes.
- **Smart multimodal services:** Smart multimodal services support users to prepare for trips involving different transport modes, and to adjust journeys based on real-time information. As well as research to develop these services, they carry out research to support the harmonising of services, ensuring continuity between modes and geographical coverage.
- **Supporting and promoting multimodal solutions:** As well as developing technical solutions and smart services to facilitate multimodality, the EU is supporting the promotion and dissemination of these services. Best practices and networking activities disseminate research results, while support tools show the potential benefits of shifting to multimodal transport. Furthermore, roadmaps and future strategies shape the future of multimodal transport.



Image: © Carlos Corra - communicationpackage.com

CIVITAS stimulates seamless public transport from door to door

Measures related to intermodality cover infrastructure investments such as stops or terminals that link multiple modes of transport, such as cycling, road and public transport. For busy corridors, automatic people mover (APM) systems can add an efficient link to the intermodal trip chain. These measures can include electric driverless vehicles run on dedicated infrastructure, designed to provide scheduled, high-frequency urban connections. The coherence between parking policy, public transport infrastructure and good Park-and-ride (P&R) facilities are essential to encourage the use of alternative transport modes. Intermodal measures often entail public-private cooperation. CIVITAS encourages new ways to maximise the potential of local public transport systems, and has realised several measures since 2002. The CIVITAS Initiative's Thematic Group on Collective Passenger Transport¹² provides a number of resources, such as training and guidance materials, policy recommendations, and learning opportunities such as trainings, study tours or workshops. The group allows also getting in contact with the city officials and experts of the presented best practices.



Image: © Harry Schiffer - www.eltis.org

CIVITAS I | Nantes (France): Developing public transport interchanges

Prior to implementing the measure, Vannes Road in Nantes had a very poor image. The multipurpose four-lane highway served a big regional shopping centre and other services but lacked infrastructure for cyclists and pedestrians, and accessible links with surrounding areas. The project to remodel the road aimed to improve the quality of the urban spaces along this route, improving public transport services, and encouraging the use of other sustainable transport modes. The new design included creating a multimodal station at the intersection between the tramline and the road, better facilities for pedestrians and cyclists, extending tramline 3 towards the north-west, and improving bus lanes. The bus-tram-car multimodal interchange opened in September 2004.

It features a covered P&R facility with 302 parking spaces accessible directly from the Vannes Road, and 10 bicycle parking spaces. The ground level of the car park has 98 spaces for customers of the shopping centre, which previously owned the land where the P&R now stands. This is Nantes' first instance of such a public-private partnership.

The safety and comfort of pedestrians and cyclists improved thanks to the creation of uninterrupted pavements and more and better-distributed pedestrian crossings, with traffic-calming features, dedicated cycle lanes, street lighting and better-quality urban spaces.¹³



CIVITAS II | Norwich (United Kingdom): Providing a high-quality bus/rail interchange

Norwich rail station is located one kilometre from the city's commercial and retail centre. The lack of easy access from the station to connecting bus services prevented the use of local rail services for travel to work, and shopping and leisure activities. Public consultations had consistently demonstrated public demand for better links between the railway station and the city centre, and for better bus service signs. The principal objectives of the measure were:

- Redesigning the space outside the railway station to improve the location of the bus stop on the station forecourt;
- Improving access for buses currently stopping on the road by locating them closer to the railway station forecourt;
- Providing high-quality waiting facilities and real-time passenger information on the station forecourt with convenient pedestrian links between the station building, the waiting facility and the bus stops on the forecourt and the adjacent road; and
- Providing covered bicycle-parking facilities.

Work on obtaining consent for planning and from the railway industry began in April 2005 and continued until October 2006. The work started onsite in January 2007 and finished in early April 2007. The existing bus stops at the railway station were moved together, making it easy to catch any bus to the city centre, whether from the station forecourt or from the adjacent Thorpe Road. This work involved building a new bus stop lay-by on the south side of Thorpe Road and a large sheltered waiting area between the bus stops on the station forecourt and Thorpe Road. The waiting area has seating for 15 people and a dedicated wheelchair space, a ticket vending machine, and a display providing real-time information on bus arrival and departure times.

Introducing new routes serving the railway station and extending existing services to the station contributed to an increase in the number of bus passenger journeys to and from the railway station.¹⁴

CIVITAS PLUS | Perugia (Italy): Intermodal interchanges for public transport

Before introducing its measure, Perugia analysed the intermodality of public transport in its mobility plans. It paid special attention to selecting the best areas in which to create the nodes and obtaining approvals from official bodies. The city chose the Cupa area, where it would also conduct a pilot project. It performed a detailed topographic survey and created a design, and approved the plan to implement the infrastructure. The major objective was to integrate all of Perugia's transport modes better. The city specifically created high-quality interchanges between the bus network, rail stations, the Minimetro line, and the escalator and elevator systems. Moreover, to increase the quality of the interchanges, it installed a new telematic information system. Prior to introducing the Minimetro system, Perugia integrated the bus network with rail stations, the escalator and P&R

system. Following the decision to invest in the Minimetro, the municipality approved a new urban mobility plan (UMP), which helped it designed a new multimodal urban transport system in the city. The measure consisted of creating nodes to improve the quality of the interconnection through footpaths, protected corridors, footbridges and advanced information systems. The UMP recommended the multimodal integration of the public transport system as a priority measure for the city, with the emphasis on creating a network of high quality interchange stops.

The measure improved the public transport network and increased customer satisfaction. Bus passenger numbers increased by 114 percent. Furthermore, the measure resulted in the implementation of a new bridge for pedestrians in Bruciate and Fontivegge.¹⁵

¹⁴ Providing a high-quality bus/rail interchange, CIVITAS Initiative, accessed April 14, 2016, <http://www.civitas-initiative.eu/content/providing-high-quality-bus-rail-interchange>
¹⁵ Intermodal interchanges for public transport, CIVITAS Initiative, accessed April 14, 2016, <http://www.civitas-initiative.eu/content/intermodal-interchanges-public-transport>



Integrating different transport modes improves the efficiency of the system

Europe is facing formidable challenges. The continent must drastically reduce greenhouse gas emissions, oil is becoming scarce (pushing prices to unprecedented levels), and congestion is intolerable in many cities, airports and ports. One of the immediate priorities is integrating better different transport modes to improve the overall efficiency of the system. If successfully implemented, intermodal passenger transport gives more options to the traveller, is user-friendly, and adds to the overall efficiency of the transport system. Many transport stakeholders have to cooperate closely for seamless intermodal travel, which is not evident in a system of increasing competition.¹⁶

Apart from the above-mentioned CIVITAS measures, there are a plenty of examples on intermodality in European cities, with case studies from Budapest (Hungary), Clermont-Ferrand (France), and Ghent (Belgium), offering insights. Additionally, an EU-funded project on the use of bicycles in trains provides a reference to intermodal services.

■ How can a former tram depot become an important intermodal transport junction? The City Gate project is a good example of an integrated brownfield development that brings new life into a previously deteriorating area. The project area in northern Budapest served as a busy transport axis since the Middle Ages. The metro line reached the site in 1990 with a stop elegantly named “City Gate”, where passengers could also change to trains. The construction of a new bridge for the Budapest bypass changed and defined the new function of the area. After its opening in 2008, local and regional bus lines needed a comfortable interchange to the metro line. The planning of a new junction began this way, with the involvement of the railway, coach bus and Budapest public transport companies. Budapest inaugurated the new intermodal hub in 2010. The planning process aimed to increase accessibility and the attractiveness of

public transport. The new hub therefore has an easy-to-use information system and a special board for visually impaired passengers developed with the help of the Hungarian National Association of the Blind and Visual Impaired. There is an easily accessible covered rack for 20 bicycles – one of the first of its type in Budapest. Besides the metro and train platforms, it has nine bus platforms that welcome some 800 buses per day - mostly regional low-floor models equipped with Wi-Fi. In 2012 the junction also became the northern starting point of Budapest’s urban ship line, offering arguably the most spectacular public transport in town.¹⁷

■ With about 3.5 million travellers passing through the railway station in Clermont-Ferrand in central France, it is undoubtedly the city’s most important transport hub. The city decided, however, that improving of its connections with other forms of transport was essential. In its 2011 Plan de Déplacements Urbains (PDU), Clermont-Ferrand outlined ways to develop these exchanges further. The PDU covers Clermont-Ferrand as well as 21 surrounding municipalities, and improving the interchanges between the urban and regional public transport networks and other forms of transport (such as cars and bicycles), was a priority. Clermont-Ferrand planned to deliver these targets in less than five years, and assigned relevant stakeholders and a budget for each. After 22 months of work, the renewed station area officially opened in January 2015. The project was on time and budget; the investment costs of EUR 17 million were accurately forecast by the PDU. The new hub now features direct, accessible and safe links between the local and regional public transport, a bike-sharing depot, bicycle parking and a taxi stop directly in front of the station. Following this first phase, the city is redeveloping the interior of the train station (2015-2018), and increasing the capacity of its parking lot from 250 to 420 places. Integrating carpooling is also part of the second phase.¹⁸

¹⁶ Magda KOPCZYNSKA, DG MOVE, in the foreword of the publication PASSENGER INTERMODALITY FROM A TO Z, provided by the EU-project LINK, accessed April 14, 2016, <http://www.mobiel21.be/sites/default/files/publications/Brochure%20link%20kleiner.pdf>

¹⁷ City Gate intermodal hub in Budapest: the transformation of a derelict area into a bustling transport hub, Eltis website, accessed April 14, 2016, <http://eltis.org/discover/case-studies/city-gate-intermodal-hub-budapest-transformation-derelict-area-bustling>

¹⁸ Creating a comfortable intermodal transport hub in Clermont-Ferrand (France), Eltis website, accessed April 14, 2016, <http://eltis.org/discover/case-studies/creating-comfortable-intermodal-transport-hub-clermont-ferrand-france>



■ Ghent-Sint-Pieters is a 100-year-old train station with 50,000 daily visitors. Because of an increase in the number of people using the station, Ghent is remodelling it into a modern multimodal hub where travellers can transfer to the train, bus, and tram, or bicycle comfortably and efficiently. The changes include a renewed station, an integrated tram and bus station, indoor bicycle parking for over 10,000 bicycles and underground parking. Starting in 2007, the construction work will continue until 2024. During construction, the station continues to operate, and whenever a part is finished it immediately becomes operational. Even though the modernisation of the train station will not finish before 2024, there have already been some major results. For instance, the capacity of the train station increased without adding more train tracks. By reducing the number of switches, increasing the number of tracks used to Bruges and the coast, and by adapting the tracks technically, trains can enter and leave the station at a higher speed. In addition, broadening and lengthening the platforms allows for larger trains. A first part of the covered bicycle parking is finished, providing free parking for almost 2,400 bikes, and the first two underground pick-up and drop-off points (Kiss-and-ride) are in use. Within the upcoming five years, the station will also have five more tracks. Visitors, commuters and residents have been very positive about the new developments and have approved the changes. The first building is finished, and civil servants from the Flemish government, who work

in building, are very positive about the location and the building. The participation projects have also shown positive results, with people willing to invest time and ideas into developing the site. The project is transferrable to other countries and cities, but keeping in mind that realising similar projects requires several partners and a long preparation. Early and continuous communication is vital and public participation is necessary to make the project acceptable to commuters and residents. The partners are able to collect the concerns of the people via participative actions. Personal contact meetings discuss and solve problems. There are also initiatives where the residents can help design the squares and the park, which the regeneration project will also create.¹⁹

■ The 2014-2017 BiTiBi project, co-funded by the EU's Intelligent Energy Europe programme, aims to improve the energy efficiency of EU transport by providing bike-train-bike services: seamless door-to-door transport services combining bicycles and trains. The bicycle is by far the most energy efficient mode of transport for short distances, while the train is the most energy efficient transport mode for longer distances. A combination of both, whereby travellers use the bicycle for the first and/or the last mile, is by definition energy efficient. The project replicates the proven successful Dutch BiTiBi approach to attract new bicycle-train combination users. This approach consists of five building blocks: I) Build safe, secure and convenient bike parking facilities at train stations, II) Provide convenient public bikes, III) Unite the bicycle and train stakeholders, IV) Integrate payment system of bike and rail services, and IV) Communicate positively the advantages for combining bicycles and trains. Where possible, the approach also considers cycling conditions in the wider railway environment. The project replicates the Dutch BiTiBi success story in the United Kingdom (Liverpool), Belgium (Ghent and Liège), Spain (Barcelona) and Italy (Milan) while involving different kinds of stakeholders, railway operators, cities, organisations of (potential) users, and big employers around the railway station. Finally, the project also provides guidelines for implementing the BiTiBi concept in other countries and areas.²⁰





The main question is not whether intermodality will improve in the future, but how quickly and in which direction

The state of the art of quality and coverage of intermodal passenger services is still very patchy with large differences between countries and European regions. Many issues still need addressing to make significant progress towards a vision of comfortable, best-value long-distance intermodal travel from A-B, where passengers have a real, well promoted, transparent choice in travel options and the use of more than one mode is not perceived as a major discomfort of travel.

According to the LINK project, three underlying issues are the key to making a breakthrough in the quality and coverage of long-distance intermodal services.²¹

1 Intermodality is the ultimate test of putting the passenger at the heart of transport, and this passenger-centred culture needs to be cultivated and shared across operators of transport services and interchanges, transport planners and decision makers at the urban, regional, national and European levels. Once such a culture is in place with sufficient incentives for those involved to facilitate travelling across modes, cooperation and innovation will surely follow.

2 This is still a relatively new topic and clear social-economic business cases need demonstrating for intermodal measures (such as travel planners and integrated ticketing) if operators, public sector planners, and decision makers are to take them up. This can only work through (at least partially) public funded research and thoroughly evaluated demonstration projects. This is particularly important as passenger intermodality has no obvious advocacy group as single modes do, so the arguments have to be strong.

3 Achieving high-quality passenger intermodality at a European level is very tough. The community needs to address the above issues at urban and national levels, and bridge European policy, standards, minimum levels

of service, common approaches, and mechanisms of international cooperation. In some cases, regulation will be required.

From a European perspective, it would be desirable and realistic to have a European one-stop shop for intermodal travel planning in place within 10 years. This should be a single entry point that provides a minimum level of data, including timetables, travel times, basic fare/charge information and information about how to buy tickets in all European languages. Most long-distance transport operators in Europe (in cooperation with urban and regional transport authorities and operators) should effectively market and offer simple combined long-distance and urban travel tickets. It is also important to have accepted standards for designing interchanges available, and local transport services such as shared taxis, carsharing or bike rental should be joined up (at least in terms of ticket sales and information) with public transport.

One might expect a number of scenarios within 10 years. These include, firstly, that a number of countries, companies and event organisers will successfully target, encourage and promote sustainable long-distance transport behaviour with mobility management techniques and centres. Secondly, road operators will automatically provide or direct travellers to information comparing road and public transport options, including information on expected delays during planned events (such as roadworks and trade fairs). Finally, adjusting a number of national tax systems can incentivise sustainable travel behaviour.

To accelerate European development, however, it is key to develop an intense programme of education and training to support the development of a passenger-centred planning and operations culture for intermodal transport on national and urban levels.



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