S-MAP 2030

An Action Plan for Seamless Mobility in North West Europe

North West of England Case Study: Irrigating the Region

June 2013

UCL

synaptic
synergy of advanced
transport solutions

Content

About Synaptic

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 (Hamiduddin et al., 2013). 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.

This document – S-MAP 2030 North West of England: Irrigating the Region – provides a case study for the North West of England, considering how the recommendations from the SYNAPTIC project might be applied in the region. The aim is to support the regional economy with investment in major public transport projects, such as the UK's High Speed

2, alongside interchange improvements, wider infrastructure investments and other policy measures, helping to spread the benefits of improved accessibility around. We draw, therefore, on two key debates, crucial to the future prosperity of the UK. The first is whether the economy of the North West can be enhanced by improving connectivity to London, the South East and continental Europe. The second is considers how these benefits can be distributed across the North West region. In particular, whether they will be concentrated in a very few larger cities, or will spread across the smaller urban centres, towns and regions around them. Many of these areas are struggling in economic terms. The concept has been developed in France, and we seek to use it here: high speed rail investment, in coordination with supporting policy measures, used to irrigate (*irriguer*) the wider region (Hall and Chen, 2013)

The public transport journey becomes more enjoyable and productive - investment seeks to improve the journey experience.

1

About S-MAP 2030

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 (LeVine and Jones, 2012; Hickman et al., 2013,).

This new thinking starts with the needs and preferences of the individual traveller for a smooth and seamless door-to-door journey – 'from any A to any B' – linked seamlessly from the "first kilometre" to the "last kilometre" 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) (Steg, 2005; Stradling et al., 2007).

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 (Hamiduddin et al., 2013; Hickman et al., 2013).

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 roundtable 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.

2

Achieving Seamless Mobility: Ten Key Elements

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:

3

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 of 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.

2. 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.

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.

7. Special attention is devoted to the first and last 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 revenue sharing.

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.

10. 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.

EUROSTAR
Public transport becomes much more attractive as more destinations are served and journey time becomes more productive and enjoyable.

PARIS GARE-DU-NORD, FRANCE

Connections between services are well integrated, with little delay, and interchanges are easy to negotiate.

ROTTERDAM CENTRAAL STATION, THE NETHERLANDS

Is being redeveloped into a hub of opportunity including major public realm improvements, new employment and mixed use developments.

FREIBURG, GERMANY

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.

4

Today's Reality: A Journey in 2013

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

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.

PRESTON STATION
The current station offers much potential for improvement. Like many in the UK it suffers from huge under investment.

Home
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.

Preston Station
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.

London Euston Station
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.

London St Pancras
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.

Brussels Midi Station
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.

Rotterdam Centraal Station
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.

Delft Station

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.

Delft Campus

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 & 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.

KING'S CROSS ST PANCRAS
There are some great facilities on the way, but the journey is poorly integrated, with many changes between trains and even interchanges. At Euston there is a long walk to the Eurostar at St Pancras

ROTTERDAM CENTRAAL
The main stations in the Netherlands are all being upgraded, including at Rotterdam and Delft.

The Vision Realised in 2030

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

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.

(For an animated view see: http://www.youtube.com/watch?feature=player_embedded&v=AZnA5RlRAlY)

Home

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.

Preston Station

The 19th century Preston Station has been redesigned to process large numbers of transfers. Suravi alights 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.

Rotterdam Centraal Station

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

5

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.

Delft Station

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, & now widely available in selected European locations incl. 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).

Delft Technopolis

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.
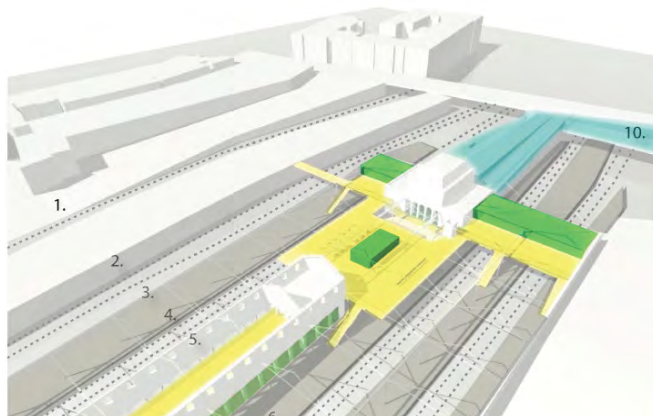
PRESTON STATION

The station is redeveloped as a multimodal interchange, offering integration between high speed rail, regional bus rapid transit and tram-train, and local bus. It is well designed internally to offer an improved user experience; is integrated into the local neighbourhood, with surrounding mixed-use development; and an improved public realm and access by walking and cycling.

ROTTERDAM CENTRAAL (Team CS-OVT)

Interchanges have been hugely improved, and are now viewed as a positive experience rather than a 'penalty'. Redevelopments in the Netherlands have led the way.

The public transport link is now an enjoyable part of the journey, allowing productivity in work or access to entertainment when in the train carriage. Information and ticketing have been hugely improved to create seamless connections between different services.

Frankfurt

'Touch and travel' allows quick and easy boarding and through ticketing for local, regional and long distance travel.

Touch&Travel
Immer dabei, immer flexibel.

So einfach funktioniert Touch&Travel

1. Registrieren
2. Anmelden
3. Fahren
4. Abmelden
5. Bezahlen

Zurich Station

Swiss 'clockface' scheduling creates a consistent, 'cascading' provision of interconnecting transport services which can be easily navigated by the traveller with minimal prior planning.

Best Practice
Case Studies

Amsterdam Bijlmer ArenA

Integration can be developed at a number of levels, including between different modes of transport, from local feeder to major national services; in the surrounding neighbourhood with higher density and mixed use development surrounding the hub; and internally, with an effective design of the internal station environment.

Comove App

Allows users to choose any transport option based on the criteria of travel time, price and CO2 emissions. Credits can be gained for choosing the public transport or cycle modes. Available in the Netherlands, it is being extended into Germany.

Achieving the S-MAP 2030 Vision
The Traveller's Perspective

What needs to be done to turn Suravi Dumill-Douze's 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 (Hickman et al., 2013). 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, there were 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.

6

Seamless Journeys: The Traveller's Perspective

Seamless Information	Seamless Ticketing	Seamless & 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 border.	**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 interchage is dramatically reduced by through services - journeys are as direct as possible, using hybrid technologies to bridge diffferent 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 kilometer)** 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 disagreable places, to avoid or transit as quickly as possible, By providing a variety of attractice 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 offered by different providers in a single package, to provide travel tailored to the customer's needs, and real-time journey support. This is an evolution of the traditional role of the travel agent - but now using e-communication on the move.		**Vehicles** The precise type of vehicle provided at each journey level is 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 ofinterchange. 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 interchange - plus augmented reality to ease wayfinding.			**Frictionless Interchange** Service integration through interchanges at every level - including the removal of remaining physical barriers, clear and consistent wayfinding, frictionless physical infrastructure, and timely coordination of services by different providers.

Border Crossings

National borders becomes frictionless. Travellers are able to cross between all EU countries without delays. Where necessary in special cases, security checks involve minimum delays. International journeys are simple and as smooth as local journeys. Remaining gaps in the EU TEN-T network are eliminated; trains, vehicles, and ferries move fast and smoothly across borders.

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.

Simplified Information:

Multi-modal and international travel information becomes the norm, with tools such as 'augmented reality' developed to help with wayfinding.

New applications are emerging that help with information delivery and wayfinding, but as yet remain uncoordinated. There is much potential here.

Personal Mobility Management:

Mobility providers will organise tailored door-to-door travel, and provide real time information and journey support in the event of disruption or changes.

Ticket machines at interchanges such as Gare du Nord in Paris develop into multifunctional and multimodal journey information terminals, complementary to face-to-face information provision.

Potentials for

Improvement

Positive Journey Experiences:

The high quality services and journey experiences offered on longer-distance journeys, which support productive use of journey time, extends to all journey legs.

The current provision for travelling can be much enhanced, with a better eating experience, and perhaps using dedicated sections of the train for business, entertainment, educational and children's facilities.

Positive Interchange Experiences:

Although the need to interchange is removed wherever possible, hubs contribute to the positive journey experience.

King's Cross in London is an example of an excellent station redevelopment, with a new western concourse and wider regeneration around the station.
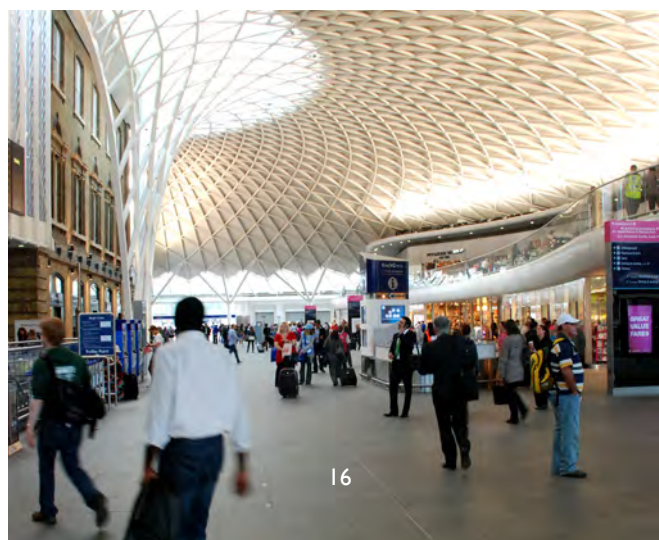
Achieving the S-MAP 2030 Vision
The Mobility Manager's Perspective

The traveller perspective is central to the 2030 Vision, but to make this 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. 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 (Hickman et al., 2013).

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 Journeys: The Mobility Manager's Perspective

Seamless Information	Seamless Ticketing	Seamless & Timely Connection	Seamless Interchange Hubs
Planning: Brain+ Data-sharing is established across the region, with open access travel information integrated into multi-modal portals.	**Purchasing: 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-scaled 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 servies 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 interchanging travellers and for the local community. 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 replaced by direct planning and ticket purchase via the Internet. There are commercial opportunities for the growth of multi-modal mobility management by third parties to provide journey planning, support and ticketing - potentially in the form of contactless technology - which is guaranteed using a credit card, or against a pre-paid limit. A pan-European guarantee system means that compensation is automatically calculated and paid in the event of journey disruption, without the need for paper forms.		**Vehicles** By providing consistent levels of safety, comfort, and journey quality, providers can tailor vehicle type more intelligently to traveller demand. This will require an expansion of services currently offered only in limited vehicles (e.g. Wi-Fi, 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 agreements 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 programmes for major stations and interchanges for compliance with EU accessibility regulations. These could be extended to smaller interchanges. The integration of separated services onto a single site, while a significant challenge, could be transformative for travellers and offer commercial opportunities for providers.	
Border Crossings Operators have a strong interest in smoothing national borders in order to opens as many international routes and intermediate stopping points as possible. This is a matter for political resolution.			
Accessibility Operators have a commercial interest in making services as widely available as they can. Whilst staffing costs are a consideration, staff members may be able to 'multi-task', particularly in smaller stations and interchanges where commercial retail, information and ticketing outlets are combined. This reduces the cost of providing basic or 'traditional' information and ticketing.			

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.

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 in the Netherlands.

Potentials for

Improvement
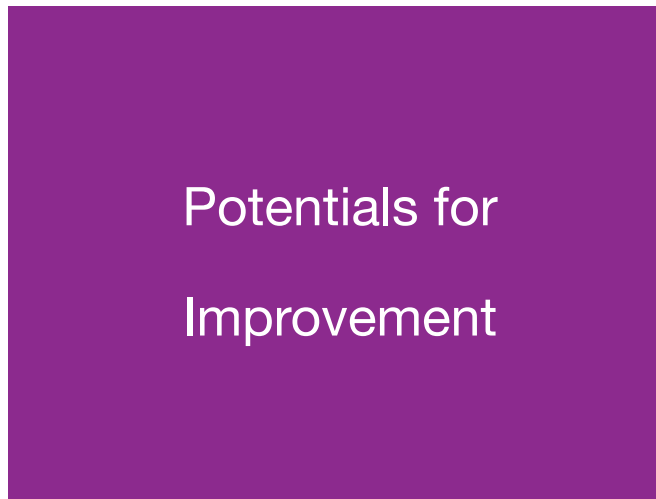
Positive Journey Experiences:

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.

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, the tram-train now provides a network across the sub-region.

19

North West of England Case Study: Irrigating the Region

The North West region in England provides an excellent example of how the wider SYNAPTIC research can be applied in a particular area. The region has three interlocking 'circles' of public transport, with very unequal levels of transport service and – as a result – very uneven access to the wider national economy (Hall and Chen, 2013):

- An inner circle comprising the high-speed West Coast Main Line, the key hubs at Manchester Piccadilly-Manchester Victoria and Liverpool Lime Street, and the urban metro systems radiating from these stations;
- An intermediate circle comprising the newly electrified network connecting these core cities with other key centres such as Bolton, Wigan, Preston and Blackpool; and
- An outer circle of places served by diesel-operated rail trains, generally infrequent, and (in the view of many users) poorly connected to the regional core cities or not connected at all – Pennine Lancashire (Blackburn, Accrington and Burnley); the South Fylde Coast resorts (Lytham, Ansdell and Fairhaven, and St Anne's on Sea); South Lancashire (Wigan to Southport, Ormskirk to Preston); North Cheshire (Altrincham to Chester); and the North Peak (Manchester to Marple and Buxton)

The SYNAPTIC proposal for the North West is to develop a further round of investments in the medium-term period, 2020-2032, anticipating the completion of HS2, by creating an integrated multi-level network of high-quality public transport linked at key locations through high-quality 'station superhubs'. Some of these investments have already been proposed by the relevant responsible agencies, including:

- Extensions of Manchester Metrolink through Salford Quays to the Trafford Shopping Centre and Port Salford, from Eccles to Eccles Station, and (via tram-train service inter-operating on heavy-rail tracks) to Marple;
- Extension of Merseyrail from Knowsley to Skelmersdale; electrification of the lines from Manchester via Altrincham to Chester and via Wigan to Southport, from Ormskirk to Preston, and from Manchester via Rochdale to Burnley and via Blackburn to Burnley, forming a Blackburn-Burnley loop; and
- Upgrading of the Liverpool-Manchester-Leeds line to become 'High Speed 1.5' – a 200 kilometres per hour (125 miles per hour) service, using Pendolino trains to navigate the sharp curves on the trans-Pennine section, and thus reducing the Liverpool-Leeds journey time to just over one hour (from Wray and Thrower, 2013)

In addition, the SINTROPHER and SYNAPTIC studies have identified potential extensions of the Blackpool Tramway, together with new BRT (bus rapid transit) links on abandoned rail right-of-way, to create a third city-regional network linking Blackpool and Preston. These links would include:

- An extension of the existing tram line from its southern terminus at Starr Gate via St Anne's and Lytham to Preston, inter-operating with heavy-rail services as a tram-train, and from Fleetwood (Copse Road) to Poulton-le-Fylde; this could be further extended via electrified Preston-Ormskirk and Wigan-Southport lines to form a Coast Tram, a major new tourist attraction resembling the successful example on the Belgian coast;
- Use of an existing express highway link, Yeadon Way, running on an abandoned rail right-of-way, to carry a new express BRT service from central Blackpool to major new residential developments east of Blackpool Airport; and conversion of abandoned rail lines to carry a new express BRT service from Preston station to park & ride interchanges at M6 junction 29/M65 junction 1, and to M6 junction 31A

7

These schemes are illustrated opposite and in the associated table, with a timetable for completion and the relevant implementation agencies.

S-MAP 2030 North West would extend good quality, well connected public transport from the urban cores of the North West to the peripheries. But it is intended to do far more than that: it is designed as a way of reducing the massive spatial inequalities that are now manifest between the different parts of the region, and between the North West and the London city-region.

THE SYNAPTIC VISION FOR THE NORTH WEST:

High speed rail investment in HS2, if supported by local public transport investments across the region, linking Manchester, Preston and Liverpool to the surrounding urban centres and towns, in addition to improvements to employment opportunities and skills, can work as a package of measures to improve the regional economy.
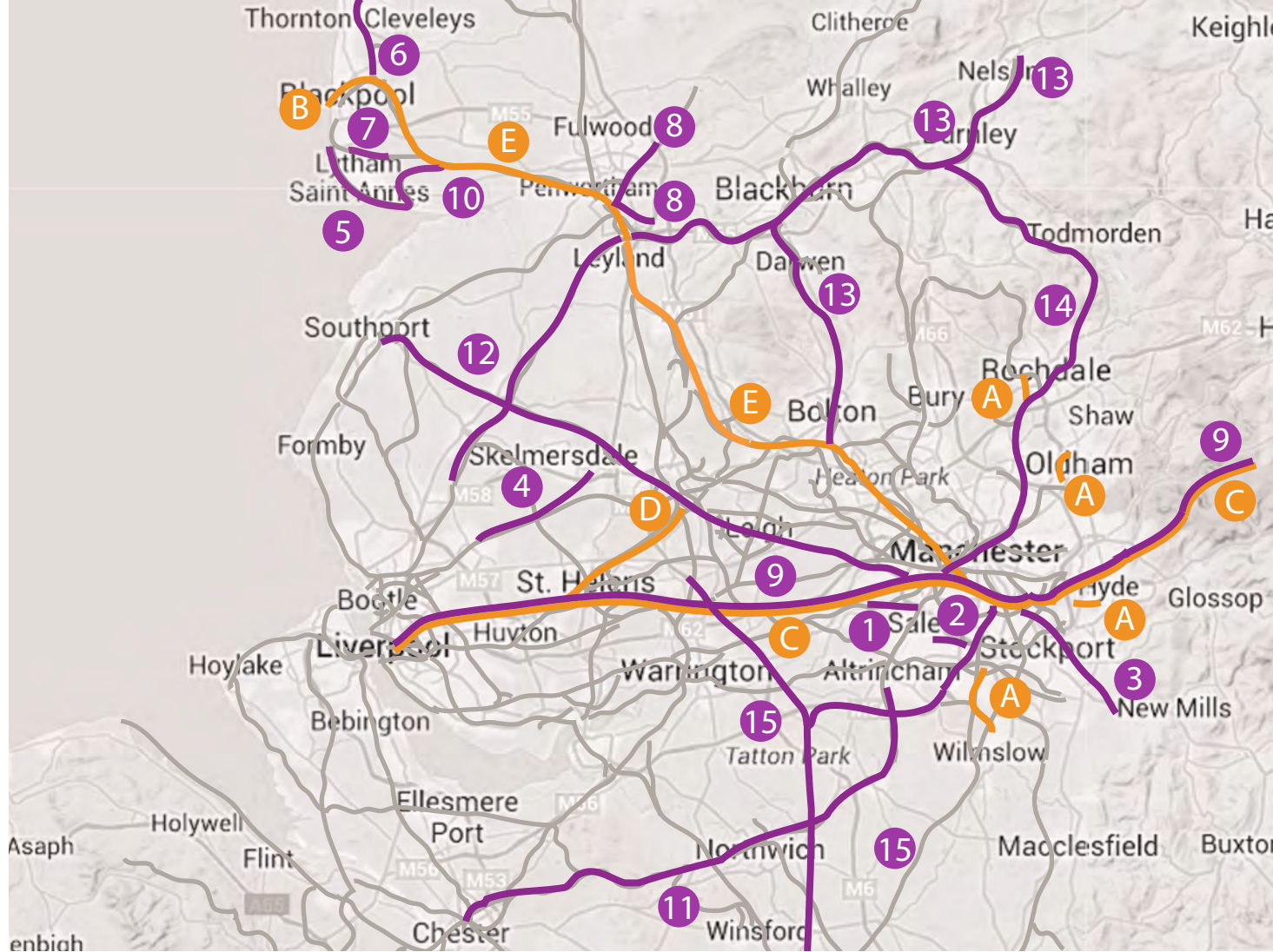
Stage One 2020

A. Ashton, Oldham and Rochdale Centres, Wythenshawe/ Airport
B. North Pier-Blackpool North tram extension
C. Liverpool-Manchester-Leeds electrification and Ordsall Curve
D. Liverpool-Wigan electrification
E. Manchester-Preston-Blackpool North electrification

Stage Two 2032

1. Trafford Centre-Port Salford tram extension
2. East Didsbury-Stockport tram extension
3. Manchester-Marple tram-train
4. Kirkby-Skelmersdale electrification
5. Squires Gate-St Anne's tram extension and St Anne's-Kirkham & Wesham electrification
6. Poulton-Fleetwood tram
7. Yeadon Way BRT
8. Preston BRT
9. High Speed 1.5: Pendolino Liverpool-Manchester-Leeds
10. Blackpool-Preston tram-train
11. Altrincham-Chester electrification
12. Manchester-Wigan-Southport and Preston-Ormskirk electrification, with Lancashire Coast tram-train
13. Manchester-Blackburn-Burnley-Colne electrification
14. Preston-Blackburn-Burnley-Todmorden electrification
15. High Speed 2

KING'S CROSS, LONDON:

The important lessons for policy makers are that transport investment can be critical to city and regional development, but it needs to be well integrated with the surrounding transport networks and the surrounding built fabric; it needs to focus on improving the user experience in the door-to-door journey; and it needs supporting measures in the wider economy. If the package of policy interventions can be well shaped, and well related to the particular context involved, there are many very positive impacts to follow.

SYNAPTIC S-MAP 2030 NORTH WEST

The proposals made in the S-MAP 2030 North West of England Case Study: Irrigating the Region have been developed by the UCL SYNAPTIC team to illustrate the potential application of the wider SYNAPTIC study. They are developed for illustrative purposes only and do not necessarily represent the views of the other partners or organisations on the study.

Table 1
SYNAPTIC's S-Map 2030 North West

System			Stage 1 – 2020	Stage 2 – 2035	Responsible agencies
1	**Inner metro networks**				
	1.1	Manchester Metrolink	Ashton, Oldham and Rochdale centres, East Didsbury , Wythenshaw e/ Manchester Airport (total 59 miles, 95 kilometres)	Trafford Centre / Port Salford, Eccles station, Stockport, Marple (tram-train)	TfGM
	1.2	Merseyrail	Existing system (total 75 miles, 121 kilometres)	Skelmersdale	Merseyrail
	1.3	Blackpool-Preston Tramway/ BRT Regional Network	Blackpool North (total 11 miles, 18 kilometres)	St Anne's-Lytham-Preston-Southport (tram-train – Coast Tram); P oulton-Fleetwood tram-train; Yeadon Way BRT ; P reston BRT	TfLa, Blackpool Transport
2	**Northern trans-Pennine electric network**				
	2.1	Liverpool-Manchester - Leeds	Liverpool-Manchester	HS1.5 – Manchester - Huddersfield-Leeds (Pendolino)	Network Rail; (New) franchisee
	2.2	Manchester - Blackpool	Manchester-Bolton-Preston-Blackpool North	Blackpool Club Train: Blackpool North-Eccles for Media City -Manchester Piccadilly; electrification, Kirkham & Wesham-St Anne 's, with Fylde Coast Club Train: St Anne's-Eccles for Media City -Manchester Piccadilly	Network Rail; (New) franchisee
	2.3	Liverpool-St Helens-Wigan	Liverpool-Wigan		Network Rail; (New) franchisee; Merseyrail
	2.4	Manchester - Chester		Manchester-Altrincham-Chester	Network Rail; (New) franchisee;
	2.5	Bolton-Burnley		Bolton-Blackburn-Burnley	Network Rail; (New) franchisee;
	2.6	Manchester-Wigan-Southport; Ormskirk-Preston		Manchester-Wigan-Southport; Preston-Ormskirk; and Fleetwood-Blackpool-St Anne's-Preston-Southport tram-train (Coast Tram)	Network Rail; (New) franchisee; Blackpool Transport
3	**Hub interchanges**				
	3.1	Manchester Piccadilly and Ordsall Curve link	New Metrolink lines	HS2	Network Rail; TfGM; HS2
	3.2	Manchester Victoria	Hauptbahnhof for through services, Liverpool-Manchester - Leeds-Newcastle; second city centre Metrolink line		Network Rail; TfGM
	3.3	Liverpool Lime Street		HS2	Network Rail; Merseyrail
	3.4	Preston		HS2; tram-train; BRT	Network Rail; TfLa; (New) franchisee
	3.5	Blackpool North	Tram link		Network Rail; TfLa; Blackpool Transport

TfGM: Transport for Greater Manchester   TfLa: Transport for Lancashire

(Hall and Chen, 2013)

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The photo shows a train station platform with signs 6, A, A, 5.2 and a tram reading "Wolfhagen".