Transport in the Digital Age

Smart mobility and Digital programmes

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Rising demand for transport in UK

Europeans, on average, travel around 35,000 passenger kilometres per year.

Every year the typical person makes 923 trips.

In 2012, the number of railway journeys made over the year reached a record 1.509 billion, surpassing, for the first time, the previous record for rail travel set in 1923.

In 2013, 17% of all bus tickets sold in the United Kingdom, were bought by young persons (people in the 17-20 age group).

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#DfT
#ORR
UK rail journeys will grow from 1.6bn to 3bn by 2035

Peak capacity today on the 10 most crowded routes
Meeting the needs of a booming megacity

London in 2031
10,000,000 inhabitants

London in 2015
8,600,000 inhabitants

+ Political priorities
+ Socio-economic forces
+ Demographic trends
+ Global influences

A core economic driver for the “Northern Powerhouse”
Digital disruption in transport and cities

Digitalisation has already made its breakthrough in many sectors. Transportation and city services sit on the axis where future digital innovation has yet to deliver key changes.
YOU CAN’T ALWAYS CREATE CAPACITY BY POURING MORE CONCRETE
Disruptive trends for smart transport and city services

Our study Transport in the Digital Age identified five trends that will shape the progress towards mobility services. These can also apply to a broader set of city services.
Examples of the smart trends currently in discussion

- Mobility as a Service
- Dynamic pricing models
- Intelligent traffic management
- Power and utilities
- Freight optimisation
- Maturing public-private city services
- Crowdsourcing and sharing economy

Internet of Things
Big Data
Cognitive Computing
40% more capacity on the railway, delivered at 30% of the conventional cost
What does this look like in the rail industry?

- Clear real-time journey planning information
- Helpful information during disruption
- Intelligent guidance from one mode to another
- Electronic ticketing with open interfaces for token validation
- Scope for service differentiation

#DigitalRailway
"Technology is changing so fast. How can we be sure we are making the right long term investments?"
Understanding the new pace of change

Investment decisions today must reconcile hugely diverse investment cycles:

a. There is huge difference in lifetimes between different investments
b. No-one knows for sure how investments should be organised after 30 years

- **IIT Systems**
  - Lifetime 5-20 years
  - Complexity and historic legacy
  - Poor history of successful project delivery

- **Vehicles**
  - Lifetime 10-15 years
  - Product lifecycle 4 years, slow to gain features

- **Consumer Technology**
  - Can't predict what we will have 5 years from now
  - May reshape demand more fundamentally
  - Exponential speed of developments

- **Rolling stock**
  - Lifetime 20-30 years
  - New fleets and refurbishment
  - Private financing

- **Infrastructure**
  - Investments for 30-50 years
  - Capacity assumed steady demand growth
  - Public sector investments
Why does digitalisation and ‘smart’ matter to Infrastructure investments?
The demand for mobility and public services will change, with possibilities to create increased capacity and to steer changes in usage of existing capacity.
Evaluating demand and assessing impact

Financial and economic impacts
e.g. Time savings, direct employment, impact to state/municipality budgets

Social Impacts
e.g. Increased road safety or access to services

Environmental impacts
e.g. Lower emissions or less noise

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Digitalisation affects the benefit dimensions

“Automated and driverless vehicles enables to make use of travel time which decreases the weight of time savings”

“Indirect, and induced Employment and GDP Contribution”

“Indirect, Induced & Wider”

“An integrated transport operator and smart fares system would drive economic growth”

“Sharing economy and MaaS gives new transportation options to customers”

“Automated and driverless vehicles increase the safety by decreasing the number of accidents”

“Telecommuting reduces the need for transportation”

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Changing types of investment

Traditional capital programmes must be delivered alongside rapid developments in other sectors.

## Capital programmes vs. Emerging mobility services

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<th>Capital programmes</th>
<th>Emerging mobility services</th>
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<td>Engineering discipline</td>
<td>Creative skillsets</td>
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<td>Infrastructure heavy</td>
<td>Zero infrastructure</td>
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<td>Forecast demand</td>
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<td>Capital funding</td>
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<td>Focus on the operation</td>
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<td>Private/social good</td>
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Emerging mobility services must be delivered alongside traditional capital programmes.
“How does this change the way we deliver our existing programmes?”
Service design thinking

• Service design is about building services around the needs of customers
• Start with the customer experience, not the sensors or data
• Build things that will enrich people’s lives

#JRShibuya
Digital approach to executing programmes

Digital changes the way infrastructure/services are built.

- Improved data quality
- Robust controls, greater accountability
- Better insights, improved decisions
- Lower cost and timely delivery
- Faster start-up and safer operations
- Improved capital efficiency
Running smart services and assets

Digital changes the way services are operated and optimised. Multi-modal transport and availability of data and automation enables a new model for Command and Control.

- Intelligent management of a multi-modal network
- Convergence of data, command and control
  - Service operations (real-time)
  - Customer information (open data)
  - Asset maintenance (Internet of things)
  - Predictive and preventative measures
  - Interface with other public sectors

1. *Digital airport towers by remote control, Sweden*
2. *City operations centre, Rio de Janeiro*
3. *Single regional traffic centre, Ontario Canada*
Digital changes the asset refresh lifecycle. We now deliver in duplicate – a complete virtual model, linked to the real world infrastructure.

- A complete virtual record informs future upgrade and planning cycles
- Creation of a complete, hierarchical virtual model of assets
- Predictive analytics optimises maintenance cycles and prevents failure
- Physical data and real-time condition monitoring augment the virtual model
"THE ONLY CERTAIN THING ABOUT THE FUTURE IS CHANGE"
The future role of the public sector in smart services

• Stimulate economic growth
• Defining policy to protect citizens and promote advances in smart services
• A regulator and facilitator of the open market
• Ensuring universal service provision
• Overseeing successful delivery
• Taxes and service charging revisited

• Make life easier and more enjoyable for our citizens!
What can we hope to expect?

- No paper tickets
- Pro-active travel plans
- Real-time passenger flows
- Car-to-car communication
- Digital uniforms

- Fully automated metros
- Intelligent road capacity
- No railway signals
- Real-time asset status
- Automated airports

- Automated railways
- Intelligent tarmac
- Cognitive control systems
- Autonomous cars
- No driving tests

5 YEARS
10 YEARS
20 YEARS
THANK YOU

@whereswarwick