[1 September 2015]

Exploring UK Rail Scenarios for 2065

Foresight Future of Cities

The Government Office for Science

Part 1.

Setting the Scene

Urban-imPulse
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London

urban producers

Transport for Europe

Government Office for Science: Foresight Future of Cities, Transport Scenarios

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 – UiP urban producers and John Worthington - Commissioner for The Independent Transport Commission to produce a working paper exploring alternative futures for cities and regions based on UK rail scenarios impacting on cities in the next 50 years.

John Worthington is the commissioner leading the ITC review of the spatial effects of High Speed rail, "Ambitions and Opportunities".
Henk Bouwman is the lead consultant for Ambitions and Opportunities. Both Henk and John have worked together in various projects and programmes concerning urban change in relation to transportation and mobility.
John Mason will be assisting in this project. He is highly qualified and experienced in qualitative data research, critical analysis and report writing.

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1. Introduction

Ways of and reasons for rail travel have changed dramatically over the last few decades and will 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, and these future scenarios will allow policy makers to critically explore policy options for city development in relation with rail connectivity.

Scope
The scope of the working paper 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 done 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 comprises part one, the background paper: Setting the Scene. It outlines the key drivers for socio-economic change and reflects on specific issues within the current situation in rail network and rail operation.
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.

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

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

Summary notes from the interview will be added to the final report as appendices.

2. Key drivers for growth:

Investments in rail infrastructure are often led by ambitions for economic growth. But the experience is that rail infrastructure can be a catalyst for economic growth, but seldom the driver. Based on study results as mentioned in chapter 1. there are three drivers that are regarded as key to economic growth: technology, lifestyles and governance.

A: Technology

Technology can drive economic growth in two key ways. Firstly, improvements in the production process can generate short-term growth cycles. Secondly, technological innovation can generate longer-term structural impacts. Both of these two processes rely on **spatial conditions** to succeed:

- Connectivity is necessary for better supply chain integration and market access (improving the production process). It is also key for accessing intellectual capital and global decision makers and finance centres (improving innovation). For instance, hi tech industries and their labour are footloose, but tend to cluster around existing agglomerations with a high skill base.
- Available and affordable space is necessary for both expanding work sites and living areas (impacting on production) and offering attractive and distinctive places to live (impacting on innovation).

***EuraLille**: After gaining a High Speed Rail connection to Paris, the City of Lille (Fr) found that businesses moved to Paris*[1]*. The city then realised that excellent connectivity is not enough: it was also very important to develop better spatial and governance conditions to provide an excellent place to live and work. Lille then sought to develop:*
1. A Good living environment where highly educated people wanted to live and raise their children.
2. High standard and demand-driven education in order to entice businesses to come back and stay in the region.
3. Improved connectivity within the region itself by extending and connecting their metro system, other light rail lines and roads (parking) to the HSR station.

* 1 EuraLille: HST station, Services & Retail, Housing & Workspaces

[1] from: 'Ambitions and Opportunities, Understanding the Spatial Impact of HSR', ITC November 2014

B: Lifestyles
85 per cent of the UK population lives in an urban economy. Cities, towns and villages should not be seen as separate entities. The word 'suburban' is therefore outdated. There are however distinct settings for living, which vary in density and intensity and relation to the open landscape. In the UK the major urban regions are Greater London, the middle section of England, often referred to as the North, and the Glasgow-Edinburgh Axis, respectively 20 million, 15 million and 3 million people.

Lifestyle choices seem to be more influenced by the car industry, allowing people to live wherever they want (with commuting time as limiting factor) and to travel with more freedom and flexibility. In the most European agglomerations we see a more criss-cross pattern of movements throughout the whole region, which in some EU countries was followed by additional public transport connections offering the same kind of connectivity, e.g. the Paris tangential metro train lines, the inter- and intraregional rail connection in the Randstad.

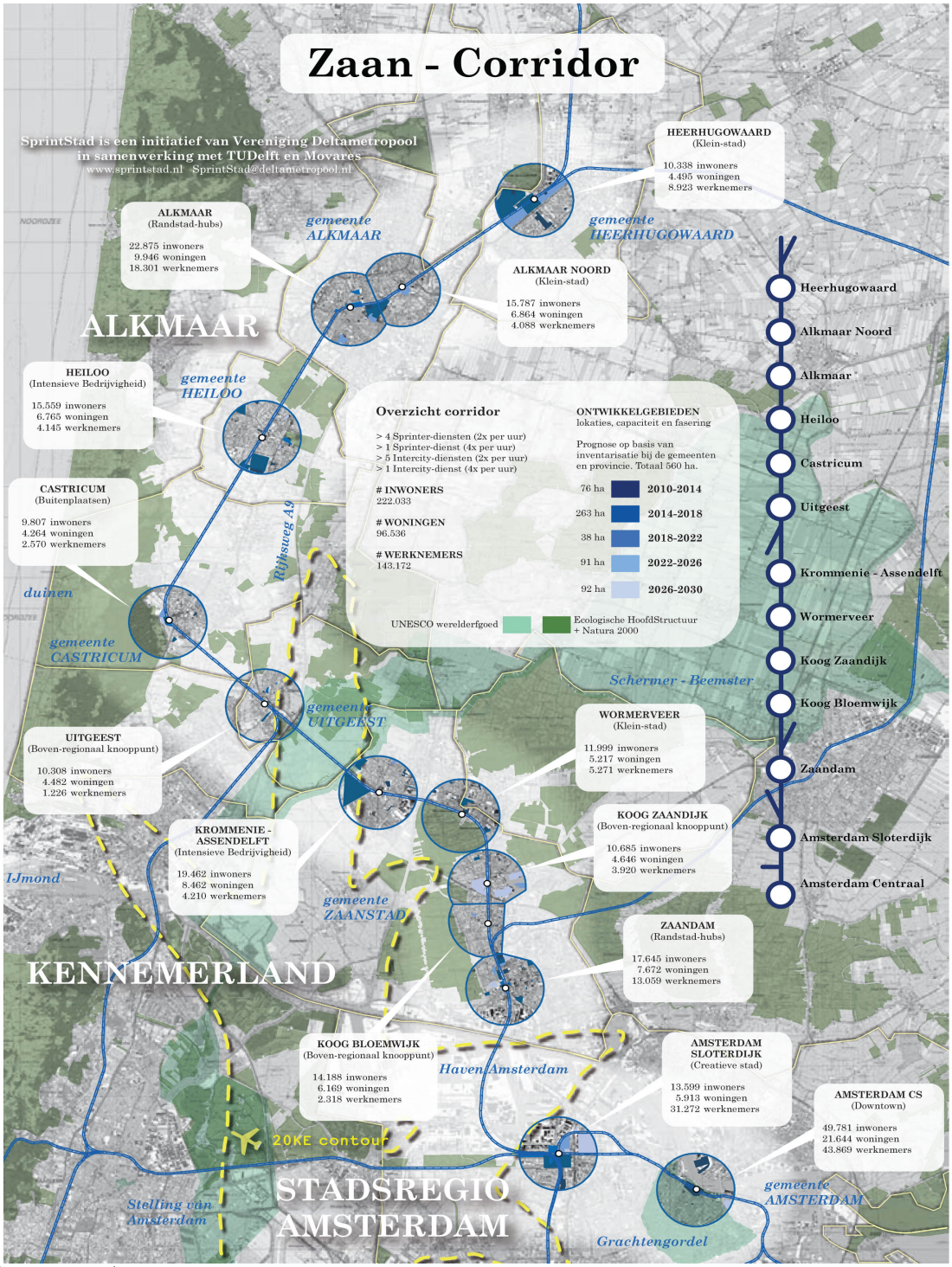
The London agglomeration is a-typical in a sense that the public transport links (rail) have created (or at least supported) a central jobs powerhouse with huge productivity in the city centre (double the UK average, paying four times the average taxes) and 90 per cent of these jobs being high value. Rail connections allow huge volumes of workers to travel in and out with relative ease.
The 'Peak Ring' or 'Penine Belt' shows a more scattered image as a poly nuclear city region, where only 10 per cent of the workforce works in other poles. The biggest interrelationship is between Manchester and Leeds.

Zaan Corridor Pilot *(North of Amsterdam) In the Netherlands a pilot[2] was done on increasing the frequency of trains between Amsterdam and the north of its province, and installing high quality internet connectivity along the infrastructure lines. It appears that highly educated, young professionals tended to move to smaller communities and work from home. In this case 'Work from home' means, that they literally work from home, but also meet in newly created work hubs in their local community and go to Amsterdam only for meetings and intense work sessions. They spent most of their time at home and in their local work hub and spent only 1 to 1 ½ day a week in Amsterdam. This way of working is enabled by a high frequency, high quality train connection to and from Amsterdam and by super-fast Internet connectivity brought in place while building the improved train connection. But another, important reason to move to this area was also the better quality living environment: space, fresh air, bigger and affordable homes, etc.*

* 2 Nodes on Public Transport from Amsterdam to North Holland

[2] Opportunities for the Zaan Corridor, Vereniging DeltaMetropool, City of Amsterdam, University of Delft cs, Spring 2014

The national Dutch railways NS and the Ministry for Environment and Infrastructure have decided to expand the pilot to other parts of the Randstad region. The pilot has shown that super connected, high quality living environments are not necessarily only possible in big city centres. Especially for young professionals, building their families, the urban region can offer green, spacious and affordable housing opportunities that a city centre for many reasons cannot. Physical and psychological connectivity is key for this rather new phenomenon. The next step in this development is that companies tend to move highly specialised parts of their companies into this 'urban landscape', close to their labour pool.



* 3 Zaan Corridor Overview

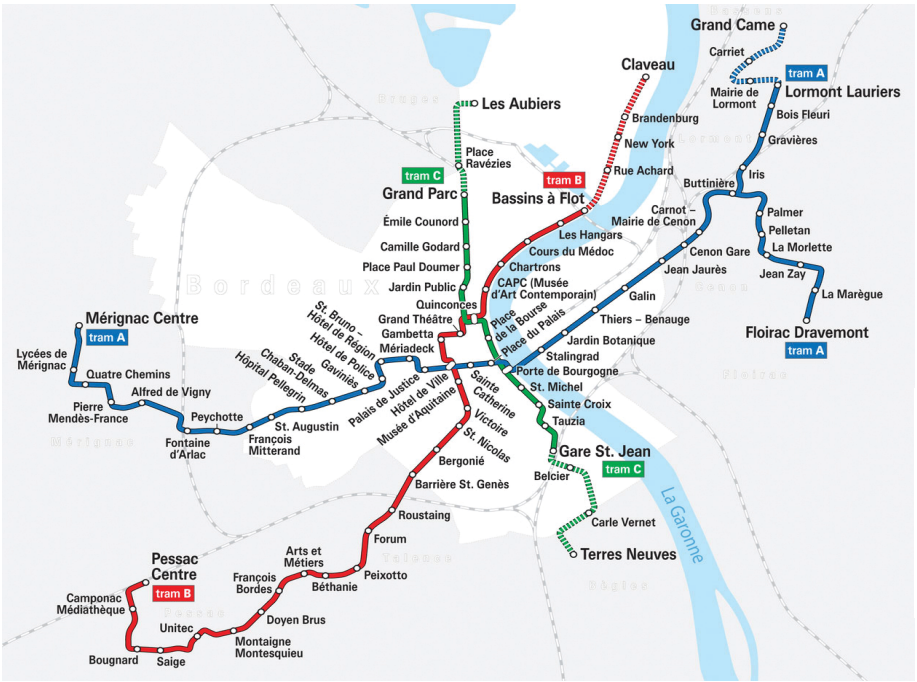
C: Governance

As can be seen in other parts of Europe, the impact of major changes in economic development and infrastructure often becomes measurable after a generation. Managing the process of urban change requires both a long-term, bold vision and an attitude to induce and nurture incremental steps on the way to achieve that vision. Communicating and cooperating with businesses, industries, and civic society will establish the confidence that they are 'allowed' to take part in and contribute to the further development of their own region. Change and innovation comes from people.

Attention must be shifted from the procedures in planning to the process of urban change. This should allow adaptation over time, without losing the initial ambition. There cannot be a procedure for innovation; governance should be focused on creating conditions allowing change to happen.

Boundaries within and between cities and regions are often reluctant to innovation. Collaboration between cities and regions often shows success in economic growth and attracting new activities. Boundaries are increasingly meaningless: the Greater London economy in 50 years time might have incorporated the Randstad region and the Flemish Quarter (including Lille) next to the UK 'Peak Ring District'. UK cities and regions will therefore have to collaborate to compete with other European regions instead of with London or their close neighbours.

***Bordeaux Euratlantique**: In France the national government offered support to the regions under the condition that the core cities and their regions collaborate in a 'city-regional' development plan: the 'Eura - projects'. Bordeaux initiated the Bordeaux Euratlantique project. They developed a long-term vision for the city region: rethinking their position in Europe, defining the 'new image' of the City region with 'Bordeaux' as a brand, and designing a process for involvement of communities and industries (e.g. Airbus) to produce ideas and induce action for change over time. Driven by the 'promise' of a HSR connection (they already have high speed trains, but not high speed rail infrastructure yet) the city region decided to invest in a brand new regional tram system that connects the culturally distinctive centres in the city region, key business centres and industries, the airport and key cultural centres. It will also connect to new settlements within the city region offering small-scale urban living environment with 'work hubs' for the expected growth of 50.000 new population!*



2012 Année Internationale des Coopératives

* 4 Bordeaux, using tramway connection to support collaboration and growth

3. On Rail

The Current Network
Rail infrastructure is inert: much of the existing UK rail is fundamentally Victorian. This is not very different from other countries and does not really matter as long as adaptations are possible. Impact studies of changes in the system are done in five to ten year chunks, since the impact of rail improvements often take a generation to bed in. Some of these adaptations are physical and to the rail itself. Most changes are in the 'controlling' infrastructure (points, signals, etc) and in the interface with the users (ticket sales, time tables etc).

Decision-making in changing rail infrastructure, or adding new rail to the network, are dependent on engineering and funding possibilities. 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: you may plan to do things in a relatively short period of time, but suppliers may not be able to match this time horizon. As in every business, it is desirable in terms of costs, cash flows and efficiency to have demand evenly spread rather than in peaks and troughs.

Have a long-term vision but take incremental steps to be able to adapt in time

Integration and Accessibility
The UK's rail system is relatively transparent – any operator can sell you a ticket for any other operator, and any station can sell you a ticket for any other station. The UK is less good at things like the Dutch-style oyster card (integration with bike parking and so on). But this is an area where technology will be critical – people can already access timetables online. Contactless payment means that we will skip the national oyster system, and just transition from one mode to another by tapping our bankcard. Technology will make journeys seamless, as long as things like timetabling are clear.
Integrating different rail systems (e.g. conventional trains on high speed rail, tramways on classic rail) is technically possible. Major issues here are controlling the system (ICT) and the way this reflects back to capacity: combining different type of trains on one track might decrease the capacity and result in underutilisation of the line: the slowest train dictate the safety time slots between the trains. Another issue is the difference between health and safety standards between the various types of trains and between organisations.
Finally, there is a difference in administration: heavy rail is administered by private enterprise; light rail is typically accountable to local government. Integration is therefore an organisational and operational issue. Karlsruhe is cited as a successful example.

Integration should be seen from the passenger: it then comes to a user-friendly interface between the system and the passenger

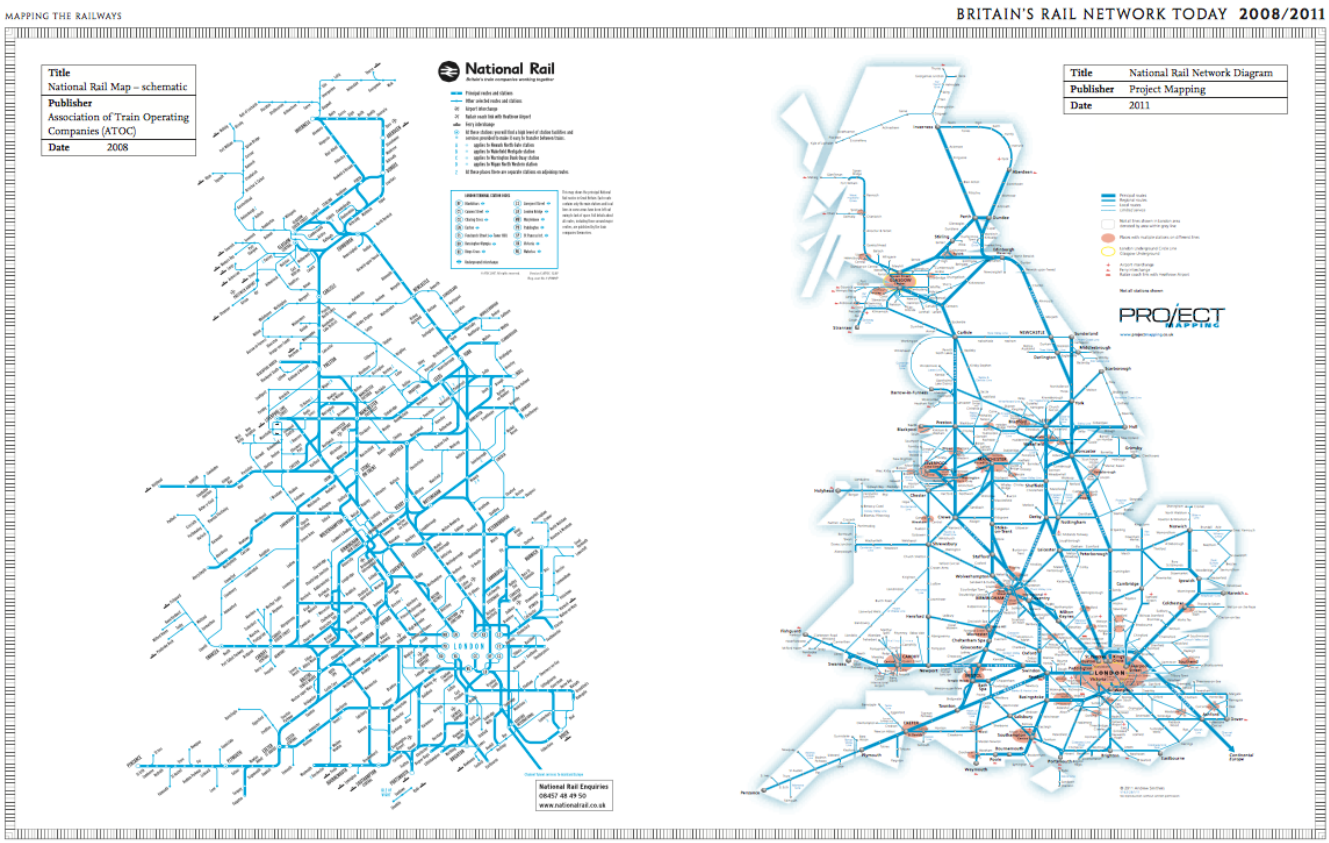
Capacity and Resilience
Based on ITC studies on the impact of HSR and HS2 on UK cities it was found in European exemplar cases that increasing capacity on rail is not only achieved by building more rail infrastructure and operating more trains. Three insights were remarkable:
-Providing interchanges between the different rail systems: build a real network that over time can adapt to changing needs. E.g. Connecting Curzon Street Station with New Street Station, Birmingham; Use Sheffield Midlands as a by-pass for HST to the north; Reservation for possible interchanges from HSR to regional trains e.g. Cambridge - Milton-Keynes - Oxford.
-Developing 'Through stations' that offers more a continuous flow and capacity for transport instead of for time costly 'turning train' operations and parking trains. An example of a terminus stations that changed into a through station is Antwerp; St.Pancras London is combination of

through and terminating trains.
-Improving station operations, e.g. in Utrecht improved ICT and removal of points increased the station capacity up to 25%.

Research on capacity improvements on the main network by re-using existing, under- and non-used rail infrastructure can lead to new opportunities.

And further smart, integrated and continuous network is more resilient for changes in demand

Governance and Ownership
The biggest change in UK rail service and noticeable for passengers was the separation of infrastructure and operations, due to EU regulation. But the divisions between rail operators and infrastructure don't particularly matter when it comes to integration of service. Sweden for instance has a much more complicated rail structure than the UK, but they operate in greater harmony due to central direction. Denmark is quite a centralised country, and the government lays out many specifications that rail operators have to abide by. Objectives are aligned.
In the UK, the major issue is timing. Rail franchises are awarded on 7 year contracts (and sometimes even shorter), which aren't long enough to encourage long term planning and investment – this means Network Rail and the franchises are working with different objectives. The key is an informed and focused client body (typically government). In Sweden and the Netherlands, regional authorities are absolutely clear on capacities, purposes, and technical issues.
Not ownership, but collaboration is key, so incentives in contracts should focus on how it is part of a greater whole, with convenience and accessibility in the background – a door-to-door-approach



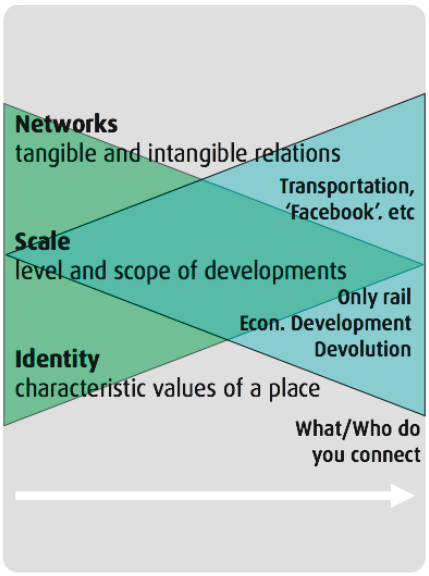
* 5 Mapping influences the perception of connectiveness (c. Project Mapping)

4. Towards Scenarios

Looking into the future of Rail Scenarios and its consequences for the way people live, in this case the Urban Form, means making many assumptions. There are however three themes that have proven to be relevant and useful to guide us in foreseeing and exploring the opportunities, to finally helping us to set out a way forward:

Networks – tangible and intangible relations: from rail networks to Facebook.
Scale – level and scope of developments: focus on rail infrastructure, devolution etc
Identity – characteristic values of Place: What and who do you connect, Place of Arrival and Departure

We will outline three Rail Models and, from those, project three types of Urban Form, to then explore them with the above themes: how do they work, how do people use them for their activities, etc. We will finally return to the three earlier topics of Technology, Lifestyles and Governance and formulate our insights.



Rail Network Models
To set up three scenarios in the next step, Part 2, we suggest to work out the following models for rail network. We will explore these models on the issues of Connectivity & Capacity, Integration & Accessibility and Governance & Ownership

1. Existing Network with current plans for extension and improvements
2. Existing Network as above with Integrated Operations
3. Integrated Network model with high-speed rail, conventional and light rail and 'local' modes of transport (cars, AV's, etc).

These models can be seen as consecutive steps. We will explore ways to accelerate or even integrate steps.

Urban Form
The Rail network models will finally form the basis of the Urban Form of where people live and work. For each model we will explore the urban typology and its principles.

a. One Core Model: London Centric with some Core Cities
   - Principal examples: London, Greater Manchester (including Airport City) and Sheffield
b. Coagulated Model: Greater London and Peak-Ring District
   - Poly Centric, Cosmopolitan Cities within the Peak Ring District
c. Urban Region Model: Urban Landscape with nodes (Core cities and 'Garden Cities')
   - Global City, Cosmopolitan Centers and Talent Towns: Cardiff – Newport - Bristol – Bath Cambridge – Milton Keynes – Oxford

5. Next steps

This document will be discussed and reviewed. In October the scenarios as mentioned in 4. will be composed. The draft form of these will be discussed in a workshop attended by members of the Future of Cities Lead Expert Group, the interviewees consulted for this report, and experts on topics that have arisen in the process of drawing the models.

The delivery of Part 2 will be end of October and will feed into the Future of Cities Event in November, where research results will be presented.