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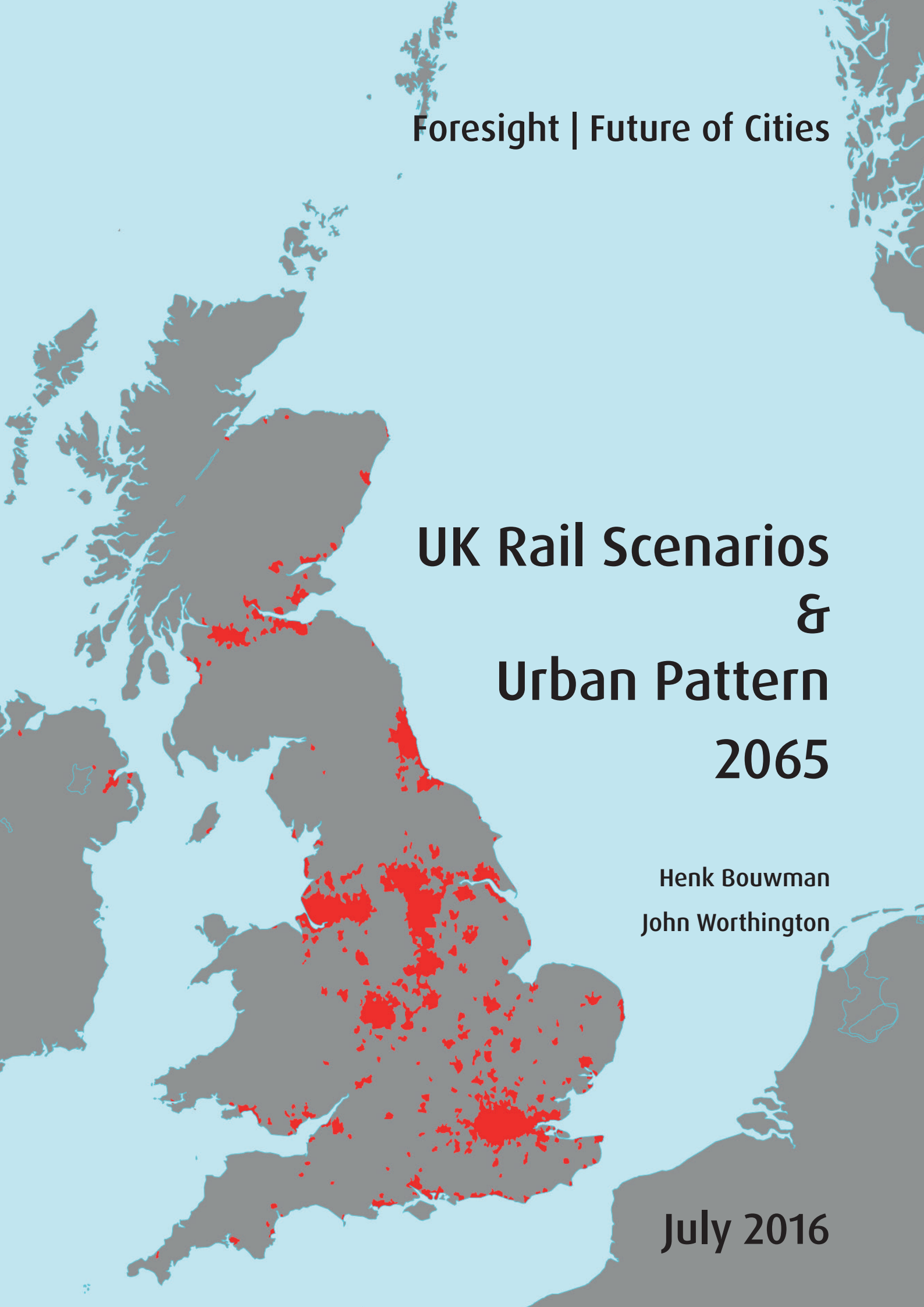

# UK Rail Scenarios & Urban Pattern 2065

Henk Bouwman

John Worthington

July 2016

Foresight uses the latest scientific evidence and futures analysis to address complex issues and provide strategic options for policy.
Foresight projects examine either an important public policy issue where science might be part of the solution, or a scientific topic where potential applications and technologies are yet to be realised.

Within the frame of their Foresight projects programme, the Government Office for Science GoS has invited Henk Bouwman and John Worthington to produce a scenario study exploring alternative futures for cities and regions based on the impact of UK rail scenarios on cities in the next 50 years.

Henk Bouwman – UiP urban producers - is an urbanist and specialist on station district developments in Europe.
Prof. John Worthington is the commissioner leading the Independent Transport Commission (ITC) research on the spatial effects of High Speed Rail. They are both co-authors of the publication 'Ambitions and Opportunities – Understanding the spatial effects of High-Speed Rail', November 2014 (ITC), and both led the 'Future HS2 Cities and Regions' - workshops to disseminate the insights from the ITC HSR research project.

John Mason – planner and urbanist - has assisted in qualitative data research and critical analysis.

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# Acknowledgements

We have based this study on our own experience gained working on long-term urban development schemes and research projects such as the recent Independent Transport Commission Review on High Speed Rail in the UK.
But an important part of this study is also inspired and fed by experts who have kindly given their time to be interviewed:
Sarah Kendall - Network Rail, for insights on both day-to-day rail operations and strategic infrastructure plans;
Geoffrey Woodling - Business Futures Network, for his global experience and expertise on futures in lifestyles and economics;
Paul Buchanan - Volterra, for his considerable experience and understanding of urban and transport economics;
Tim Stonor - Space Syntax, for his expertise on smart cities;
Roger Madelin - Argent and ITC, for his depth of experience of achieving change;
Alan Baxter – Alan Baxter Associates, for his inexhaustible knowledge on everything related to rail;
And still in the background, Sir Peter Hall, who has inspired us all to think beyond the usual!
Finally we would like to thank the Foresights Expert Group, chaired by Sir Alan Wilson, for having the opportunity to explore this subject and learn!



# Preface

This report is the result of a journey from the past to the future and back to explore opportunities and the impact of possible Rail Network Scenarios in the UK. In his book 'Reframing Business, When the Map Changes the Landscape' Richard Normann explains that time should not be perceived as a continuous line from the past into the future, but as a present condition in which we interpret the past and draw up scenarios to meet expectations and explore ways of continuing.
The UK Rail Scenarios 2065 sketches three possible outcomes over a 50 year time period. 50 years look a long way ahead, but in the rail industry, today's strategic infrastructure decisions are shaping the urban landscape of 50 years ahead. Based on experiences in the UK and elsewhere in Europe we see that changes in rail infrastructure often take a generation to embed. That means that in order to achieve aspirations and ambitions for change and improvements in the UK rail infrastructure certain steps should be taken in the near future.
We hope that these 'explorative scenarios' offer other ways of thinking and help to formulate ambitions and policies. It by no means pretends to be a truth!

Henk Bouwman
Prof John Worthington

July 2016

# INTRODUCTION

## On this Work

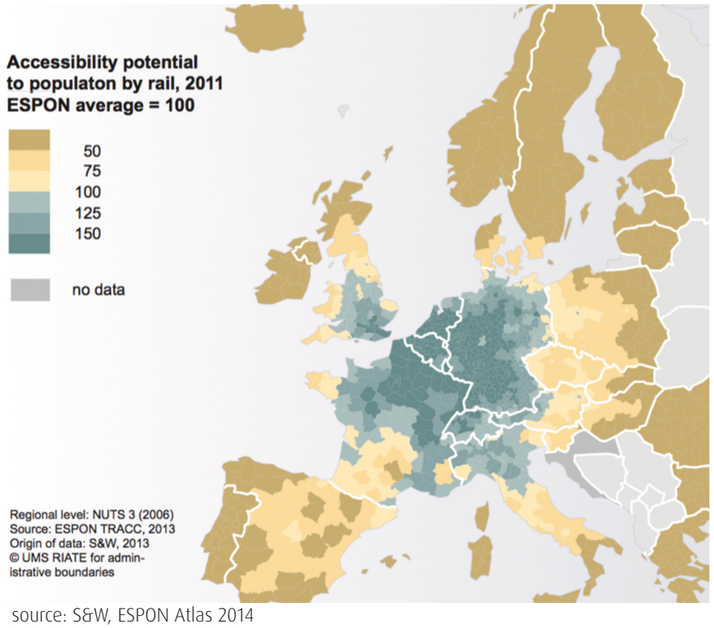
Ways of and reasons for travelling by rail have changed dramatically over the last few decades and will most likely continue to do so due to changes in people's social, economic and technical circumstances. This will impact urban development in many different ways. These future scenarios will allow policy makers to critically explore policy options for city development in relation to rail connectivity.

The scope of this study is to provide alternative scenarios for UK Rail Futures 2065 and opportunities for further development of the cities and regions. This will support disseminating GoS Foresight Future of Cities work to selected UK cities and central government policy makers.

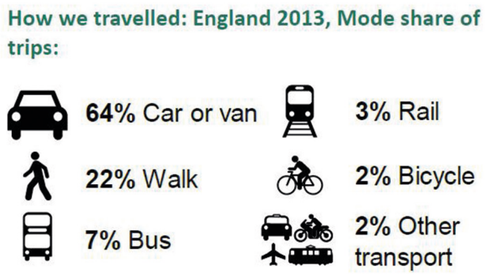
Approach
The study is based on 'Learning from Experience' and uses research results and insights from recent work on the impact of HSR on UK Cities. The study is in two stages:

1. A background paper to set the scene and identify key drivers for socio economic change.
2. The scenario study showing three different ways of how rail (network and operation) might evolve in 50 years, time and what that could mean for the UK urban form.

This document is the result of both stages. The first part, 'Setting the Scene', resulted from the background paper. It outlines the key drivers for socio-economic change and reflects on specific issues within the current situation in rail network and rail operation.
Based on the findings from other studies and interviews with people from different sectors in the field of urban change, pre-conditions are formulated to give directions for the scenarios.




source: S&W, ESPON Atlas 2014




source: ETA Trust, The Face of Travel, December 2014



The second part presents the UK Rail Scenarios and the possible Urban Landscape. The continuous change in cities is dependent on so many parameters, sometimes unknown, and there are no formulas to predict these futures. We have however, using the scene set in the first part, formulated pre-conditions on key aspects, which allowed us to sketch three possible scenarios for the future of cities over a 50 year time period.
As we can see elsewhere in Europe and around the world, excellent Connectivity and Accessibility are key to the economic success of cities. And since the UK road network will be nearing saturation in the time span of the scenarios, the vast UK rail infrastructure network offers opportunities for intense, convenient and clean travel for both passengers and freight. But although UK rail has a relatively similar accessibility potential for the population as elsewhere in Europe, the use of rail compared to other means of transport is some way behind. Based on earlier experience researching the spatial effects of HSR in the UK it appears that an excellent interconnectivity between the various modes (train, tram/metro, bicycle, bus and car), sufficient capacity of trains, the convenience of interchange and the legibility of the interface between clients (passengers) and systems (ticketing, pricing, communication in general) are extremely relevant to the way people perceive public transport (even in combination with the car) as a good alternative for travel.
The proposed scenarios show different rail options (network and operations), but also different ways of integrating the various modes. Using the key drivers for economic activities (not necessarily growth), we have linked the rail scenarios to different UK urban landscapes.

The main aim in preparing these scenarios is to influence the way of thinking about, and support decision making for, future developments in rail and urban form.

Sources
The background paper uses earlier research and study results of the Foresight Future of Cities programme as well as the position papers that are currently being prepared by members of the Lead Expert Group of Future for Cities; demographic and population growth projections and Aspirations for the Future (https://www.gov.uk/government/collections/future-of-cities#project-reports).

Other sources drawn from are:
-The ITC's study on High Speed Rail resulting in the publication 'Ambitions and Opportunities, Understanding the spatial impact of HSR', November 2014;
-Preceding studies and study trips for the ITC's HSR project, including research on network and socio-economic impact in Benelux, France and the Nordic countries;
-The 'Learning from Europe" programme (INTA and the Academy of Urbanism) and especially the publication 'Places of Connections', September 2012;
-Nieuwe Stedelijkheid, WRR Advice, December 2012 (Scientific Advisory Board on Government Policies (Netherlands))

In addition to this background literature, we have interviewed experts in transportation and economic and spatial development:
-Sarah Kendall, Network Rail, Area Director and Strategy Advisor
-Geoff Woodling, Business Futures Network, Director
-Paul Buchanan, Volterra, Economist
-Tim Stonor, Space Syntax, Architect Director
-Roger Madelin, Director Argent and ITC Commissioner

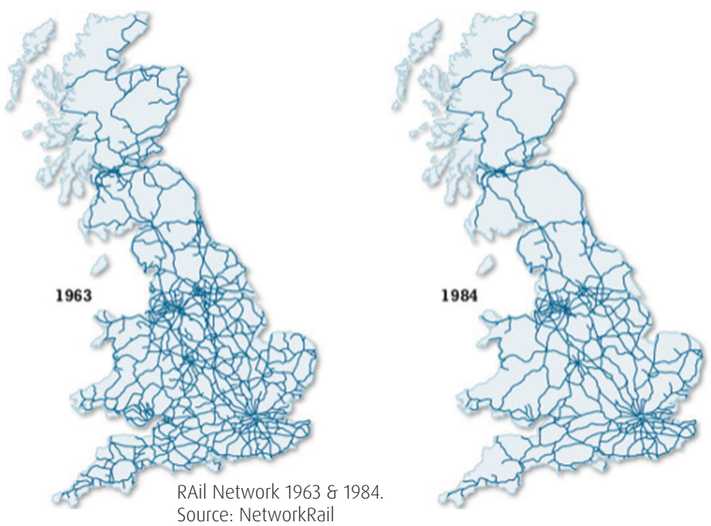
We have held a workshop with SpaceSyntax on their Future of Cities work on mapping UK Growth Scenarios.

# RAIL

## on Investments

Most UK rail infrastructure dates back 150 years. Changes or additions to the infrastructure network are thought of in five to ten year chunks, since the impact of rail improvements often take a generation to embed. For Network Rail and other bodies, long-term strategic options are articulated as options for funders: it is up to funders whether improvements are done quickly or slowly. Another factor in scenario planning is the capacity of suppliers: for their operations it is better to spread demand evenly over time.

Preconditions:
Create a long-term vision for the UK Rail Infrastructure Network.
Prioritise key projects in time, sequence and necessary funds.
Define key projects in scale: national, regional and local.
Understand the capacity of suppliers and support them in skills development programmes.
Define type of investor related to type of project (eg. long or short term).

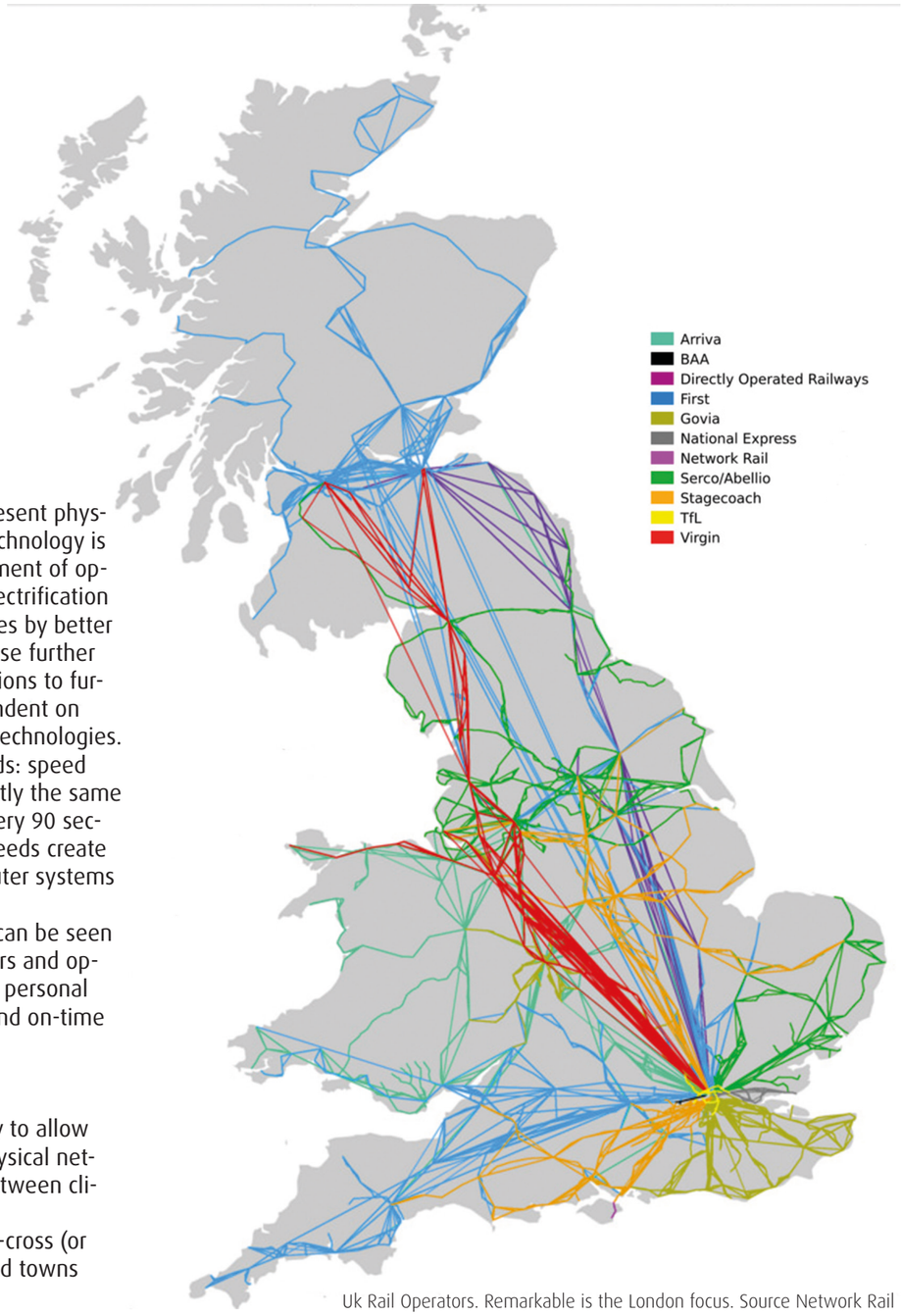



RAil Network 1963 & 1984.
Source: NetworkRail

## on Technology

Brunel would still recognise the present physical system, 150 years later. And technology is not the limiting factor for improvement of operations. Improvements such as electrification of lines, optimising the use of routes by better computer systems in order to release further capacity and introducing ICT in stations to further optimise operations are dependent on funding, not on the availability of technologies.
In terms of capacity, rail is like roads: speed dictates capacity. Trains doing exactly the same thing on a single line can leave every 90 seconds. Trains moving at a mix of speeds create a challenge for timetabling. Computer systems can help in optimising operations.
The biggest change in technology can be seen in the interface between passengers and operators. The development of smart personal devices will result in on-demand and on-time services for travelling by train.

Preconditions:
Apply (already) existing technology to allow opportunities for improving the physical network, operations and interfaces between clients and operators.
Address the growing need for criss-cross (or radial) travelling between cities and towns (compare M25 ring road).




Uk Rail Operators. Remarkable is the London focus. Source Network Rail

## on Operations

The EU has clear rules on the separation of infrastructure and operations but this is not the critical issue when it comes to integration of various rail operations. The major issue in the UK is timing: rail franchises are awarded on 7-year contracts, which are too short to encourage long-term planning and investment. Network Rail and the franchisees have different objectives. The remapping of franchisees' areas is another complicating factor.
Integration between the various modes of transport is complicated due to differences in accountability and responsibility (e.g. train operators are independent whilst Transport for London is directly accountable to local government). Administrative boundaries are increasingly meaningless to transport operations and are obstructive to further integration. Integration is an organisational and operational issue.

Preconditions:
Meaningful geographical boundaries for collaborating authorities are key to integrate transportation services (passengers and freight).
Establishing the accountability and responsibility of operators under a single control is essential for joining up services.
To monitor integration and advise on improvements an informed and focused client body can be key to improved operations (e.g. the Netherlands: governmental 'Inspectorate for Living Environment and Transport' and Passengers Interest Society 'Rover', similar to the Swedish model).

# ECONOMICS

## on 'Industries'

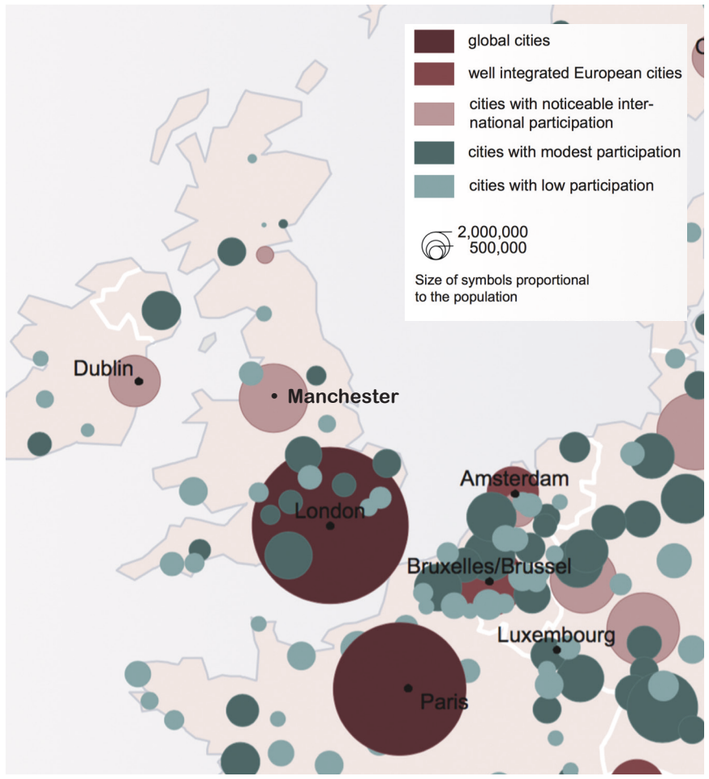
It is possible that the economy of central London will have changed greatly in 50 years. London will remain and even strengthen its position as the European Global Capital for the brightest human capital and their biotope. The organisational structure of banking, legal and other professional service will survive, but it is likely that (for example) certain operations in the financial sector will be replaced by smart systems, and some organisations and institutions will move their R&D and specific back-office operations to cheaper cities like Manchester-Leeds, Birmingham and Amsterdam and in future maybe to Lille-Brussels depending on extra capacity in the EU mainland connection.
The UK has a world-class manufacturing legacy. Developments in new ways of manufacturing (3D printing, robotics, etc.) will give new opportunities to further establish the UK manufacturing industries. For this, new ways of funding are necessary, to support the industries and to ensure accessibility to and from markets through both virtual and physical networks.

Preconditions:
London remains the Europe's premier Global Metropole.
London will be Europe's financial core city in an orbital system of concentric, servicing cities.
Local/Regional investment Banks can be helpful in developing the 'New Manufacturing' and innovations in the industries.
Further development of specific skills is necessary to create and nurture specific biotopes for excellence, which in turn will help to create distinctive city economies.

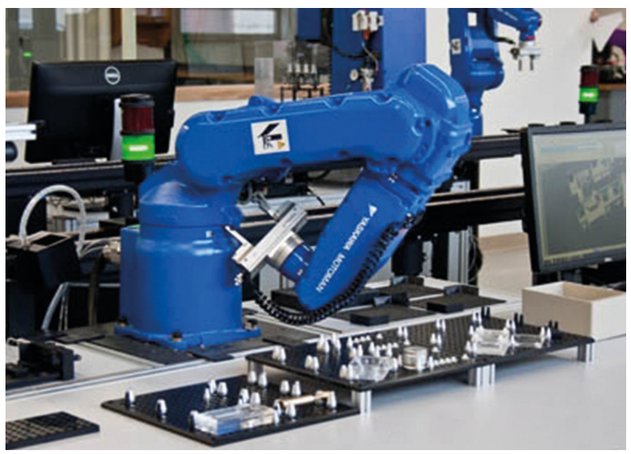
## on Competition

London should focus on its position as Global Capital. Its competition is to be found in Hong Kong, Dubai, New York, and Sao Paolo. The UK regions, with their manufacturing industries, universities and legal and financial services, will have to compete with other European regions. Therefore London should focus on its global position leaving issues of regional governance with the regions. The UK cities and regions will have to collaborate more closely and use the benefits of London's improved proximity to compete with other EU regions. Investments in radial connections, instead of London focused, will reinforce the perception of the regions as polycentric systems of cities and market towns. This will be key to the economic success of the emerging industries.

Preconditions:
Developing the UK cities and regions will mean adapting a model of polycentric collaborating cities.
City regions should be able to respond quickly to changing economic markets in order to remain competitive and therefore should be more independent.




Global Position in Economic and Research Network, source: ESPON Atlas - Mapping European Territorial Structures and Dynamics, November 2014



Advanced Manufacturing: One of the robotic arms used in Manchester Community College's robotics lab. Photo: Liisa Rajala

## on Manufacturing

Manufacturing has been and is still one of the UK's strong economic activities. The emerging new ways of manufacturing (3D, robotics, clean) give opportunities to further develop the manufacturing of high-tech and high-end products and to build on the great knowledge of (raw) materials as a base for this.
At the client side it might bring the manufacturing of (for instance) a chair closer to the client, using (downloaded) software and being printed around the corner. At the industry side it might further develop the manufacturing of machines that produce these products, impacting on R&D, education (skills), transportation and logistics, services, finance and legal. Sales and distributions/logistics are key conditions for successful manufacturing industries.

Preconditions:
The latent unique attributes of each UK city region can be awakened by the opportunities of New Manufacturing. Examples of distinctive assets are myriad: specialist knowledge of materials and a proud 'culture of making'; creative industries stimulated by the popular music; an innovative branding and advertising industry; etc.
Specialisation of the city's and region's industries needs devolution of power in order to allow them to quickly adapt to emerging markets and demands.
Specialisation will bring a greater variety in the city economies.

# LIFESTYLES

## on Urban Economy

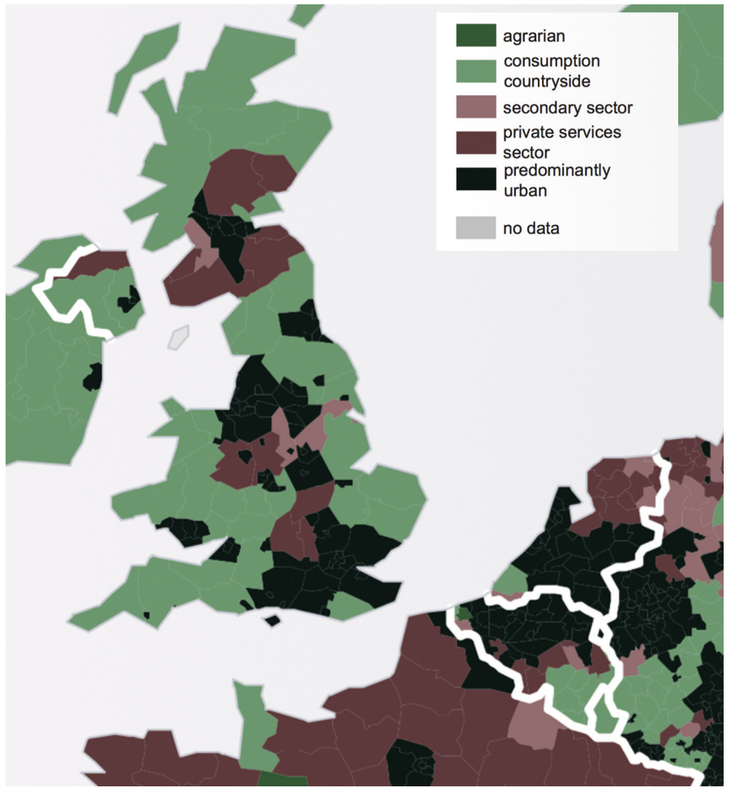
85% of the UK population lives in an urban economy. The present sprawl of work, leisure and living has led to a more diffused pattern of travel. Sometimes the weekend use of cars and public transport exceeds the weekday. London is in many ways an exception being a Global Capital: 30% of jobs are in the inner city and 90% of these jobs are high value. However the London CBD has changed drastically over the last 50 years with the growth of Canary Wharf and Stratford, and will continue to change with Old Oak Common as a future HS2 node and cities like Birmingham and Manchester as well as Brussels-Lille 'getting closer'. Where London is a Global Metropole offering services on a global scale, other UK and European Cities will become more and more Cosmopolitan Centres: 'complete' cities, well-connected, and known for their specific values and economic, cultural and/or environmental characteristics. If one uses the metaphor of an 'orbital system', one should be aware that in such a system every planet plays a role and is necessary to keep the balance in the system.

Preconditions:
The vitality and strength of the UK urban economy depends on connections, in which rail can play a major role, both intra-regional and inter-regional.
Cities, towns and villages should not be seen as separate entities but as one economic organism.
Combined Authorities with long-lasting boundaries will enhance regional economic development, improve collaboration with neighbours and other institutions and bodies, and strengthen competitiveness.
In the foreseeable future people will keep using cars, bicycles, light and heavy rail and foot to travel: the level of 'connectedness' and convenience offered in changing between these modes will determine the success of each city region as a Place of Connection and Exchange.

Workplace can be everywhere

## on Networks

Virtual Networks have seriously changed our society over the last decades. But it has not kept people from travelling; on the contrary, it has made travelling much easier through improved interfaces, exchange of experience and ways of payment.
The consequences of internet shopping are difficult to foresee: On the one hand people are buying more via the internet with an extensive growth of delivery services as a consequence. On the other hand the possible future linking of production and consumption in the same locality, using downloaded product specs, could make long distance transportation of products redundant.
Workplaces can be everywhere, as long as there is a reliable and high speed internet connection. It does not mean the death of the workplace. The work ecosystem is more determined by other criteria than before: places where people can meet, exchange expertise, collaborate and co-produce.
Mapping the availability of services, goods and places to stay have created a culture of sharing. Ownership of goods seems to move to the background; sharing and servicing to the foreground.




85 % of the UK population lives in an urban economy: Structural Types 1990-2006, source: ESPON Atlas - Mapping European Territorial Structures and Dynamics, November 2014

Rotterdam Central Station as City Lounge: a Place of Connection to meet, exchange and connect. Photo: Jet Nijssen

Preconditions:
Through the Internet, knowledge is available everywhere and on demand. For expertise and co-production it will still be necessary to meet others face to face, in stimulating and enjoyable places.
The use of virtual networks will result in work no longer being located in one spot, but in a diversity of settings: working from home and local work hubs, and meeting in central locations.
From this development so-called Egalitarian Ecologies might appear: areas offering excellent biotopes for specific activities and attracting those with similar values and interests (Silicon Valley, Amsterdam-North, Munich region).
A smaller scale form could be 'Talent Towns': a town that is known for its specific 'industry' and specialises in particular activities and goods.

## on Places of Connection

The coming decades will bring major investment in new stations as interchanges of high speed trains, classic and light rail and other modes of transport. These interchanges will not only be technical solutions for getting people around. As can be experienced in other European cities and in London at St. Pancras International these stations celebrate places to meet, exchange, recreate, work and learn.
These new Places of Connection should welcome people to connect and interact, within the station domain as well as in the surrounding neighbourhoods. They should, finally, express the wider region's characteristics and identity.

# RAIL SCENARIOS

source: DfT policy paper sept 2015

## Key Directions for Rail

**Current Network**: Development of a long-term vision on the UK Rail Network. Incremental steps are crucial to make developments feasible and adaptive in time.

**Integration and Accessibility**: Integration which is observable from the passenger's viewpoint will improve the accessibility of the network and its operations. Management, control and ownership are key issues, but are of little concern to passengers.

**Capacity and Resilience**: Interchanges between different types of rail networks, Through Stations and investments in 'Network Intelligence' help increase capacity and make the system resilient.

**Re-using** existing, under- and non-used rail infrastructure may lead to new opportunities, although feasibility should be balanced with creating new lines.



As result of the interviews and research work for the Independent Transport Commission's (ITC) review of High Speed Rail, the following Rail Scenarios are defined:

## 1. Existing Network

with current plans for extensions and improvements, combined with High Speed Rail (HSR). In this scenario HSR is a 'singular' line, not interchanging with the current network. Furthermore the current programmes like improvements on the Great Western route, the West and East Coast Lines are taken into account.

Planned work on electrification
source: Network Rail

InterCity 125, high)er speed trains on 'classic' rail

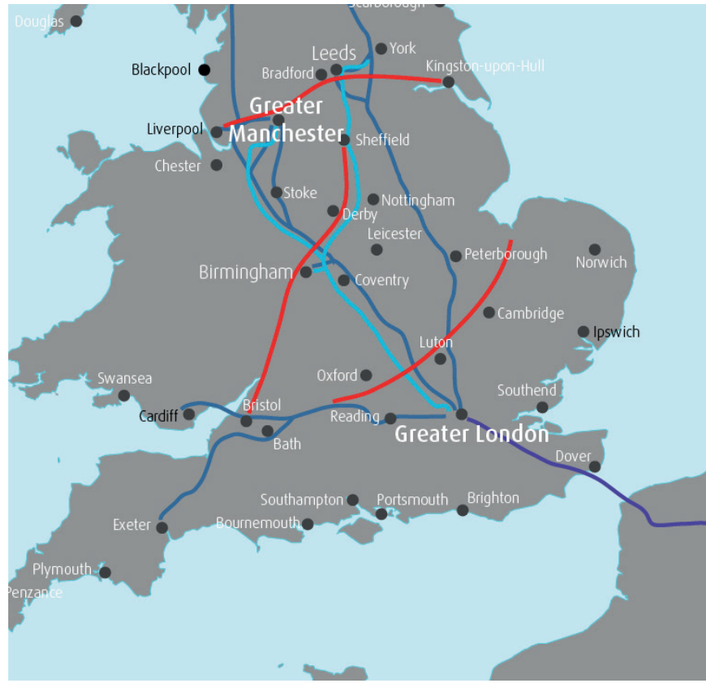
## 2. Integrated Operations of High Speed & 'Classic Rail'

on existing network (scenario 1) (e.g. Birmingham New Street Station, Sheffield, Midlands). This scenario means further, physical (!) integration of the HSR network and the 'classic' rail network: the ability of high-speed trains to link to HS1, interchanges at Birmingham via New Street Station or Moore Street Station, links to Liverpool, Sheffield 'Central Station', York and to Edinburgh via Newcastle, and to Glasgow. In this scenario east-west connections (using mainly existing lines) of 'classic' rail are integrated between Hull and Liverpool via Leeds and Manchester, between Sheffield and Bristol via 'Midlands Connect', and between Cambridge via Milton Keynes to Oxford and Swindon.

## 3. Integrated Networks

with (national) High Speed connections and main classic rail lines, regional and local modes of transport (light rail, buses, AV's, cars, bicycles). Building on scenario 2, this scenario provides Public Transport Terminals linking all modes of public transport. This is focussed on the passenger's convenience, with parking facilities at sub centre stations feeding into the rail network from less dense and rural areas.

Aspects like funding and decision-making, management of the process, and devolution are fundamentally different in each scenario. Although it looks as if the scenarios are consecutive steps, they are not!



HS1 - purple, HS2 - light blue, Main north, west and south lines - blue, in Red: fast new connections using existing rail

# Capital Metropoles

## UK & the World

Rail Scenario 1


*The rail scenario based on the existing network with current plans for extensions and improvements, combined with HSR may lead to a UK urban model where London is the Global Capital and Manchester the Capital of the North.*




Greater Manchester has already an extensive regional public transport network 'Metrolink', crossing authority's boundaries.
Source: Transport for Greater Manchester 2013


Metrolink trams Manchester, photo C. Thomond, 2014

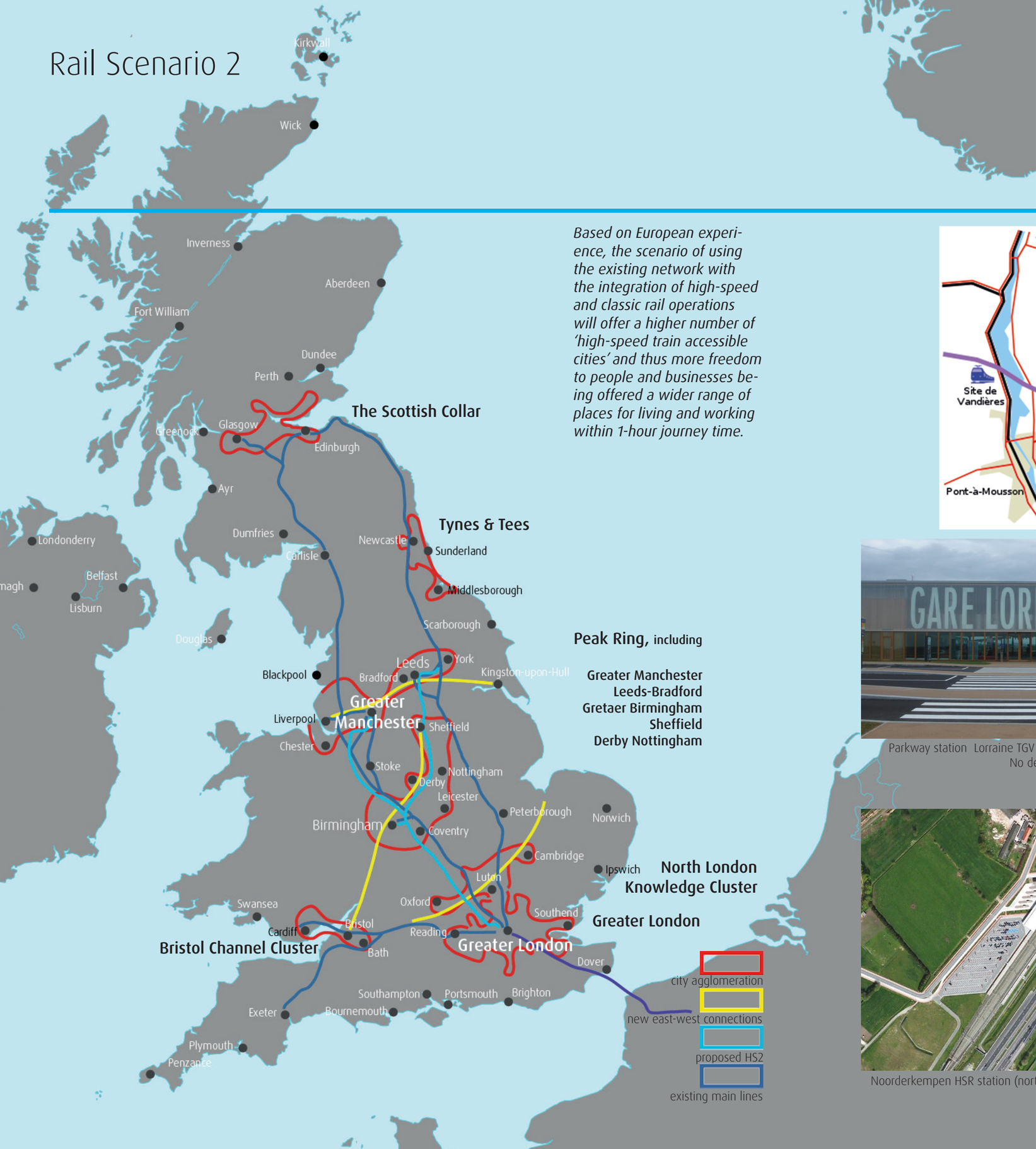
Looking at examples elsewhere in Europe it is reasonable to conclude that embedding high-speed rail and improved classic rail in a dense well-functioning regional public transport network is conditional for unlocking the economic potential of a city region. Hence infrastructure investment focusing on adding new high-speed infrastructure and thus releasing capacity on existing infrastructure is more likely to benefit Greater London, since much of that released capacity links each UK city region to London but not the city regions with each other.
With its productivity higher than any other UK city region its economic growth potential, and finite physical capacity, London has a very strong economic case for further investing in its high cost regional rail infrastructure in the foreseeable future.

Although Manchester has less employment potential and transport capacity in comparison with London, Greater Manchester has the greatest opportunity to develop its own regional public transport network and will become the core city in the development of an (improved) east-west rail connection, connecting Liverpool via Manchester to Hull.

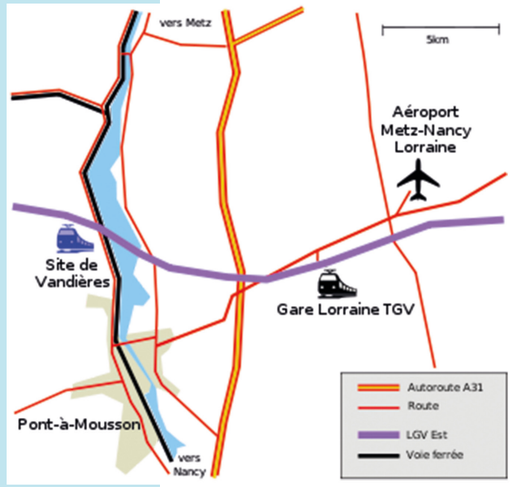
The rail scenario based on the existing network with current plans for extensions and improvements, combined with HSR may lead to a UK urban model where London is the Global Capital and Manchester the Capital of the North. For Manchester this will be a way to really achieve significant agglomeration and employment productivity gains from the investments in infrastructure, which in the long run will bring opportunities for Liverpool, Leeds and Sheffield.

# 6 United Cities
## coagulated city region pattern

Rail Scenario 2

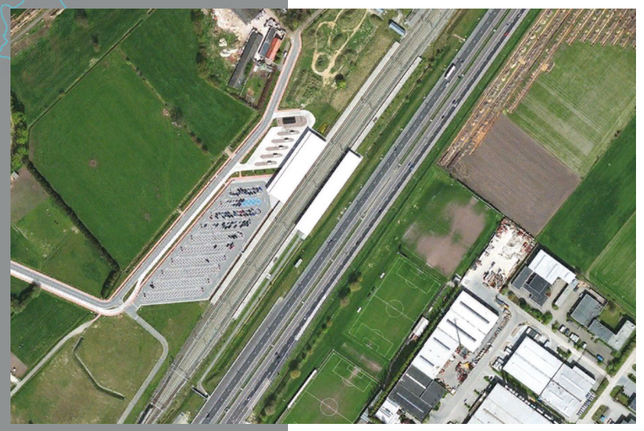



*Based on European experience, the scenario of using the existing network with the integration of high-speed and classic rail operations will offer a higher number of 'high-speed train accessible cities' and thus more freedom to people and businesses being offered a wider range of places for living and working within 1-hour journey time.*





Parkway station Lorraine TGV to catch car-users from the rural hinterland. No development around the station was planned.



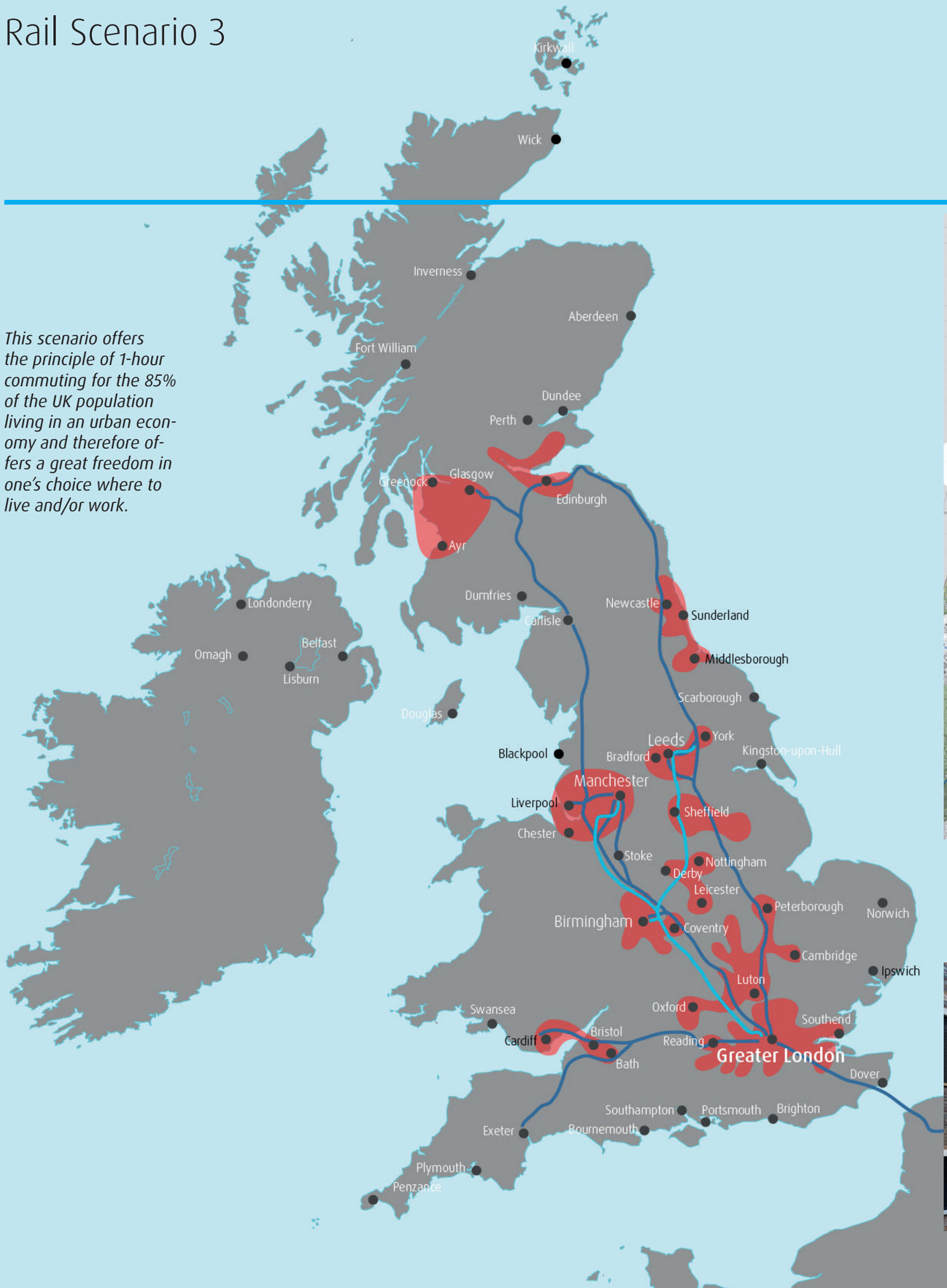
Noorderkempen HSR station (north from Antwerp) as remainder of construction process, now regional station.

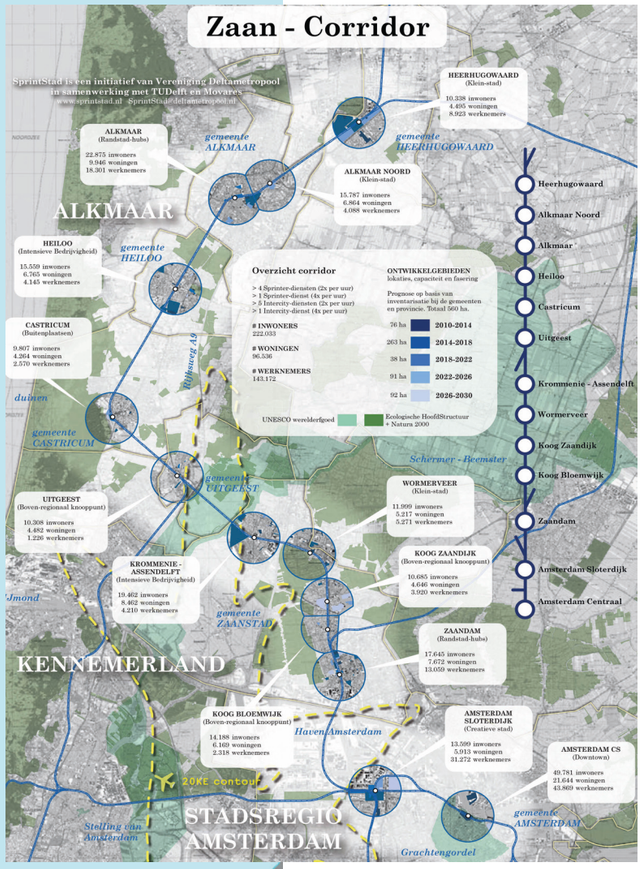
European countries with high-speed infrastructure have combined that infrastructure with 'classic' rail. Initially this was often the result of the approach to phasing the construction process (e.g. Tours in France), but more and more often this sequencing has become a way to integrate high-speed and classic rail.
The initial High Speed Rail infrastructure proposals in France were focussed on speed and timesaving. Later on the mere convenience of a 'one seat trip' appeared to attract (new) passengers as well, maybe travelling from city centre to city centre a bit less quickly but not losing time in changing trains or changing between different modes of transport. We also see 'season' destinations: mostly high-speed trains using classic rail to specific (holiday) destinations (e.g. ski resorts in the Alps). For the operators it gave the possibility to 'park' the trains in relatively remote railway yards (rather than expensive central stations). The integrated approach offered the operators the opportunity 'to programme' and adapt their rail stock and the use of stations and rail infrastructure.

Specifically in this scenario, with a less developed regional and local public transport system, the use of cars in combination with rail is an imaginable outcome. The rail system will be fed in by people using their car and thus 'parkway stations' are necessary add-ons to the rail network. Stations like Arras station (Fr) and The Noorderkempen (B) were originally temporary "end stations", but are now seen and used as stations that allow people to come by car from low density housing areas and continue by train and vice versa. The station TGV Lorraine (Fr) is specially built for this way of travelling.
The 1-hour-commuting-distance offers city centre to city centre travel as well as using 'parkway stations' like the East Midlands, Crewe and the airport stations (e.g. Birmingham International, Luton and Manchester with their vast parking facilities). The existing but extended ticketing system, offering combined parking, train and flight tickets, supports this scenario.

# UK Connect
## networked Regions of Cities

*This scenario offers the principle of 1-hour commuting for the 85% of the UK population living in an urban economy and therefore offers a great freedom in one's choice where to live and/or work.*




North Holland Region (North from Amsterdam) has become a work landscape using fast connections (internet and trains) to link to Amsterdam Centre

Old office buildings re-used as new work hubs

The fully Integrated Network is based on a 'door-to-door travel' approach. This approach offers great freedom in planning one's journey, based on timetable-less public transport (at least regionally and locally, e.g. the Tube) and easy interchange between modes of transport (bicycle-car-train-foot-flight). A well-developed regional and local public transport system, presently missing, as a link between the long-distance (rail) travel and local 'travel (from) home', is conditional for this scenario.

This scenario offers the principle of 1-hour commuting for the 85% of the UK population living in an urban economy and therefore offers a great freedom in one's choice of where to live and/or work. Looking at the example of the region north of Amsterdam, this approach made it possible for people to choose between various living environments from rural to very central. The rural option is always close to a 'workhub' combined with a (metro-)train stop, only being a maximum of 30 minutes away from the centre of Amsterdam and its connections to air and high-speed train EU destinations.

Small ecosystems of specific specialist workplaces, as well as Talent Towns, can emerge. This can result in a wider geographical spread of economic activities. Supporting the central city's economy, this approach can make the city region distinct and attractive for businesses and companies because of its great variety of work-biotopes for their labour force.
It is expected to lead to less car-use in the city centre and combined with the changing attitude towards owning a car, it may well lead into a city centre where only Autonomous Vehicles are allowed, resulting in new opportunities for the public realm and a cleaner environment.

# Appendice


Sources:
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'One day' England: time-space compression to London
With the dominance of London as a world city and the government's strategy to retain its international aviation hub status as Britain's international gateway, the ability to go to business meetings in London on a day trip is critical. In order to illustrate the rail journey times for inter-city links with London, the figure to the right shows the differential quality of the rail connections between provincial cities and London in terms of the actual journey time incurred. With the faster speed rail links, the journey time between London and many northern cities such as York, Newcastle-upon-Tyne, Edinburgh and Glasgow (marked in red) are significantly reduced, thereby enhancing the mobility of the population for business and leisure trips. Although Manchester is in closer proximity to these northern cities, train journey times to them are actually very similar to those to London. On the other hand, some cities such as Norwich, Nottingham and Cardiff (marked in blue) have a relatively lengthier journey to London when compared with their physical locations.
The figure also shows which cities are currently within a one day round trip journey time (up to 2 hours each way) to London*. Of the 8 core cities in England, only Birmingham is clearly within this cut-off point, along with some trains from Bristol and Manchester. Liverpool and Nottingham just marginally miss this cut-off. Compared to the high-speed rail networks in Europe, Japan and recently in China, it is clear that the physical rail connections between major British cities are way behind their counterparts elsewhere in the world.

*[The journey time is based on the quickest train journey during on-peak- business hours of the National Rail Planner between City Y and London. The time calculation is simply based on the assumption that it takes 1 minute to travel 1 mile. So, if City Y is 60 miles from London then it should take 60 minutes to travel to city Y from London. However, this might not always be the case. For example, rail service capacity or infrastructure quality and/or provision might mean that it takes less time to travel to City Y than would be expected by its distance from London (e.g. Newcastle) or that it might take longer (e.g. Norwich)].

With the HS2 proposal, it is interesting to see what 'one day' England will look like. The figure to the left calculates the time-space compression introduced between Birmingham, Leeds and Manchester to London by HS2 as there are confirmed terminals in these cities. It is interesting to see that the journey time to Birmingham will tip into the 1 hour circle (50 minutes) and Manchester will move from the edge of the 2 hour cut-off to within 1 hour 15 minutes. However, the biggest winner is Leeds as this journey to London will be compressed from 2 hours 35 minutes to 1 hour 20 minutes
These, of course, are some crude estimates and the real journey time saving will very much depend on the final confirmed routes and the number of terminals along the lines. Based on the data provided in an earlier consultation document of High Speed Rail10, an alternative scenario of the estimated journey time improvement to London is tested. These calculations are based on the assumptions that there will be terminals in Birmingham Airport, East Midlands and South Yorkshire along the Birmingham to Leeds line. This alternative scenario will share out the time saving advantages between other areas along the line rather than just speeding up the journey to Leeds.

Source: Department for Transport (2011) High Speed Rail: Investing in Britain's Future - Consultation Summary, London: DfT, p.20.


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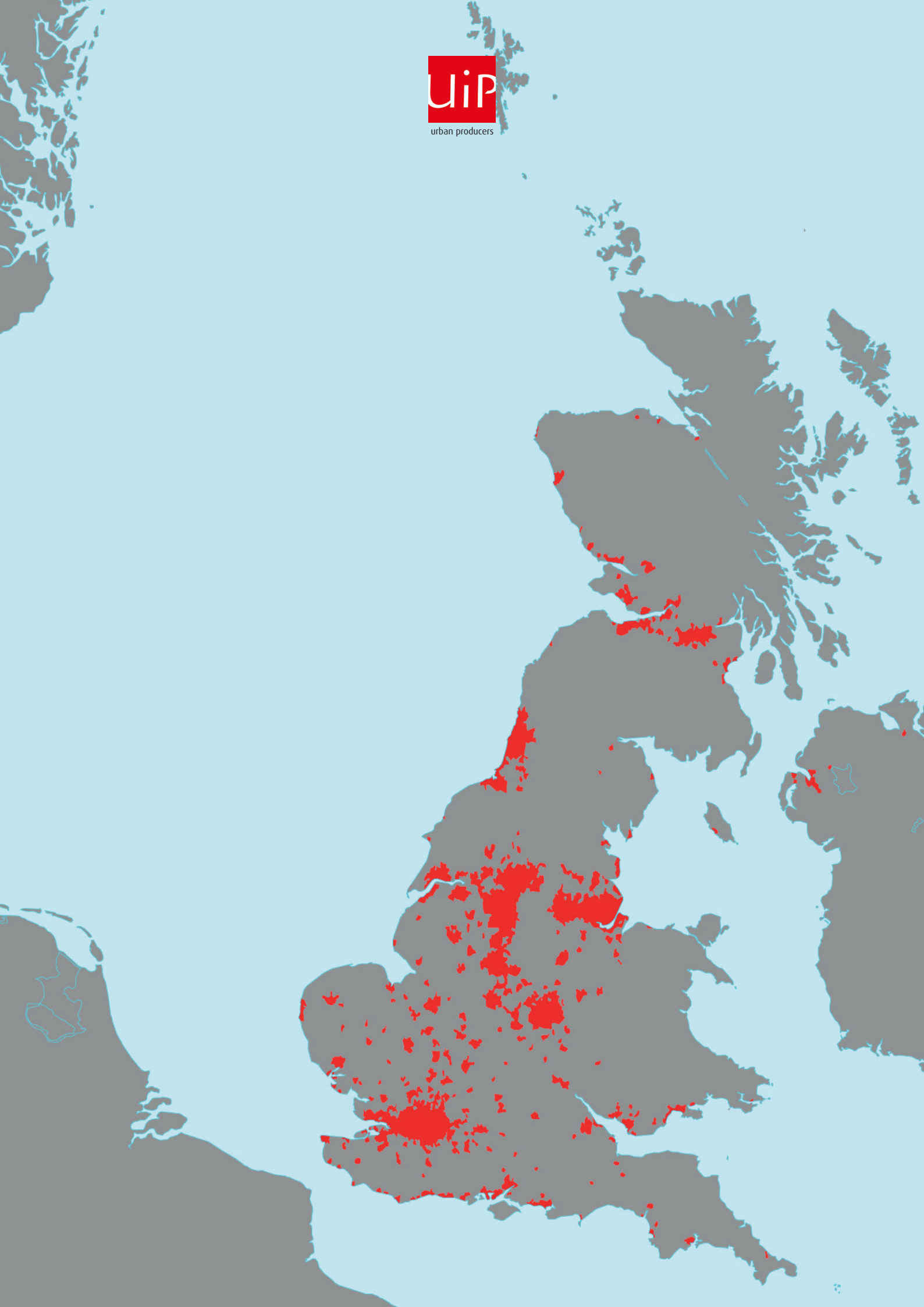
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