

An Action Plan for Seamless Mobility in North West Europe







SYNAPTIC ('Synergy of New Advanced Public Transport Solutions Improving Connectivity in North West Europe') is an EU-funded INTERREG IVB cluster of four North West European transport projects: RoCK (Regions of Connected Knowledge), BAPTS (Boosting Advanced Public Transport Systems), SINTROPHER (Sustainable Integrated Tram-Based Transport Options for Peripheral European Regions), and ICMA amobilife (Improving Connectivity and Mobility Access).

It brings together 52 partner organisations from 8 countries in North West Europe with the common objective: to enhance the framework conditions for intermodality and seamless door-to-door journeys.

S-MAP 2030 (Seamless Mobility Action Plan for 2030) presents policy and investment recommendations to help build a system of seamless door-to-door journeys by public transport in the North West Europe (NWE) region, focused on the needs of the individual traveller. It sets out a vision and guiding principles that will help achieve a radical improvement in daily door-to-door journeys in NWE by 2030 by providing recommendations for policy changes and investment initiatives at EU, national and regional levels, and by identifying opportunities ("development potentials") and market barriers ("crunch points") that need to be unlocked to facilitate seamless journeys.

Contents:

amobilife

About Synpatic
About S-MAP 2030
The S-MAP 2030 Vision
Scenario: Today's Reality A Journey in 2012
Scenario: The Vision realised A Journey in 2030
Best Practise - Case Studies
Experience: Achieving the S-MAP 2030 Vision
The Traveller P <mark>erspective</mark>
The Mobility Manager Perspective
The Seamless Mobility Action Plan for 2030
Acknowledgements





2

3

4

6



Neither the European Commission, nor any person acting on behalf of the Commission, is responsible for the use which might be made of the information contained in this publication. The views expressed in this publication have not been adopted or in any way approved by the Commission and should not be relied upon as a statement of the Commission's views.

Seamless Travel Europe-Wide, 2030

European transport planners have taken a global lead in challenging old orthodoxies, developing a new way of looking at the problem. Instead of viewing the time spent in travelling as an inconvenience, and the transport interchange as a 'penalty', they can be looked at as opportunities. The quality of a journey matters as much as its duration. Across Europe, the evidence is that car use has peaked: travellers are increasingly avoiding congested highways in favour of high-quality public transport as the primary mode of travel (S-MAP 2030 Technical Report, November 2012).

This new thinking starts with the needs and preferences of the individual traveller for a smooth and seamless door-todoor journey – 'from any A to any B' – linked seamlessly from the "first kilometre/mile" to the "last kilometre/mile" using the most convenient and appropriate combination of transport modes, including public transport, walking, cycling, taxi service and car usage.

It means improving both the *instrumental* features of the trip - the directness and convenience of the journey from A to B – and also its *affective features* - the quality of the travel experience and the capacity to be productive.

S-MAP 2030's Target Audiences

S-MAP 2030 is based on an analysis of journeys completed in the NWE region in 2012, on expert reviews of current European good practice, and on consultations and round table seminars with transport experts and passenger organisations, which are published and available separately (S-MAP 2030 Technical Report, November 2012; S-MAP 2030 Technical Report of NWE Journey Audits, November 2012).

S-MAP 2030's key target audiences are:

- the INTERREG V programmes for the period 2014 to 2020.
- initiatives arising from the EU Transport White Paper 2011, and future EU programmes such as IEE, HORIZON 2020, EU Structural Funds, etc.
- national policies and investments of EU Member States.
- policies and investments at regional and city-region level, by governmental and/or transport authorities.

This Action Plan has been produced with extensive consultation with transport and passenger organisations in Member States, the European Commission, and the European Passenger Federation. It also follows four SYNAPTIC round table seminars attended by experts from industry, national government organisations, European organisations and the academic sector.

Achieving Seamless Mobility: Three Basic Principles

- The focus becomes the overall door-to-door journey, not just the individual elements. Journeys become coordinated, integrated and easy to use, with points of friction between different stages removed or reduced.
- Surface public transport is the obvious choice, compared to the private car or plane for many journeys within cities and between cities, and especially compared with short-haul air within Europe.
- The traveller only sees the 'tip of the iceberg'. while the delivery of transport services involves considerable underlying complexity for providers, it is simple for travellers to use.

Public transport becomes much more attractive as more destinations are served and journey time becomes more productive and enjoyable, e.g. Eurostar facilities. >

Connections between services are well integrated, with little delay, and interchanges are easy to negotiate, e.g. Paris Gare-du-Nord/FR. >

Rotterdam Centraal Station/NL is being redeveloped into a hub of opportunity including major public realm improvements, new employment and mixed use developments. >

In Freiburg i.B./DE the tram route runs through the middle of the residential areas and provides the quickest link into the town centre. Barrier-free access to public transport is available at the start of every journey. >





Delivering seamless mobility requires a change in mindset for many transport agencies and operators. The key to this change will be thinking from (and for) the traveller's perspective. A new vision is needed, creating seamless mobility with the following ten key elements:

1. Journeys are more productive

From 2012: The speed paradigm: While transport planning often emphasises speed, evidence shows that travellers increasingly value and use travel time in a manner that is enjoyable and productive.

To 2030: The productivity paradigm: While fast convenient services remain important, improved services and interchange hubs mean greater productivity when travelling. For example Swiss Railways have already introduced the philosophy - not "as fast as possible", but "as fast as necessary". They operate networks based on customers' needs: their trains connect at major interchange hubs at the same time.

Personalised mobility is universal: modules comprising technologies and systems are seamlessly integrated according to individual needs

From 2012: Individual operator businesses: Transport operators work to maximise their business returns and optimise their individual services, often in competition with each other.

To 2030: **Integrated mobility services:** Mobility providers define their core business as 'mobility management'. This covers all transport modes. Mobility companies offer personalised solutions for customers; companies may not always offer every module, but one module connects to other modules as required by the traveller.

3. Services are coordinated, integrated and easy to use *From 2012:* Service information and connections lack

integration: Timetables for different services are developed and published separately, without consideration of the vital connections between them. Information about connections is lacking and the physical connections themselves are often difficult or inconvenient, especially for those with limited mobility.

To 2030: Services and information are coordinated and demand responsive: Information about individual services is coordinated seamlessly in response to individual requests. Connections are fast and simple.

Ten Key Elements

4. Information and communications technology assists the journey experience

From 2012: ICT is poorly targeted and delivered: Electronic timetabling, booking systems, journey information, internet and mobile phone applications are generally fragmented. *To 2030:* ICT is a central element in creating a high-quality journey: Focussed ICT systems make door-to-door journeys simple to plan, book and pay for. They provide the traveller with options and guarantees in case of disruptions.

5. Transport Interchanges are hubs of opportunity

From 2012: Interchanges as 'crunch points': Changing is often seen as a potential journey disruption. Smaller interchanges often present traveller-unfriendly environments. **To 2030: Interchanges as 'opportunity spaces':** Transport hubs become useful elements of the journey – for exercise, shopping, a meal or networking opportunity – and community social spaces. Larger hubs are already becoming important destinations in their own right – this can also be extended to smaller hubs.

6. Travel disruption is managed, minimised and monitored

From 2012: Individual service failures multiply across transport networks: While operators try to ensure that their services run punctually, complex networks mean that disruptions occasionally occur. This creates cumulative problems for travellers.

To 2030: Mobility Management: Where a major disruption occurs, a mobility management service automatically intervenes to ensure that the traveller is looked after and the final destination is reached as conveniently as possible by an alternative mode or route. Improved facilities ensure that time delays are not wasted. Constant monitoring ensures quality control and traveller satisfaction, whilst adequate staffing is essential to ensure that there is always a human presence on hand to assist.

Special attention is devoted to the first and last mile/ kilometre

From 2012: Multiple obstacles: Travel planning services often make unrealistic assumptions about access to the transport network based on distance from home to transport stop. Street design, urban quality and the weather can present formidable barriers to some groups.
To 2030: An integrated approach: User-centric, door-to-door journeys mean taking account of many of the instrumental and affective factors that influence journey-making. The route to and from the station becomes much more attractive, including by walking and cycling.

8. Borders fade

From 2012: Levels of service suffer: Over the past 20 years, there has been a focus on improving strategic services within Member States. Cross-border rail-based services have suffered from rules, regulations and technical standards that prevent improved connections. There remain many barriers to international rail journeys.

To 2030: Technology and cooperation overcomes barriers: Hybrid transport technologies (e.g. diesel-electric trains) can be used across national borders between countries with different technical vehicle requirements. Borders become "zones" as opposed to "lines", to ensure co-operation and seamless connections. EU-MOVE and national governments work to develop co-operation, timetabling and revenuesharing. Transport operators overcome organisational 'silos' and run services across borders.

9. No traveller is left behind

From 2012: Separation of transport for different groups: Services such as paratransit or demand-responsive transit are provided for older people or those with specific needs. To 2030: 1 in 4 people will be in the upper age bracket: This will add to pressure on demand from those whose independence is determined by mobility. But enabling older people to access the full range of mobility services will ensure that no one is left out.

Seamless mobility, although complex to manage, is simple for the user

From 2012: Journey planning is complex and confusing. Journeys consist of isolated stages provided by different operators, poorly coordinated both in terms of location and timetabling.

To 2030: Journey planning is smooth and simple. The individual elements are combined in personal travel plans for each user. Although problems will inevitably arise, they are invisible to the customer.

Today's Reality

Suravi Dumill-Douze's journey from Preston (GB) to Delft (NL) in 2012

This is the story of Suravi, a working mother living in Preston in north-west England, who is leaving for a visit to Delft in the Netherlands for a business meeting and conference at the Technical University, taking her four-year-old child with her. It provides an example of a complex journey in the NWE of today, and the multiple frustrations that have to be overcome.

Home 09 hrs 30 Preston Station London Euston Station London St Pancras **Brussels** Midi Station Rotterdam Centraal Station **Delft Station Delft Campus** 19 hrs 00

Suravi and her partner have recently relocated to Preston from London to jobs at the University of Central Lancashire. They have rented a new home on the edge of a village outside Preston. But they are already finding some snags. The University is only 5km away and the village school works brilliantly for their daughter. But the bus service runs only once an hour, and today her partner needs their sole car to make a visit to a research complex difficult to reach by public transport. So Suravi has to leave over an hour before her train departure, wheeling two bags (one packed with material for the meeting) and carrying her small daughter in a backpack, for the 10-minute walk to the bus stop. The bus arrives five minutes late. Suravi can get her bags on the bus - not easy, since new passengers have to climb over them – for the 25-minute journey. Unfortunately the bus runs only to the bus station on the other side of town from the train station, necessitating a transfer to another bus for the last 10 minutes. Suravi is already beginning to feel nervous and drained of energy.

At the station, she pulls the bags down a long ramp into the historic station entrance, but then finds her London train is leaving from a platform that means going up and down a series of staircases. Now weary, she hears an announcement that due to a technical problem, the train from Glasgow is running 50 minutes late. She joins a queue of anxious people at the ticket office, but they cannot help her with onward connections because a different train company is involved.

Suravi arrives, still behind schedule, at London Euston Station and she now has an acute problem: her Eurostar to Brussels is due to leave in 45 minutes from London St Pancras, a kilometre distant. She finds a lift to take her down to the taxi rank but it seems to be on the wrong side of a vast and alienating underground space – and she then sees a long queue of waiting travellers. Now seriously anxious, she takes the lift upstairs and starts to walk along the Euston Road to St Pancras Station. It starts to rain, and spray from passing vehicles showers them as they try to navigate the narrow crowded pavement.

Arriving at St Pancras, she tries to board the Eurostar, but she is now ten minutes late for the minimum 30-minute check-in necessitated by security X-ray baggage checks and the passport check for entry into the Schengen passport-free zone (since the UK is not a member). Much discouraged, she joins a queue at the Eurostar ticket counter. There is another train in an hour but, since the Eurostar management takes no account of delays on the UK rail system, she has to give up her entire ticket and buy another at the maximum walk-up rate. She is relieved that someone else will have to meet the bill, though she foresees trouble with her university finance office.

Negotiating the check-in, Suravi boards a crowded Eurostar train to Brussels. The seats are not as good as she had originally chosen, but at least the train arrives at Brussels Midi Station on time. She exits the platform, waits in a queue for a crowded lift, and finds herself in the Station's central underground concourse. It is difficult to find the platform for her connection on to Rotterdam and the information kiosk has a long queue, but she finally sees an obscure electronic indicator that shows her the Rotterdam platform. She now has only minutes and there are more stairs to climb, with the bags.

She wonders why Thalys and Eurostar cannot cooperate to provide a through service, and recalls a news item that Deutsche Bahn were trying to do this but were facing all kinds of bureaucratic obstacles. The Thalys train also has to split in two, and she boards the wrong half, going to Cologne. She runs down the platform and jumps on board the correct half, just in time. The Thalys is supposed to be a high-speed train, but it seems to be crawling through Belgium with several unscheduled stops. After leaving Antwerp, it finally speeds up and she is soon in Rotterdam.

Here there is another problem: the station is a building site and, although it looks as if it is going to be impressive, there are no lifts and she again has to drag her bags down a long staircase to a temporary concourse. The connecting train to Delft is 15 minutes late, but staff at the information kiosk tell her that there is a different train in five minutes. She drags the bags up another staircase to the platform.

The trip to Delft takes less than 15 minutes but, arriving there, she finds another building site. A friendly local person, with excellent English, tells her that taxis are on the other side of the Station – over a footbridge with steep stairs. Almost exhausted, Suravi finds a taxi and drops her hand baggage at the hotel and arranges child care for her daughter. On the way, her friendly driver (also fluent English-speaking) tells her that this is all part of a huge programme to create a multimodal transport interchange, to be completed in 2015. He points to a sign indicating the start of a tram line extension through the huge campus to a terminus at Technopolis, the R&D centre for applied innovation – including new ideas for transport. She feels that she could really use some of those.

The Vision Realised

Suravi Dumill-Douze's journey from Preston (GB) to Delft (NL) in 2030

Imagine Suravi has been taken by a time machine into the year 2030. She is about to make a typical seamless international journey. It combines best practice that already existed in 2012, now widely applied, with modest and quite predictable developments – particularly in information and ticketing – which have transformed her trip. The Dumill-Douze have relocated to a new high-rise apartment complex, on the edge of the University of Central Lancashire campus in central Preston, close to a stop on the Ribble Valley Regional BRT system serving Preston-Blackburn-Burnley (and also the village where they used to live). They enjoy life here, with easy access to the cinema, music, theatre, schools, and with short commutes by walking, cycling, or public transport.

Suravi talks to her minuscule Brain+ (a personal organiser) for the best route and train. It books her a door-to-door ticket from her mobility provider, offering, of course, a personal service. Brain+ comes in different versions: most days, she uses one embedded in a ring on her finger, but today – because she wants to entertain her daughter by showing cartoons – she uses a 2012-style tablet. Her credit card is automatically charged and the Brain+ acts as the ticket. Since she has some bulky display material for the conference, she checks it in ahead the evening before; it travels overnight on a high-speed express freight and postal train, freeing space on board trains and daytime service schedules for an improved traveller service.

Suravi's Brain+ tells her that her Bus Rapid Transit bus is approaching the stop outside her apartment. Emerging from a tunnel under the campus, the bus drops staff and students, who have travelled from the Park & Ride transfer at the edge of the city, through the back door of a tubular bus shelter, originally designed in Curitiba in the 1970s, and now a worldwide classic. As she enters at the front, her Brain+ checks her ticket and automatically alerts her to any delays and likely problems with interchange. Looping through the County Council headquarters, where more travellers alight, in 5 minutes the bus arrives at the station and she exits through another Curitiba shelter.

The 19th century Preston Station has been redesigned to process large numbers of transfers. Suravi outside the station on Fishergate and walks into the building, through a new glass and steel entrance attached to the old Victorian station facade, adjacent to a new city square with cycle parking underground and cycle hire/café. There is now a new deck inside the old station building, offering a warm location to wait, buy a coffee or browse in the shops.

There are timed departures every 15 minutes to all major interchanges including the new London International station (Euston-St Pancras-King's Cross, an integrated major multimodal interchange via underground people mover), but Suravi boards an international Eurostar train direct to Brussels, Rotterdam and Amsterdam, which departs from Preston every hour, stopping at Manchester Piccadilly, London Western Gateway and London Olympic International. Her e-ticket is automatically checked. Since the UK remains outside the EU Core Area (which came into existence in 2020) security software automatically recognises her as a 'reliable passenger' needing no passport check within the EU.

Her train travels on High Speed Two, the main north-south high-speed UK line from London to the Midlands and North of England, which opened in 2028. Controversial in 2012, it is now accepted as a key element in the European public transport network. It is Europe's fastest, with trains travelling at up to 400 kilometres an hour – fast enough to compete with short-haul air trips from Manchester to mainland NWE airports, which have virtually disappeared since it opened. Transiting London via a short special link to the older (and slightly slower) HS1, it passes through the Channel Tunnel and runs non-stop through France and Belgium. On the journey Suravi drops her daughter into the play carriage, overseen by a professional child minder, and goes to work in a business compartment where she connects her tablet to the internet for a virtual meeting with other people coming to the conference.

Suravi is unfamiliar with the Rotterdam Station, but her Brain+ recognises this and gives directions to the restaurant, bar, retail area, and next platform. It alerts her that her connection to Delft is delayed by 15 minutes and diverts her to a faster connection. Since the Euro-10-Minutes-Guarantee is broken, she automatically receives compensation, direct to her bank account (without the need to claim). On return, her travel bill is automatically and directly charged and itemised, including business travel and compensation claims –no form filling nowadays.

In the new Delft Station interchange concourse, the number 19 tram offers a direct connection from the Station forecourt to the TU Delft campus, but Suravi wants to drop her hand baggage and collect her heavy baggage at the hotel, so she uses a driverless automated car, first tested by Google over 20 years ago in California, and now widely available in selected European locations including the TU Delft campus. Having coordinated its movements with the arrival of the train, it is waiting on the platform concourse and then drives direct to the hotel, where Suravi picks up her the heavy baggage, already delivered to her room.

On the following days, Suravi uses a 'Bakfiets', a cargo bike commonly used in the Netherlands for decades, to get some fresh air on the way to the Campus, to attend her meetings at the University. A crèche at the TU looks after Sami. The automated car, the bicycle and the crèche are already booked and paid for (as part of the eTicket Europe – an integrated platform of Europe-wide electronic ticketing services). After the meeting, she stays over for a couple of days for a family holiday: a useful way of reducing the environmental impact of business travel. The whole journey is almost zero carbon, because all rail is electrified and most power sources are renewable (since the cost of oil has risen so much).

Suravi reflects on the contrast with 2012, when public transport was often a last resort. Now everyone makes it their first choice. Tickets can be bought door-to-door, services are well integrated, information and entertainment are readily accessible; stations have been redesigned as travel and interchange hubs, and centres for their communities. Every city offers an excellent range of high-speed rail, tram-train, tram, bus rapid transit and bus options. The quality of the journey experience has been hugely improved, journey time is productive, enjoyable and little different to the rest of the day, in the office or at home. Travel is clean, electrically-powered, with very low energy consumption.

Delft Station

Rotterdam

Centraal

Station

Home

09 hrs 30

Preston

Station





Delft Technopolis





Swiss 'clockface' scheduling Good practice in service integration:

Introduced in the early 1980s, the clockface principle creates a consistent, 'cascading' provision of interconnecting transport services which can be easily navigated by the traveller with minimal prior planning. The principle is illustrated by the example of the scheduling structure adopted at Zurich main railway station, which shows how departure intervals increase with decreasing level of service. This basic service pattern is replicated across Switzerland, where all major cities have hub timings at approximately 00 and 30 minutes past the hour, and basic 'interval families' of 30 minutes for inter-city trains, 15 minutes for regional rail and bus services, and 7.5 minutes for local tramway and bus services in which schedules are integrated to provide optimal connectivity with higher order services. Overall, trains may travel slightly slower but overall journey times, including interconnections, are good.





Zurich main station: weekday, 12:14 p.m.: Optimised for the customer, not the operator. In 10 minutes' time, every platform will be full.





Amsterdam Bijlmer ArenA

Amsterdam Bijlmer ArenA Good practice in Multimodal Interchange:

Transport hubs integrate a number of different modes of transport at different levels - from local feeder to major national services. Hubs should be well-integrated into the urban environment. Local pedestrian access is indicated by way of clear 'totem pole' signage. Cycling is supported by good access and adequate, secure storage. Real-time information screens are provided for all services. There are staffed help points throughout the station. Larger interchanges facilities include:

- Escalators/lifts to cope with high numbers of passengers with luggage
- Staffing: Available from first to last train
- Canopies: At least half length of heavily used platforms
- Catering: Attractive choice open beyond core times
- Waiting Room: Available on well used platforms from first to last trains

An example of good practice is Amsterdam Bijlmer ArenA station in the Amsterdam suburbs, which serves a major sport and entertainment complex as well as back offices and a large public housing estate, integrates Dutch intercity and suburban stopping trains, the Amsterdam Metro, tram and bus services. Particularly notable is the architectural integration of the different modes, as well as the services, into a single all-embracing design complex of great clarity.

COMOVE (NL/DE) Good practice in information and ticketing:

COMOVE is an independent service developed in the Netherlands but is now operational in Hamburg and will be expanded throughout Germany and the Netherlands in cooperation with cities/large rural areas.

COMOVE is an app allowing users to choose any transport option connected within this area for door-to-door transport, based on the criteria; travel time, price and carbon emissions; for example:

Ulla goes from the ABC-Strasse Hamburg to the Berlin Fachhochschule. As the weather is fine in Hamburg she decides to take a rental bike instead of the U-Bahn to the nearest station. There she travels with an intercity to Berlin. As it's raining in Berlin, she decides to book a taxi. She chooses a Green Cab. When she arrives in Berlin, the cab is already waiting. On her account, she earns CO₂ credits which are highly valued by the city and allows her to vote for projects to improve the quality of life in the city. The greener she travels, the more points she earns.



The COMOVE-App allows users to plan and book multi-modal door-to-door journeys including carbon emissions as a selection criteria

Touch&Travel



Touch & Travel provides a demonstration case for e-ticketing integrating local, regional and national public transport connections.

Touch&Travel Payment (DE) Good practice in ticketing:

Touch&Travel is used for through ticketing for local, regional and long distance travel. It allows passengers to check in with their smart phone shortly before your journey and check out at end destination meaning passengers pay only the distance travelled. If passengers make several journeys on one day within a network, they will automatically be charged for a day ticket.

For example: You check in for your Touch&Travel journey at your local bus stop, get on the bus and change to the train at a nearby station. At Frankfurt/M main station, you take an ICE Intercity Express to Berlin, change at the main station to an underground or local train and check out at the end of the journey. Your bill comes at the end of the month by direct debit. You don't need to worry about getting the correct ticket for the Frankfurt/M regional public transport association, Deutsche Bahn (German Rail) or the Berlin public transport provider; you can just get on and go.

/ision
\mathbf{c}
N
٩.
~
2
S
the
b
evi
•
С-

SEAMLESS JOURNEYS: THE TRAVELLER PERSPECTIVE

	é
	·E
	t
5	ē
0	D
÷	S
2	E.
4	Ā
E	1
Ę	e,
Ś	크
ŭ	e e
Ъ.	5
÷	Ξ.
5	
÷	e
Å.	£

What needs to be done to turn Suravi Dumill-Douzes fictional journey into reality? How do we achieve the 2030 vision: a transport system, Europe-wide, with the traveller at the centre? How do we create a system with seamless door-to-door travel, from any A to any B, across Europe? Her journey, though fictional, is based on the results of a SYNAPTIC Project audit of real journey experiences across Europe in 2012, from the perspective of the traveller (S-MAP 2030 Technical Report, November 2012). The key message was that in most cases, the actual journey failed to meet the traveller's expectations:

- There was a strong lack of consistency and quality in basic services and facilities at transport interchanges as well as in response to disruptions and unforeseen circumstances across transport agencies
- and operators.
 The biggest deficiencies were instrumental issues, such as the cost and speed of the trip.
 Also some serious deficiencies among affec-
- Also some serious deficiencies among affective issues - the elements of journey quality we often ignore in the design of public transport systems. For example, there was a lack of Wi-Fi; the trip was perceived as inconvenient; it was poorly integrated, with too much waiting time; it was too busy, too overcrowded and travellers felt anxious and impatient, there was little chance for social interaction; they could not use their time productively; and there was insufficient protection against the weather.

All of these seem are fundamental problems with the quality of the public transport journey, and key barriers to increased usage.

Seamless Information	Seamless Ticketing	Seamless and Timely Connection	Seamless Interchange Hubs
Planning: Brain + Multi-modal travel information – available on various devices - which is easy to navigate, accurate and provides information over the complete journey whether local or international.	Purchasing: Brain + One ticket per journey, covering every stage and every different mode from start to finish. The critical aspect is integration across services and across borders.	Baggage Hassle-free movement of baggage, of every type. This could include advance check-in and collection of heavier baggage, before the start of the journey, as well as easy movement of bags and other items (e.g. baby buggies) at interchanges.	Direct Services The need to interchange is dramatically reduced by through services -journeys are as direct as possible, using hybrid technologies to bridge different technical standards across networks wherever appropriate.
Notifications Instant, personalised real-time notification to the traveller - both before and during the journey - of significant events including delays and missed connections.	Guarantees A journey guarantee and an automatic refund in the event of disruption by the provider, with no paperwork.	First mile (or kilometre) High-quality 'first mile' connections to the hub by a variety of modes. This means efficient local transport services – including mass transit, demand-responsive transport, and para-transit, and adequate infrastructure provision for physical modes from front door to interchange.	Social Hubs Hubs are no longer simply seen as disagreeable places, to avoid or transit as quickly as possible. By providing a variety of attractive services – eating, drinking, relaxation, and entertainment – hubs make a positive contribution to journeys and become a new focus of local community life.
Multi-Modal Mobility Management Tailored mobility services: door-to-door travel package, to provide travel tailored to the custo is an evolution of the traditional role of the tra the move.	offered by different providers in a single omer's needs, and real-time journey support. This vel agent – but now using e-communication on	Vehicles The precise type of vehicle provided at each journey levelis no longer important. All are clean, smooth, safe, and comfortable They provide on-board services to create a positive experience.	Consistent Facilities Consistency in facilities between hubs. Minimum guaranteed levels of services and amenities are provided at different levels of interchange. Everyone knows precisely what to expect.
Wayfinding Continuous, consistent information for the traveller at every stage of the journey – with clear signage, that is standardised and consistent across Europe, clearly visible at every point in interchanges – plus augmented reality to ease wayfinding.			Frictionless interchange Service integration through interchanges at every level -including the removal of remaining physical barriers. Iclear and consistent wayfinding, frictionless physical infrastructure, and timely coordination of services by different providers.
Border Crossings National borders become frictionless. Traveller. International journeys are as simple and as sm borders.	s are able to cross between all EU countries withou ooth as local journeys. Remaining gaps in the EU	t delays. Where necessary in special cases, security EN-T network are eliminated; trains, vehicles, and f	checks involve minimum delays. erries move fast and smoothly across

Accessibility

Technology continues to develop rapidly and becomes standard, but seamless door-to-door mobility must be as widely accessible as possible to every traveller – including visitors, infrequent travellers, the less well-off, mobility impaired or those with no Brain + or a mobility provider to manage their journeys. This means that technology must complement, not replace, simple and easily understood information, ticketing systems, networks and hubs with staff ready to assist.

Potentials for Improvement:	Simplified Information	Personal Mobility Management	Positive Journey Experiences	Positive Interchange Experiences
Actions to improve the journey experience, and seamless mobility, from a traveller's perspective are shown in the table above and beside, arranged in four themes: <i>Seam</i> - less Information, Seamless Ticketing, Seam-	Multi-modal and international travel information becomes the norm, with tools such as 'augmented reality' developed to help with wayfinding.	Mobility providers will organise tailored door-to-door travel, and provide real- time information and journey support in the event of disruption or changes.	The high quality services and journey experiences offered on longer-distance journeys, which support productive use of journey time, extends to all journey legs.	Although the need to interchange is removed wherever possible, hubs contribute to the positive journey experience.
less and Timely Connections and Seamless Interchange Hubs.				
	New applications are emerging that help with information delivery and wayfinding, but as yet remain uncoordinated. There is much	Ticket machines at interchanges such as Gare du Nord in Paris develop into multifunctional and multimodal Journey Information	The current provision for travelling can be much enhanced, with a better eating experi- ence, and perhaps using dedicated sections of	King's Cross in London is an example of an excellent station redevelopment, with a new western concourse and wider regeneration

SEAMLESS MOBILITY SEAMLESS MOBILITY SEAMLESS MOBILITY SEAMLESS MOBILITY

a new an

around the station

the train for business, entertainment, educa-

Terminals, complementary to face-to-face

potential here.

information provision.

tional and children's facilities.

Positive Interchange Experiences	There is currently no structure in place for minimum standards for different interchange levels.	Kassel's tram-train shows that an effective integration of previously distinct services is possible; in Kassel/ DE the tram-train now provides a network across the sub-region.
Positive Journey Experiences	The current focus on a single mode means that shorter journeys are usually not recognised as significant elements of longer journey chains.	Mobile technologies will transform the journey experience, allowing the journey to become a productive and enjoyable experience rather than 'wasted' time.
Personal Mobility Management	A competitive market-based approach leads to an inward focus and fragmentation between services.	At times, it is the personal help that counts and all stations need this face-to-face guidance on offer, like at the train station in Breda/NL.
Simplified Information	Incompatible data streams and lack of strategic coordination of information; in some cases information for different services is not located together.	Booking a journey with cross-border connections is easiest on the Deutsche Bahn website – there needs to be a European-wide version of this type of provision.

Potentials for Improvement

12

SEAMLESS MOBILITY SEAMLESS MOBILITY SEAMLESS MOBILITY SEAMLESS MOBILITY

ities for action:	obility Manager	ective
Prioritie	Fhe Mobi	Perspecti

The traveller perspective is central to the 2030 Vision, but to make that vision a reality requires action from the numerous agencies and operators who provide transport services to the traveller.

Many practical barriers and development opportunities must be addressed, summarised in the table opposite. The major barriers can be seen as "crunch points": elements, aspects or issues, which are crucial to achieve the 2030 Vision. Many of the action priorities do not require a widespread revolution in transport provision. There are many examples of good practice in transport provision across Europe. The SYNAPTIC project has reviewed current good practice in the four themes of seamless information, seamless ticketing, seamless and timely connections allowing journeys to be tailored more precisely to individual needs, and seamless interchange hubs (S-MAP 2030 Technical Report, November 2012). But generally they remain localised to a region, city or country. The challenge is often to extend the current best practice more widely across Europe.

	Seamless Interchange Hubs
BEHIND THE SCENES	Seamless and timeley connections
SEAMLESS JOURNEYS	Seamless Ticketing
	Seamless Information

Planning: Brain + Data-sharing is established across the region, with open access travel information integrated into multi-modal portals.	Purchase: Brain + Revenue-sharing and protection protocols allow multi-modal ticketing across national borders and between currencies. This may entail airline-style open ticketing policies which allow sale by third parties	Baggage A premium service which offers both a commercial opportunity and a means to use infrastructure and vehicle capacity intelligently. For international services, it will require coordination with local customs agencies.	Direct Services There will be major benefits in time savings and customer convenience from direct services able to interoperate between different networks and between a great variety of European cities.
Notifications Real-time information from individual operators (which already exists in many cases) needs to be up-called and integrated across journey chains throughout Europe. This may present software challenges but is well within the capability even of 2012 technology.	Guarantees This requires up-scaling of schemes already offered by operators who show confidence in the services they offer. But since journey chains rather than individual services are the issue, this will require pan-regional agreements between operators at all levels.	First and Last Mile Local public transport services need to be genuinely integrated with regional and longer distance services. This requires bringing bus and railway stations together to create easy, convenient multi-modal hubs.	Social Hubs Hubs, integrated into their wider urban contexts, allow facilities and amenity spaces to play a role both for interchan- ging travellers and for the local com- munity. Social media will contribute to promoting the use of hubs as meeting and networking spaces.
Mobility Provision Travel agents have, for the most part, been repl via the internet. There are commercial opportun management by third parties to provide journey the form of contactless technology – which is gu pre-paid limit. A pan-European guarantee system means that c paid in the event of journey disruption, without	cced by direct planning and ticket purchase ities for the growth of multi-modal mobility planning, support and ticketing – potentially in aranteed using a credit card, or against a ompensation is automatically calculated and the need for paper forms.	Vehicles By providing consistent levels of safety, comfort, and journey quality, providers can tailor vehicle type more intelligenty to traveller demand. This will require an expansion of services currently offered only in limited vehicles (e.g. wi-fr, power sockets, etc.)	Consistent Facilities There are commercial advantages to improving the quality of journeys and for boosting business opportunities in hubs. The creation of consistent basic standards for different interchange levels across different countries requires formal and enforceable agree- ments with a compliance plan.
Wayfinding Innovative approaches such as augmented reality could be achieved via a portable device or even as public information on long distance services, as currently occurs pre-arrival on long haul flights.	Cross-border Zonal Fare Systems Zonal fare systems should reflect natural catchment areas rather than administrative boundaries (such as regional or national borders).	Frictionless interchange Many NWE countries currently have modernisation interchanges for compliance with EU accessibility smaller interchanges. The integration of separated services onto a sing be transformative for travellers and offer comme	n programmes for major stations and regulations. These could be extended to le site, while a significant challenge, could rcial opportunities for providers.
Border Crossings Operators have a strong interest in smoothing n resolution.	ational borders in order to open as many internati	onal routes and intermediate stopping points as po	sible. This is a matter for political
Accessibility Operators have a commercial interest in making smaller stations and interchanges where comme	services as widely available as they can. Whilst sta rcial retail, information and ticketing outlets are c	ffing costs are a consideration, staff members may combined. This reduces the cost of providing basic o	oe able to 'multi-task', particularly in * 'traditional' information and ticketing.

SEAMLESS MOBILITY SEAMLESS MOBILITY

How do we achieve the S_MAP 2030 vision outlined on page 4?

The principal components of the S-MAP 2030 Action Plan are given below with actors we believe are most appropriate to implement them

SYNAPTIC Theme	Development Potentials	Crunch Point (Bottlenecks to Implementation)
Seamless Informa- tion	Seamless Information flow - navigating a multi-modal journey is a complex task. To be attractive and visible to potential travellers the multi-modal journey has to be facilitated and simplified by a constant and personalised flow of information.	 Public Perception - Low expectations of the public on operators, public ignorance of available options and lack of competence to use travel services. Privacy laws regarding personal travel data - Existing technology allows PT to be tailored to the individual, but the large volume of available data requires careful and secure handling. Incompatible information data systems - coordination of service providers and industries. Competition (regulation) inhibits data exchange and data hand-over between transport organisations.
	Human resources - adequate human presence in hubs and on board services to provide security and assistance.	Cost cutting - often means staff cuts, but the benefits for user per- ceptions of PT - safe, humane, easy to contact- are underestimated.
Seamless Ticketing	Transparent ticketing and pricing - one ticket for each multi-modal journey (from local to international). The pricing is transparent. Different combinations of trans- port modes can be compared for any given journey.	 Data - is produced in different formats by different operators. Real-time comparison of transport modes requires a high level of data availability and integration of a wide variety of data sources. Confidentiality - prevents the exchange of financial information by competing organisations Revenue sharing - protocols are often not in place Privacy laws - restrict the sharing and blocking of personal
	Personal mobility management - tailored travel services with real-time journey support and automatic compensation brought under quality guarantees. Transport actors define their core business as mobility management of all transport modes.	Competition regulations - in some countries undermine the coordination of services Single operators - and single transport sectors are differently regulated. The multi-modal journey lies beyond current regulation and
Seamless and timely connec- tions	Productive journey time - becomes as important as the current speed paradigm. The need to interchange is removed where possible, particularly for local journeys in border regios.	Public perception - travel time is often perceived as wasted time and an unavoidable loss for travel
	New Forms of Transport - A mobility system that has information provision and the multi-modal journey at its heart is an ideal platform to integrate, foster and publi- cise new forms of transport and emerging technologies.	Car Ownership - patterns are changing, meaning that alternative vehicle schemes e.g. car shares, shared taxis, DRT and paratransit services need to be included in the public transport web, particu- larly for dispersed markets and for addressing specific user needs. 'Growing pains' - innovative services take time to capture a vi- able level of market share.
	Borders fade - organisational, system, national and administrative borders are overcome with increasing interaction and coordination between agencies.	Low priority given to non-strategic lines and border connections for the adoption of technical specifications for interoperability, creating the need to change services, particularly across borders.
	Effective Journey Chains - created by regular, coordi- nated and economically viable connections.	Competition and an increase in the number of transport organi- sations increase the complexity of coordination; but coordination is at the heart of a multi-modal mobility system.
Seamless interchange hubs	Positive interchange experience - where interchanging is required, hubs become part of the positive journey experience and passengers appreciate time in hubs. While waiting for the connecting transport mode they can fulfil many daily needs.	 Public perception - journey interchanges perceived as critical weak links and impediments to seamless journeys. Management of interchange facilities - and services independently from competing organisations. Investment focus on transport links not on interchange between transport modes.
	Place making - Hubs are community assets as well as 'gateways' which give a first impression of a destination, and are well integrated in the urban structure and accessible by foot and bike.	Movement function is the current emphasis and hubs are not usually considered as 'destinations' in their own right.
	Shared mobility - Seamless mobility is attractive be- cause it has become a social and communicative activity.	Public Perception - mobility is predominantly an individual ex- perience. Sharing a vehicle or transport mode is a necessity, not a choice. The predominant experience is to sit among strangers in trains and buses or to be alone in your car. Interchanges are crowded and interaction between passengers scarce.

How should we address the 10 key elements for seamless mobility ?

RECOMME	NDATIONS	Key Agencies for implementation
 EU subsidies - are granted in relation to level of cooperation regarding travel planning, booking and pricing. Tendering - transport systems have to be modular. They are designed to be connected with each other. 	Statutory obligation for operators and authorities to provide travel data via documented and standardised interfaces at reasonable costs EU data policy - policy that balances public benefits with personal pri- vacy laws. Defines the potential and the public interest in personal travel data mining and carefully balances the advantages for the passenger of personalised services and threats of personal data release.	DG-MOVE, DG CONNECT, DG RESEARCH, transport operators, met- ropolitan urban transport agencies (to drive data integration) National and local governments (as subsidy providers)
Staff development - Staff deployed in dual retail-passenger assistance roles throughout the mobility system.	Tendering - Minimum staffing integrated into service level guarantees	Operators (to coordinate with local retailers)
Legal guarantees - to protect and compensate users in case of data or financial fraud Price guarantees - ensure that the cheapest ticket option is offered and billed.	EU legal principle - personal data cannot be sold and stays in personal ownership for ever Integrated reservation system - good practice taken from airlines and introduced in the mobility industry.	DG MOVE, operators Subsidy providers (national and local governments)
Integrated mobility packages - research and development supported to produce online and mobile services. Access to all transport modes provided by new mobility services based on usage, not ownership. Tenders include service level quality with incentives covering: • customer satisfaction • data sharing • open interface standards	 Public service contracts - Cooperation between operators incentivised through subsidy clauses. Passenger rights - include liability for the multi-modal journey sold as one product. Compensation schemes or Guarantees - in case the single multi-modal journey 'product' fails. Like the airline system, this spans across all sectors and operators involved. 	Subsidy providers (national and local governments) DG MOVE with transport operators DG MOVE with transport operators
EU policy - Travel experience established and defined as aim of EU transport policy Best Practice Transfer - learn from the Swiss slogan 'as fast as neces- sary' not 'as fast as possible' and from their pioneering use of 'clock face' scheduling, intermodality and quality of mobility provision. Reallocate car parking to prioritise and allow sufficient space for the range of road vehicle first and last mile/kilometre connections.	On-board service improvements mean that time spent travelling can be used for diverse activities e.g. working, meetings, entertainment etc. Demographic change underlines the need to ensure a basic level of network accessibility for all groups.	DG-MOVE, Member State governments (to drive demonstration projects). Member State governments (to revise competition regulation, and subsidise cooperation) Operators, local government
Support multi-modal vehicle development able to interoperate across different networks, reducing interchange need. Pilot schemes in border regios to show the integration of all aspects. Organisational change - that facilitates cooperation across borders must be supported.	Standardised EU signalling, certification regimes in planned upgrade programmes Demonstration corridor - implementation of the different elements on long distances and across national borders. 'Code share' cooperation between operators modelled on airline coordi- nation to reduce costs on peripheral connections but allow for competi- tion on core routes.	DG REGIO, Member States National or regional authorities Transport operators
 EU Policy - shift from transport corridors to transport hubs and their local and regioal catchment area. Special focus on major hubs near national borders. Tight integration of services within the transport hub, as for airports and some larger rail hubs. 	Support integration of new services into existing transport hubs- e.g. bicycle parking, electric bicycle hire, education, meeting facilities etc. Support high densities around transport hubs- e.g. Underutilised land taxed or reverts to community ownership.	Member State governments (to discourage vacant land and revise competition regulation) Member State governments, with regional or local authorities
Improve physical integration - into localities. Support value-added services - including social networking to create a	Revise legislation which inhibits spatial and temporal integration.	National governments (legislation), operators and community groups (in- tegration); local government (urban realm) Transport operators
allow passengers to share public space and private transport modes more effectively.		

15

For further information contact

City of Eindhoven Henk Kok, Synaptic Project Leader Sector Strategy/Bureau International Coordination P.O. Box 90150, 5600 RB Eindhoven, the Netherlands h.kok@eindhoven.nl

Iqbal Hamiduddin

Bartlett School of Planning UCL, Wates House 22 Gordon Street, London WC1H OQB, United Kingdom i.hamiduddin@ucl.ac.uk

Communication & Design

neubighubacher, Cologne, Germany Vermeulen Brand Design, Landgraaf, the Netherlands

Images

All photos and images from the SYNAPTIC study team, with the exception of Eurostar train photos (Eurostar International); Delft station (Mecanoo); Delft Station Rebuilding Site (Fritz van den Dop), Rotterdam station (Team CS, Rotterdam Centraal); High Speed2 (HS2 Ltd); and King's Cross redevelopment (Argent), Touch & Travel (Deutsche Bahn), COMOVE App (COMOVE).

Project Website

www.synaptic-cluster.eu www.synaptic-cluster/solutions

Produced 04/2013

The use of the S-MAP is strongly encouraged. Please feel free to use, multiply and copy it.

Acknowledgements

S-MAP 2030 has been written by a team from University College London as part of the SYNAPTIC project - and includes important contributions from the wider SYNAPTIC project team members. Thanks to all who have contributed to this document and to the extensive research that supports it, outlined in the S-MAP 2030 Technical Report (November 2012) and S-MAP 2030 Technical Report of NWE Journey Audits (November 2012).

SYNAPTIC Expert Group

Professor Sir Peter Hall, Dr Iqbal Hamiduddin, Dr Robin Hickman, Professor Peter Jones, Charles King and Colin Osborne (University College London), Professor John Nelson and Dr Mark Beecroft (University of Aberdeen), Mario Ramirez-Reiez and Dr Celiane Camargo Borges (NHTV Breda University of Applied Sciences), Professor Helmut Holzapfel (University of Kassel), Professor Dr Felix Huber (University of Wuppertal), Gösta Weber and Henk Kok (City of Eindhoven), Simon Hubacher (neubighubacher Consultants), Bonnie Fenton (Rupprecht Consult), Olaf Lewald (City of Bielefeld), Stuart Murray (Transport for Greater Manchester), Winfried Schmitz (TraffiQ, Frankfurt) and Willy Smeulders (European Passengers Federation).

Student Research Assistance

Thea Sellmann, Sandra Vinge, Dan Durrant and Edwin Loo (University College London), Craig Morton and Konstantinos Papangelis (University of Aberdeen), Joyce Fong, Rumen Moskov and Mirjam Wubbels (NHTV Breda University of Applied Sciences), Katharina Dillmann, Isabelle Hoth and Thorsten Stubenrauch (University of Wuppertal).

Thanks to consultees across Europe which include

European Commission DG MOVE and DG Region, European Passengers' Federation, International Association of Public Transport (UITP), City of Bremen Senate Department for Construction, City of Eindhoven - Environment and Transport, Passenger Focus, Passenger Transport Executive Group (PTEG), Bus Users UK, London Travelwatch, Rail Users Ireland, La Fédération Nationale des Associations d'Usagers des Transports (FNAUT), ProBahn, Verkehrsklub Deutschland, Reizigers Openbaar Vervoer (Rover), l'Association des clients des transports en commun (ACTP), Vlaamse Reizigersbond REBO, Trein Tram Bus (Belgium), POLIS, Nahverkehr Rheinland GmbH NVR

