Department for Transport

Delivering the sustainable railway

Tony Mercado
Department for Transport

Technology has key role to play but…

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- What do our passengers really want and value?
- A better railway requires a change of culture…so we need to tackle hearts and minds
- Where are best practices to be found and how can we learn from their successes and experiences?

Topics I’m going to touch on

- Recent developments
  - Electrification
  - Value for money study
- The work of TSAG

Electrification: what's been announced (south of the border)

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In July:

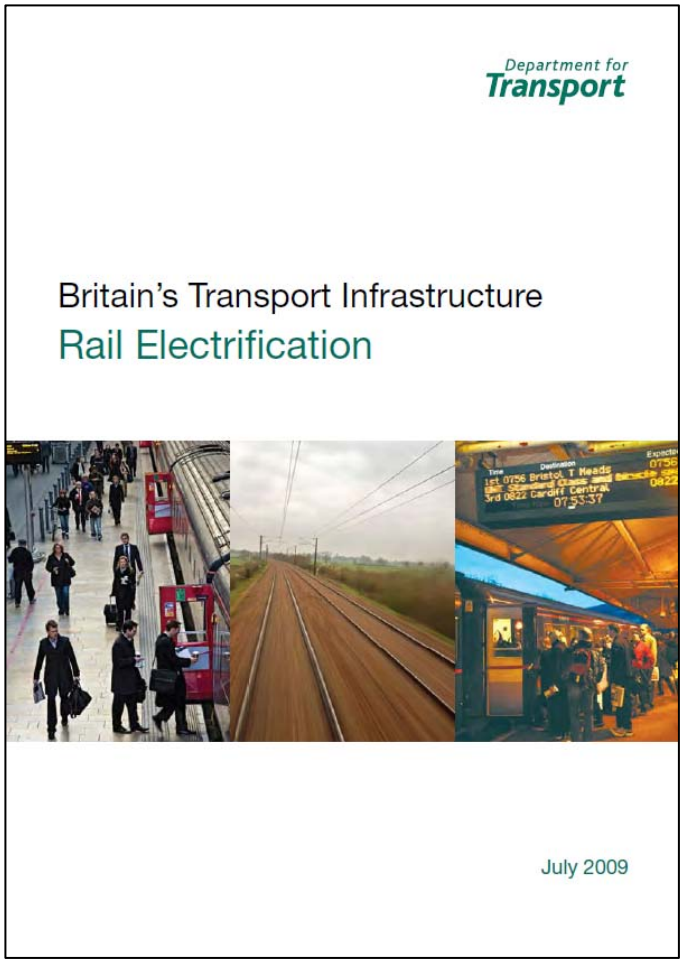
- GWML - £1000m
  - Bristol by 2016
  - Swansea by 2017

- Liverpool – Manchester
  - £100m
  - By 2013

In December:

- Preston – Liverpool/Manchester – Blackpool
  - £200m
  - By 2016

Ongoing work to assess other routes



We can’t put wires up everywhere…

- There will always be a need for self powered trains
- Alternatives to diesel fuel are still some way off
- Should we buy new DMUs or life extend?
- How do we cope with growth?
- Need sustainable solutions

Rail Value for Money study

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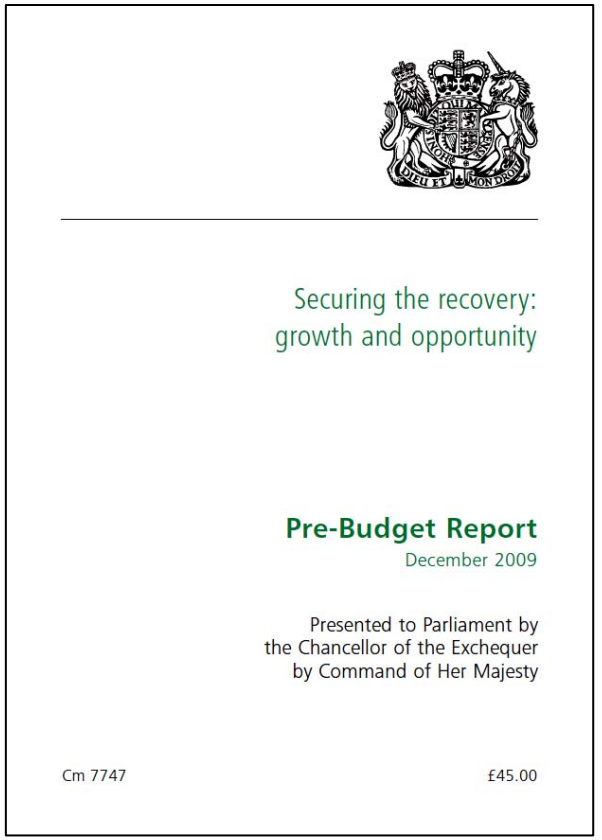
- Announced in the Pre-Budget Report in November 2009
- Aim is to examine the overall cost structure of the railway sector and identify options for improving value for money – deliver the same outputs on half the funding
- Will consider the possible role of new technology, processes and working practices in fostering greater added value
- Jointly sponsored by DfT and ORR. Transport Scotland actively engaged



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The Technical Strategy Advisory Group:

Progress so far & future plans

Agenda

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- The role of TSAG
  - Contribute to industry planning process
- TSAG's work plan
- Examples of current activities
  - Route mapping
  - Reliability
  - Rolling Stock
  - Other Strategic Research Activity

Technical Strategy Advisory Group (TSAG) What is it, what does it do?

- TSAG is an independent cross-industry expert group, funded by the Department and established to:
  - Develop and own the Rail Technical Strategy
  - Set the long term technical agenda to meet anticipated industry need (not solutions looking for a problem)
  - Be the strategic research client group
  - Coordinate the activities of the Systems Interface Committees, linking current tactical work to long term strategy

- TSAG focus is therefore:
  - CP5 and beyond
  - Whole life/whole system sustainable solutions
  - Developing and publishing, in 2012, the Rail Technical Strategy that supports HLOS for CP5 and beyond

High level goals – the 4Cs

- **Customers**
- **Cost**
- **Capacity**
- **Carbon**

TSAG: how does it work?

- Technology Route mapping
  - Where do we want to be? — Size the problem and the prize
  - Where are we now? — Size the Gap
  - How do we get there? — Identify options and solutions
- Strategic Research
  - Horizon Scanning
  - Co-ordination with others (research and planning)
  - Leveraging research funding for the rail industry
- Implementation
  - Contributing to the industry planning process
  - Giving the planners new options
  - Identifying technology insertion points
  - Supporting whole industry, whole system business cases
  - Supporting appropriate technology development

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TSAG outline timetable

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- 2009
  - Draft route maps ✓
  - Initial research projects ✓
  - Establish links with EPSRC, TSB, RRUK ✓
  - Establish technology watch ✓ and rail research ‘clearing house’
- 2010
  - TSAG ‘mid term review’ – 30 year view
  - Initial input to CP5 planning process
- 2012
  - RTS2 published alongside HLOS2

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Beyond 2014: Setting the technical vision for the future

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- Why is a vision needed?
  - Look ahead to the requirements of the future
  - Create a coordinated cross-industry approach to developing solutions
- Time required to identify, develop and deploy technical solutions for 2030s means we have to start now

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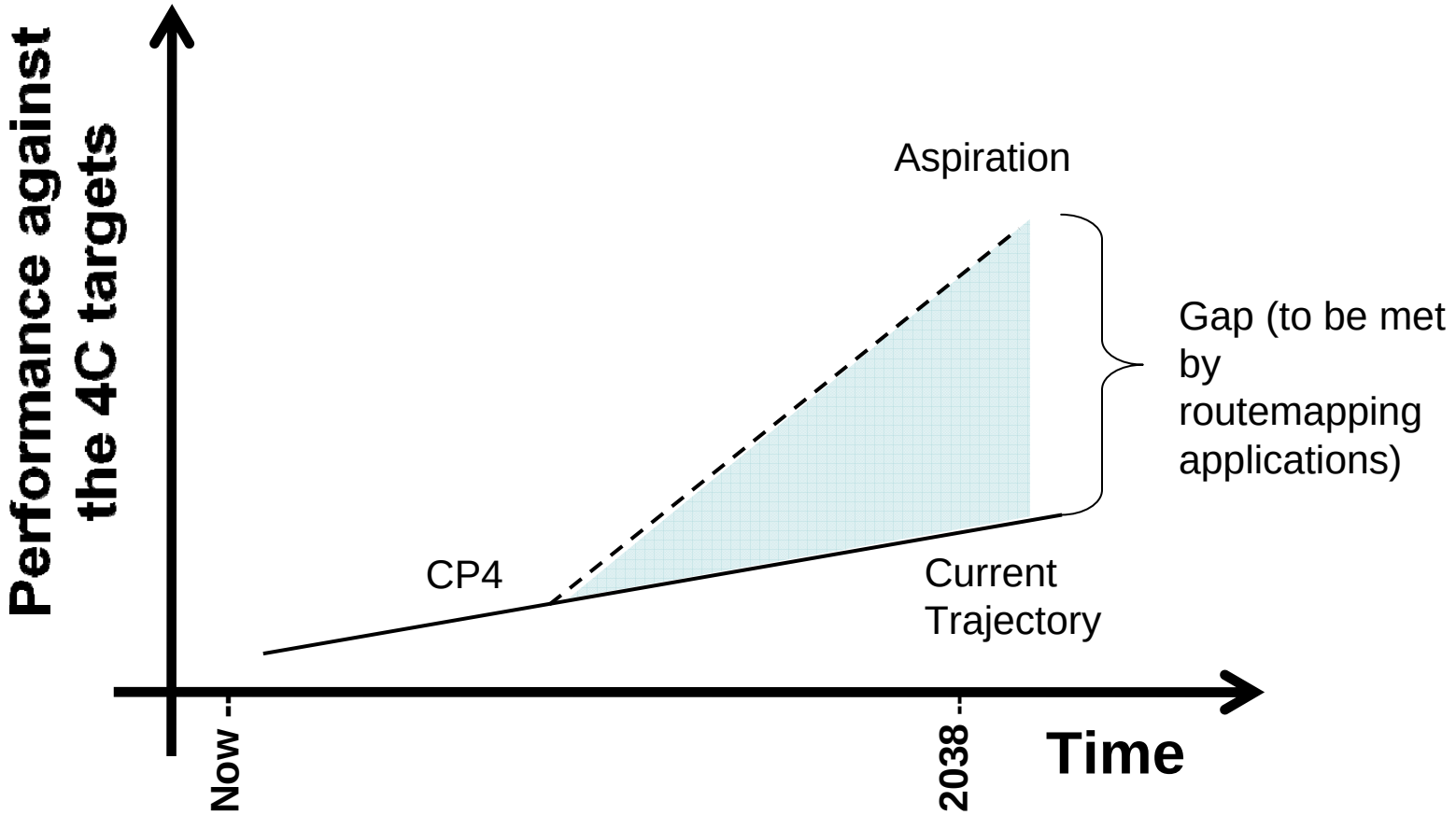
Where we are now?

Route-mapping helps select the most efficient route through complex issues

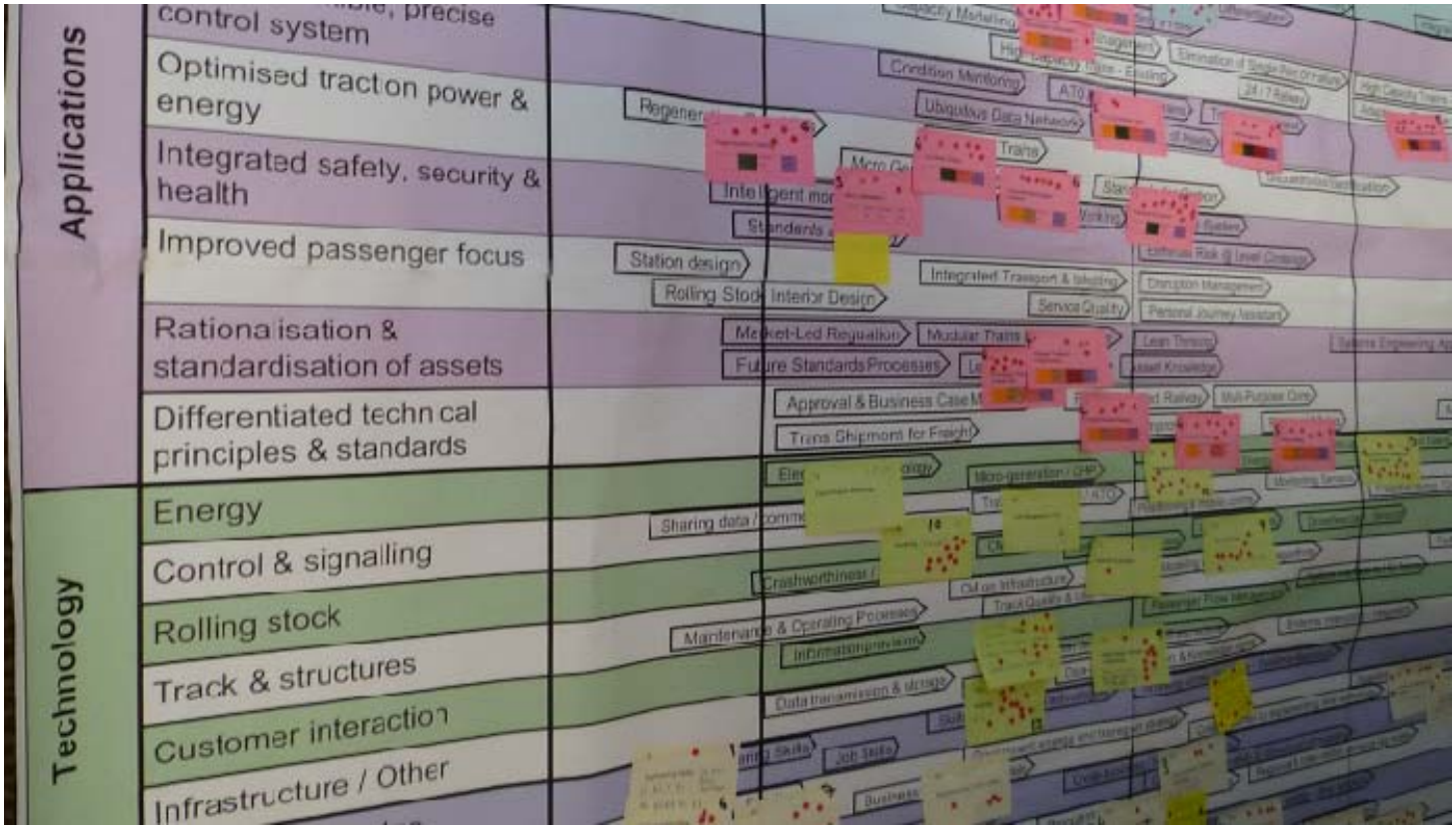
Where are we heading?

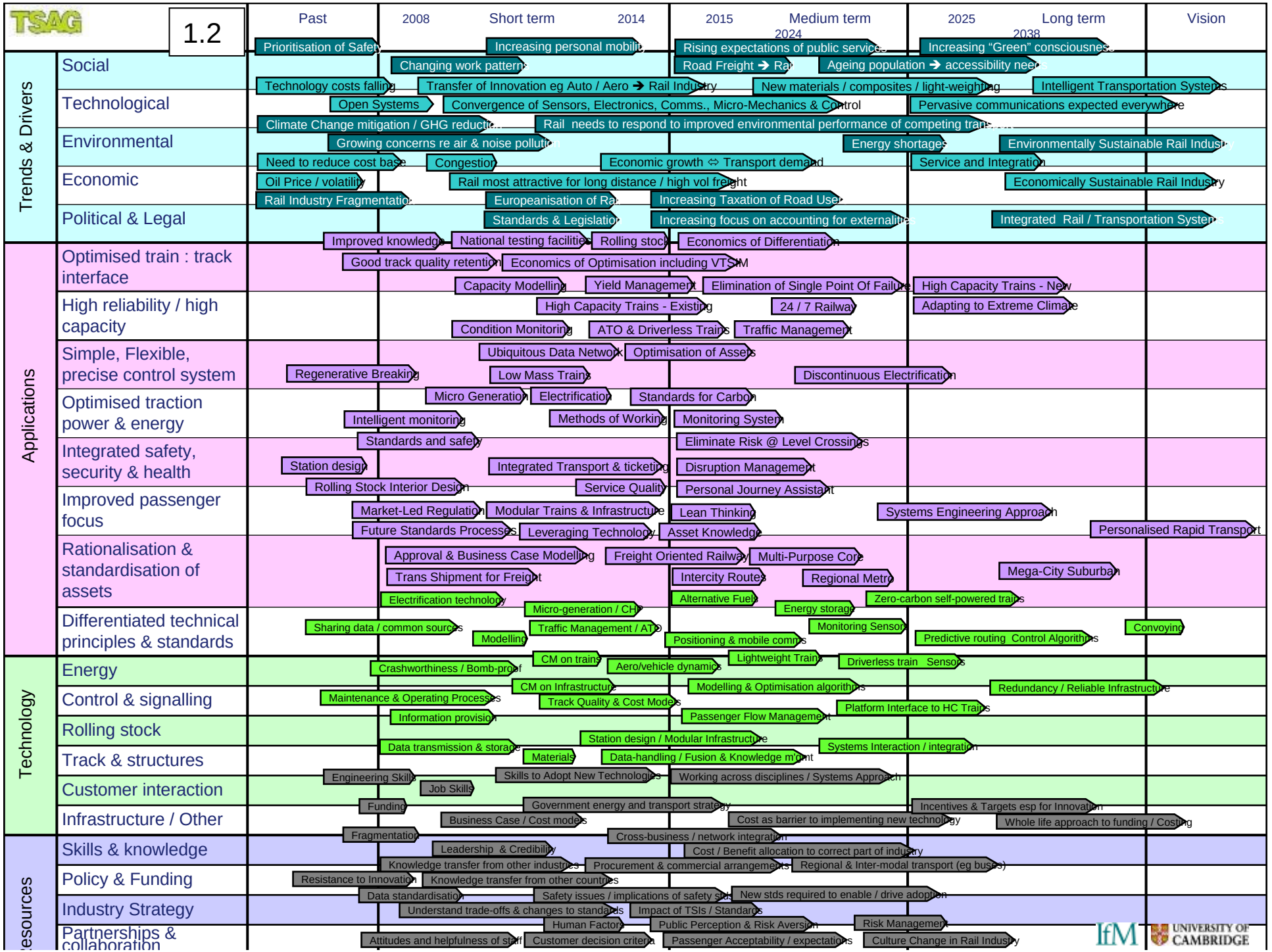
Trajectory for current activity vs step change



Industry workshops

- 150+ participated

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Congestion
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Whole life approach to funding / Costing
Fragmentation
Cross-business / network integration
Leadership & Credibility
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Knowledge transfer from other industries
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Resistance to Innovation
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Data standardisation
Safety issues / implications of safety stds
New stds required to enable / drive adoption
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Impact of TSIs / Standards
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Passenger Acceptability / expectations
Culture Change in Rail Industry
IfM
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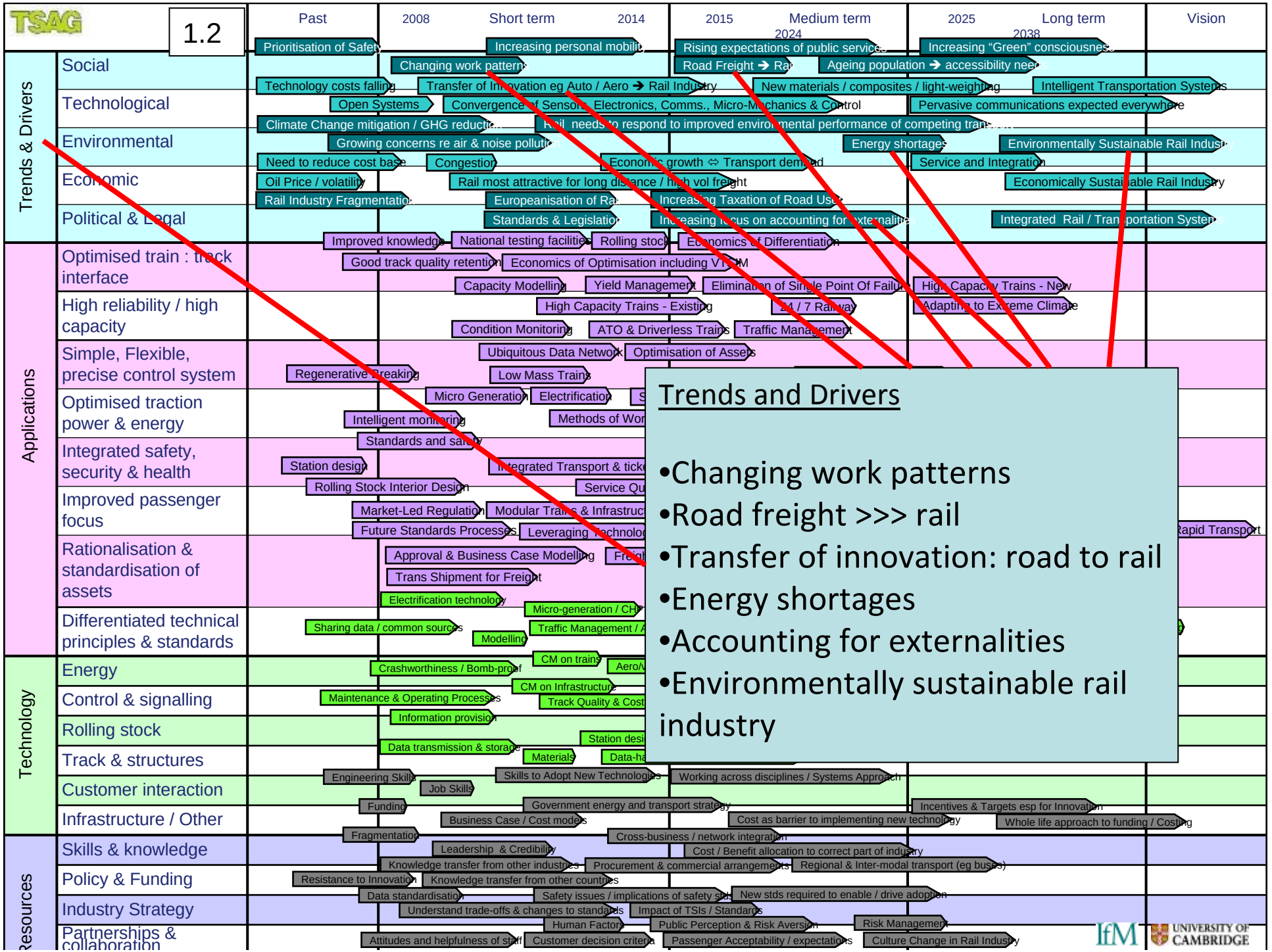
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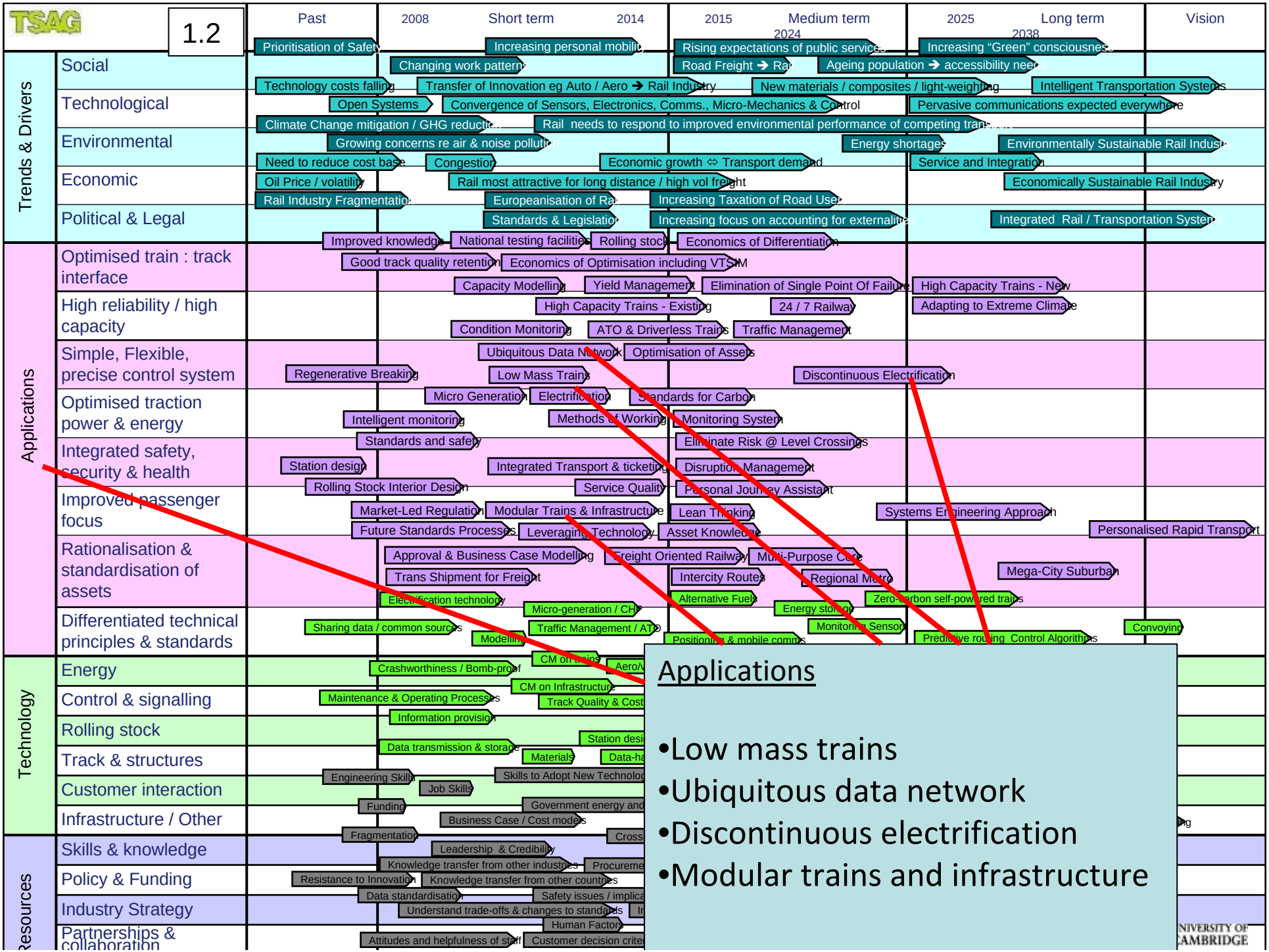
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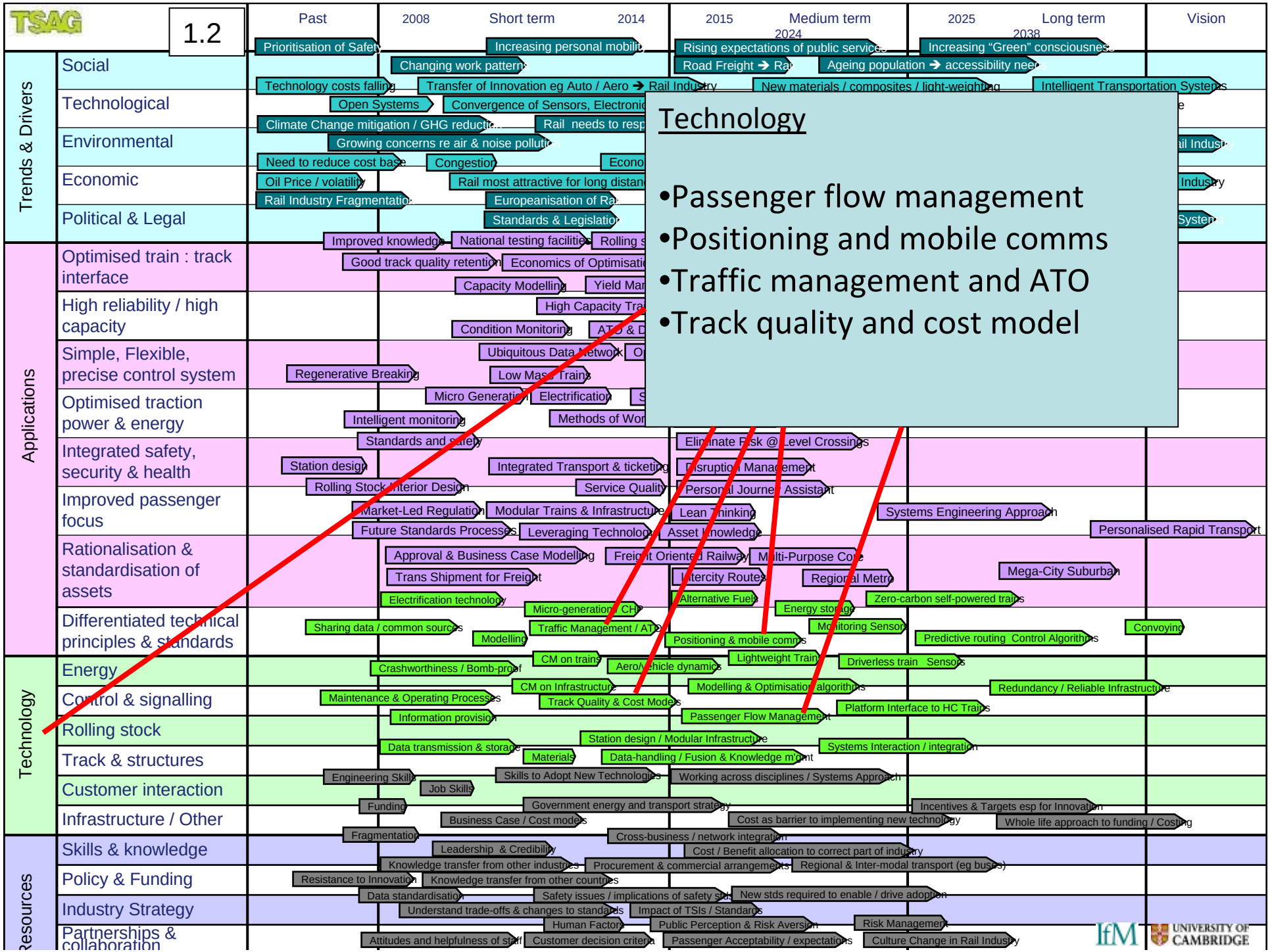
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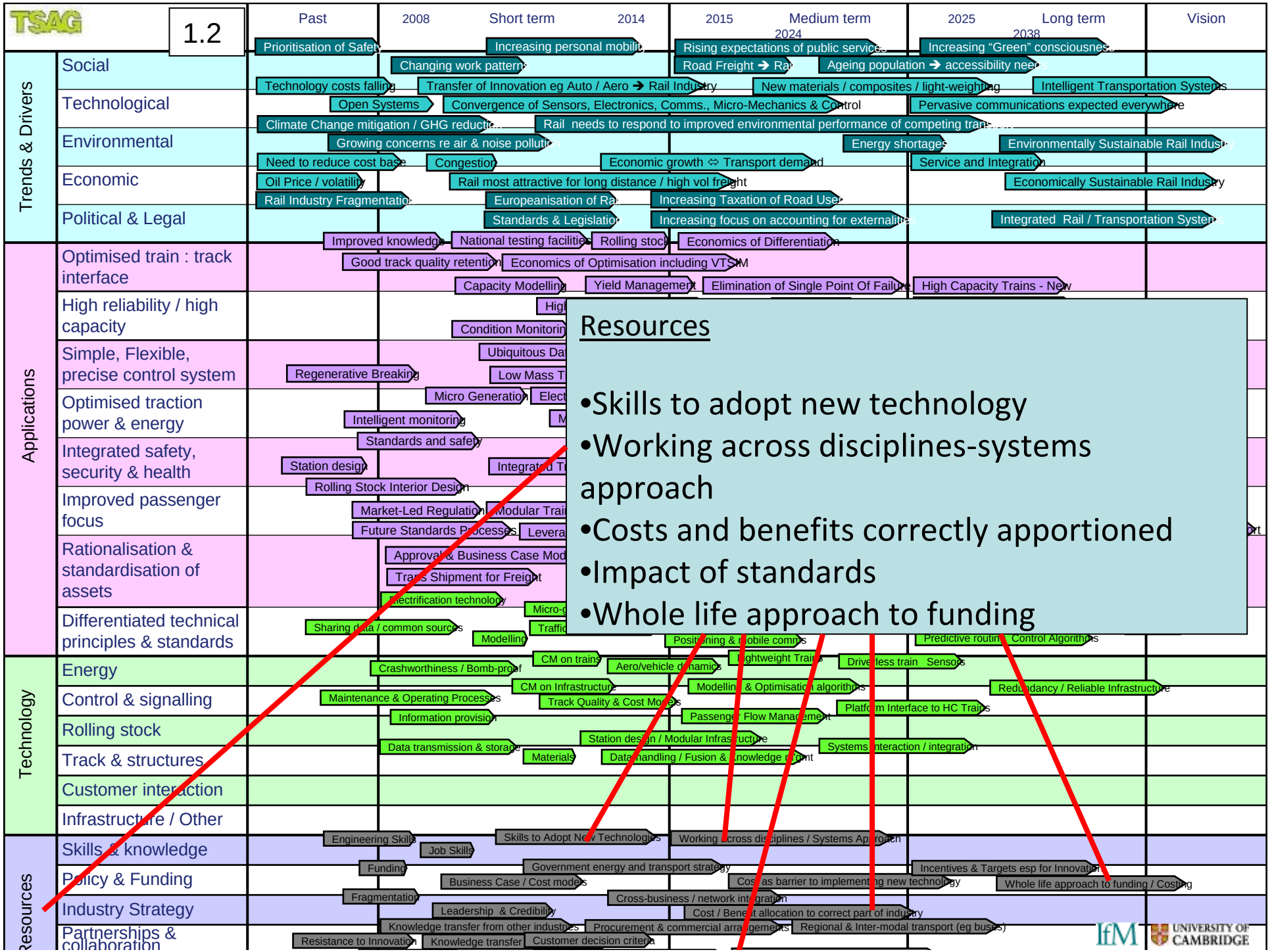
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•Skills to adopt new technology
•Working across disciplines-systems approach
•Costs and benefits correctly apportioned
•Impact of standards
•Whole life approach to funding
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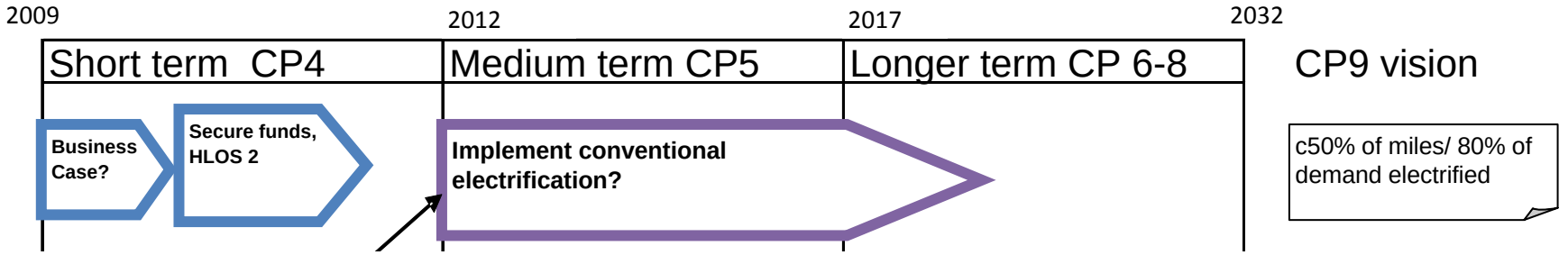
The top 20 applications…

Application	4C Impact	Scenario Importance
Traffic Management	Very High	Very High
Disruption Management	Very High	Very High
Mega-City Suburban	Very High	High
Service Quality	Very High	Very High
Station design & Crowd Management	Very High	High
Yield Management	High	Very High
Improved Hubs	High	Very High
Freight Oriented Railway	High	Very High
Regional Metro	Very High	High
ATO & Driverless Trains	Very High	High
Optimisation of Assets	Very High	High
Integrated Transport & ticketing	High	High
High Capacity Trains - Existing	High	Very High
Standards for Carbon	High	Very High
Modular Trains & Infrastructure	Very High	High
Improved Electrification Systems	Moderate	Very High
Low Mass Trains **Braking**	High	High
Regenerative Breaking	High	High
Economics of Optimisation including VTSIM	Very High	Low
Personal Journey Assistant	Very High	Moderate

What might our route maps look like?

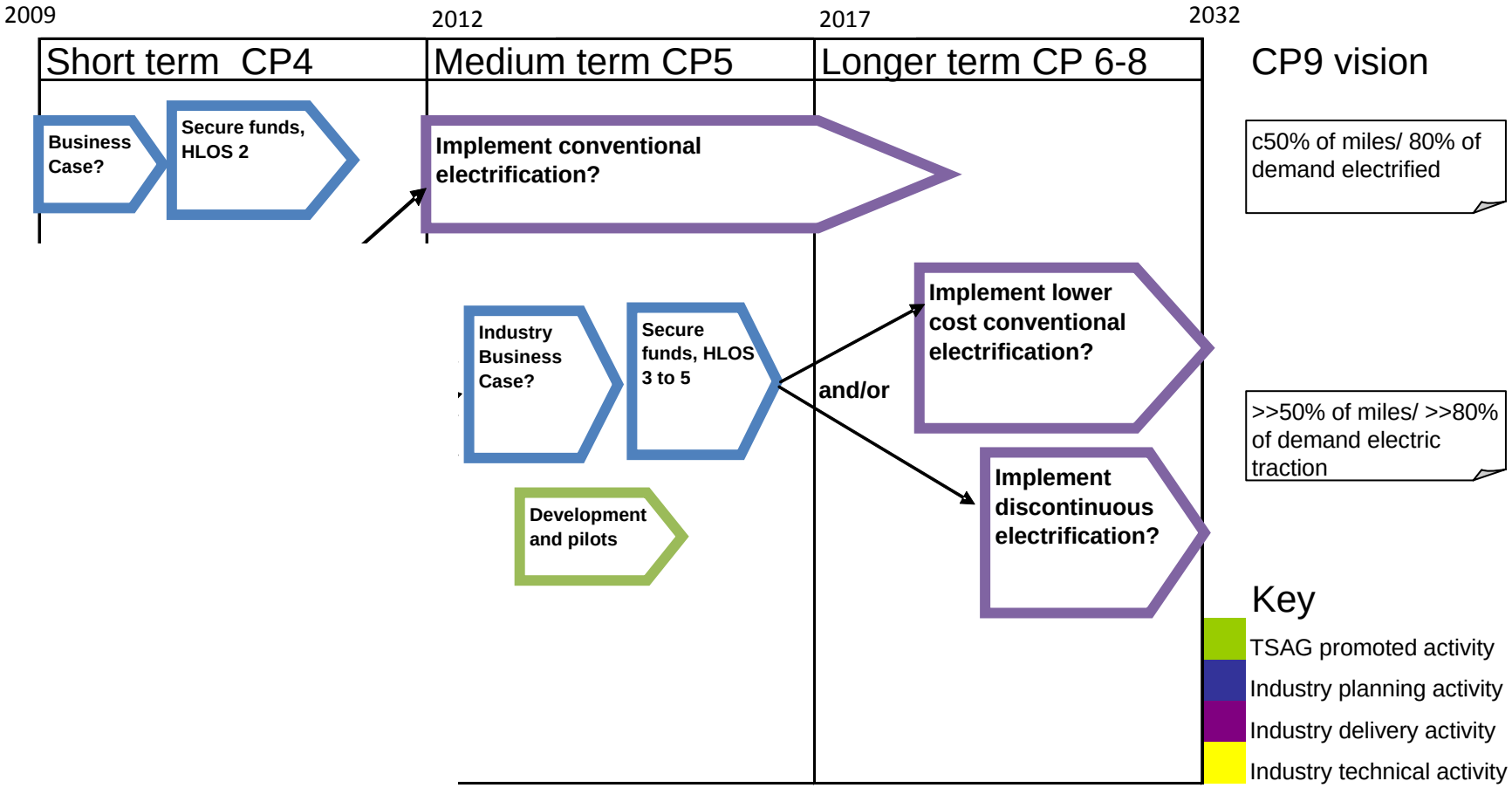
Traction power and energy deployment programme



What might our route maps look like?

Department for Transport

Traction power and energy deployment programme



What might our route maps look like?

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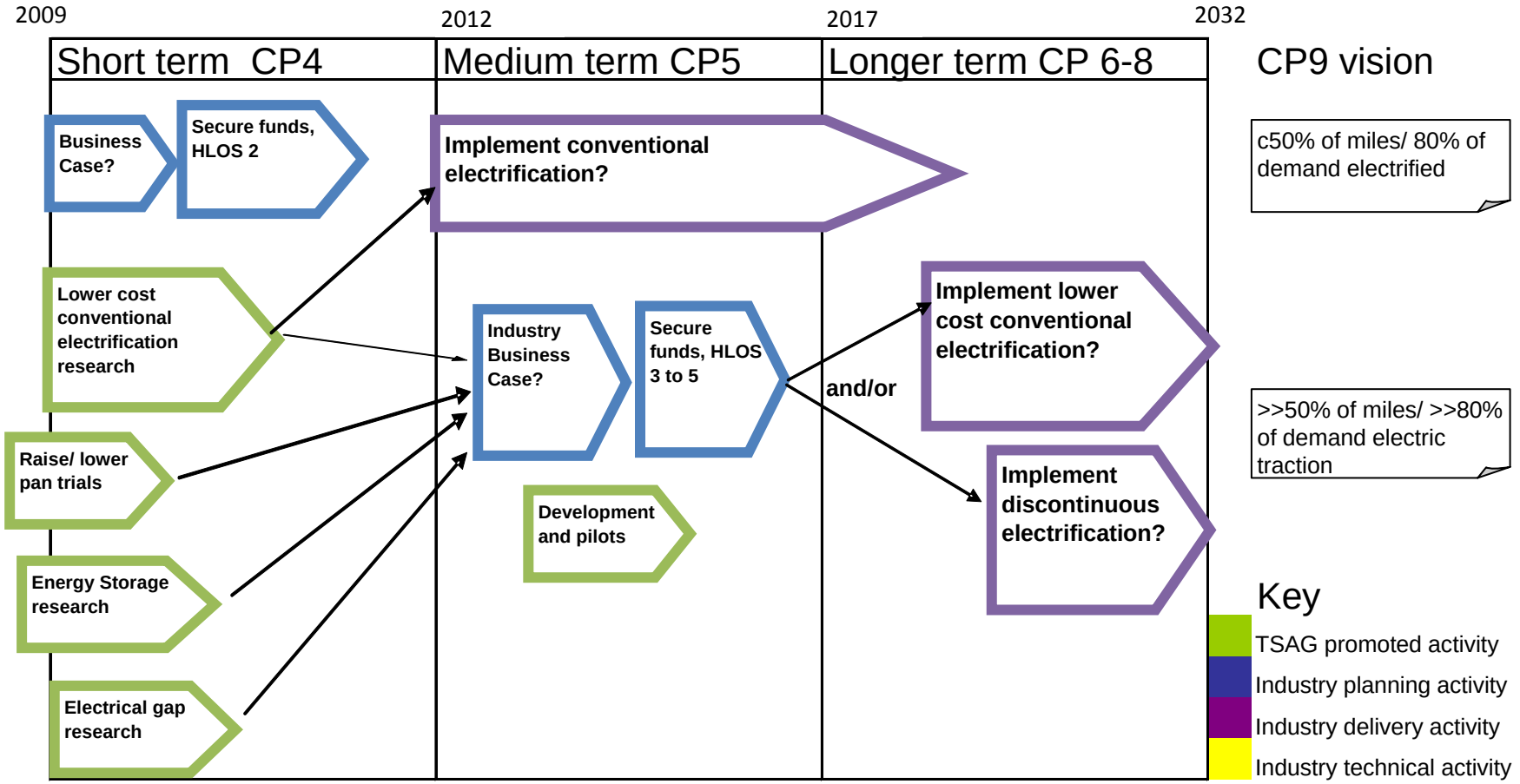

Agenda

Department for Transport

- The role of TSAG
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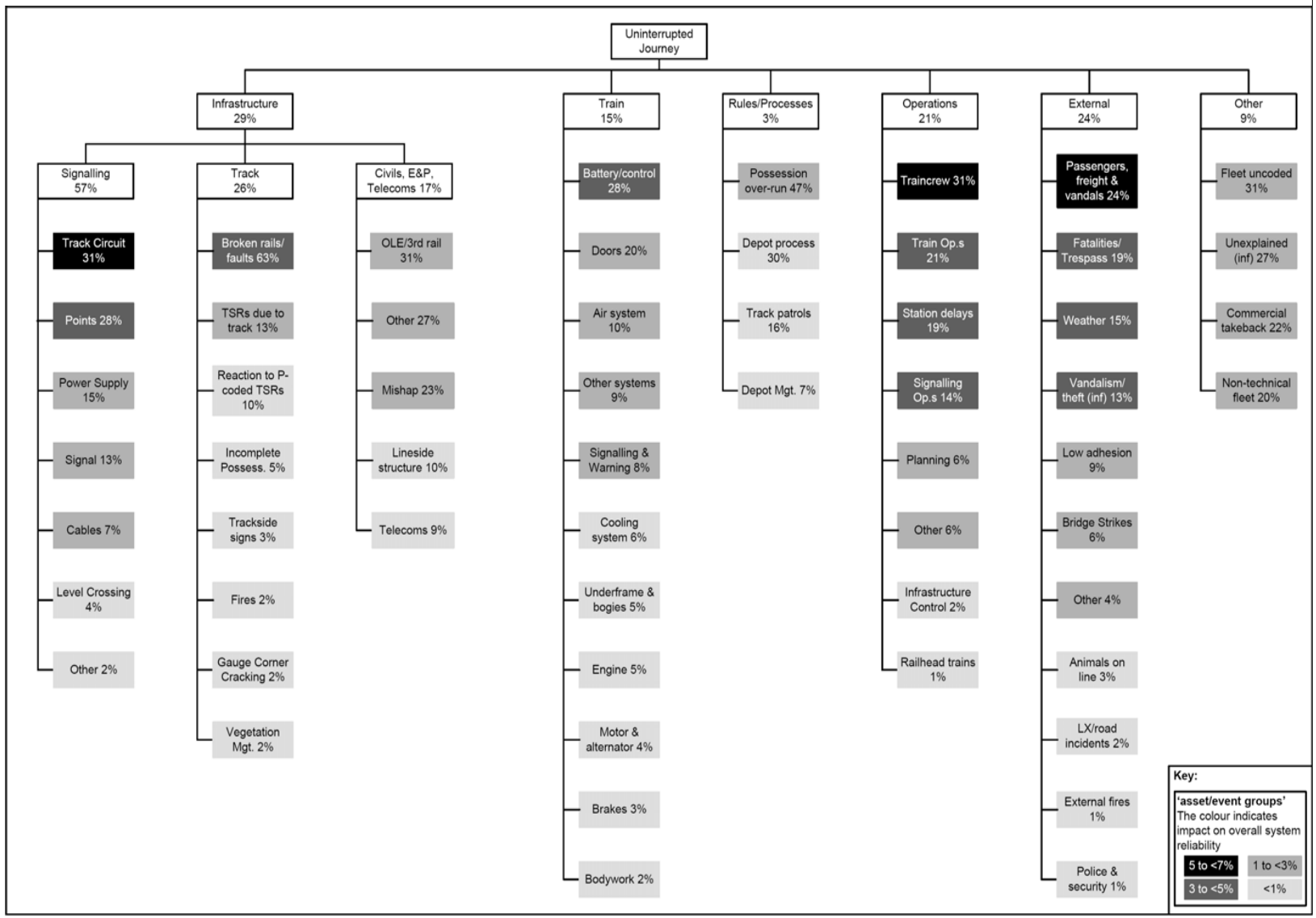
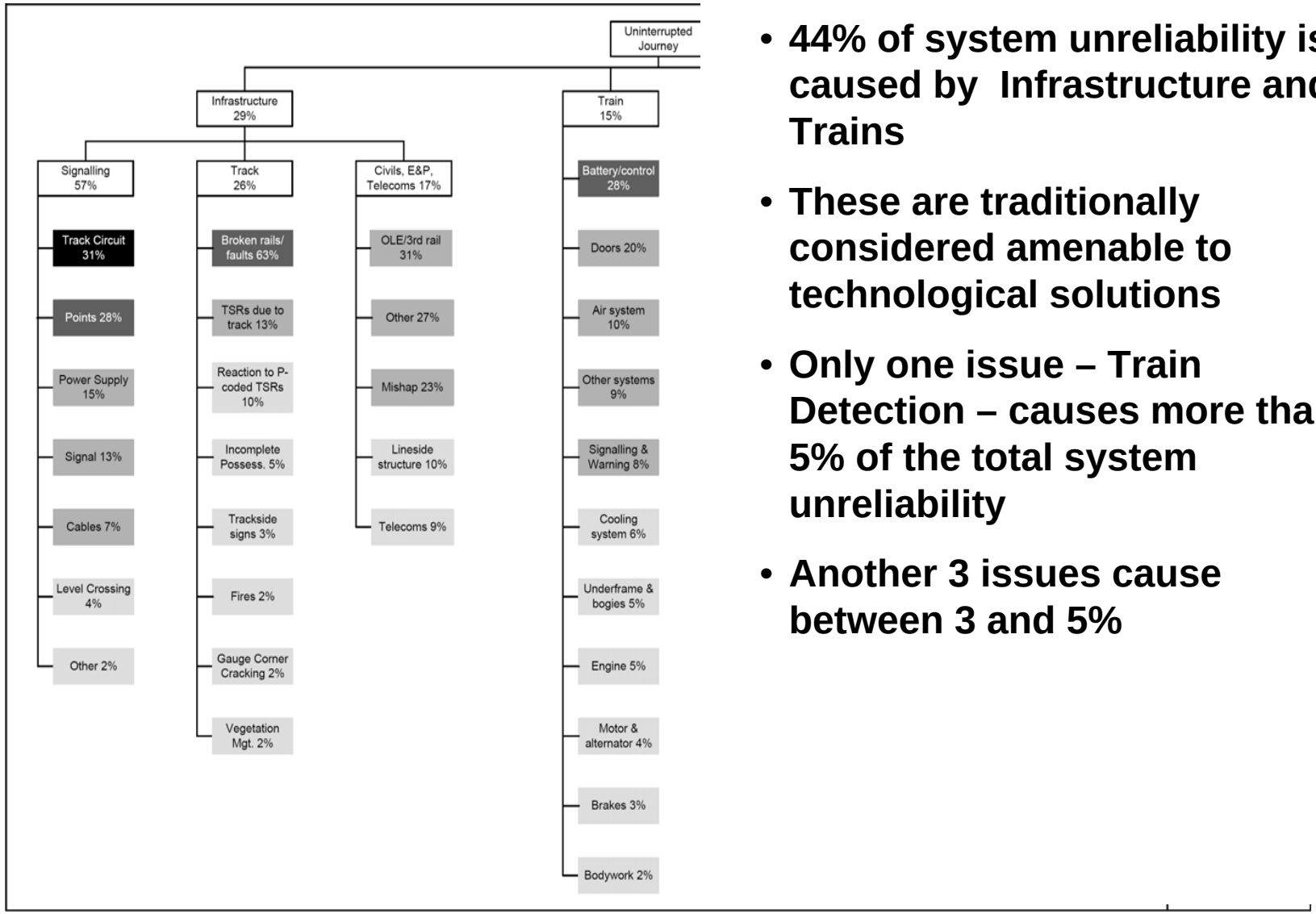
  - Rolling Stock
  - Other Strategic Research Activity

Department for Transport

System Thinking: Where is the reliability problem?



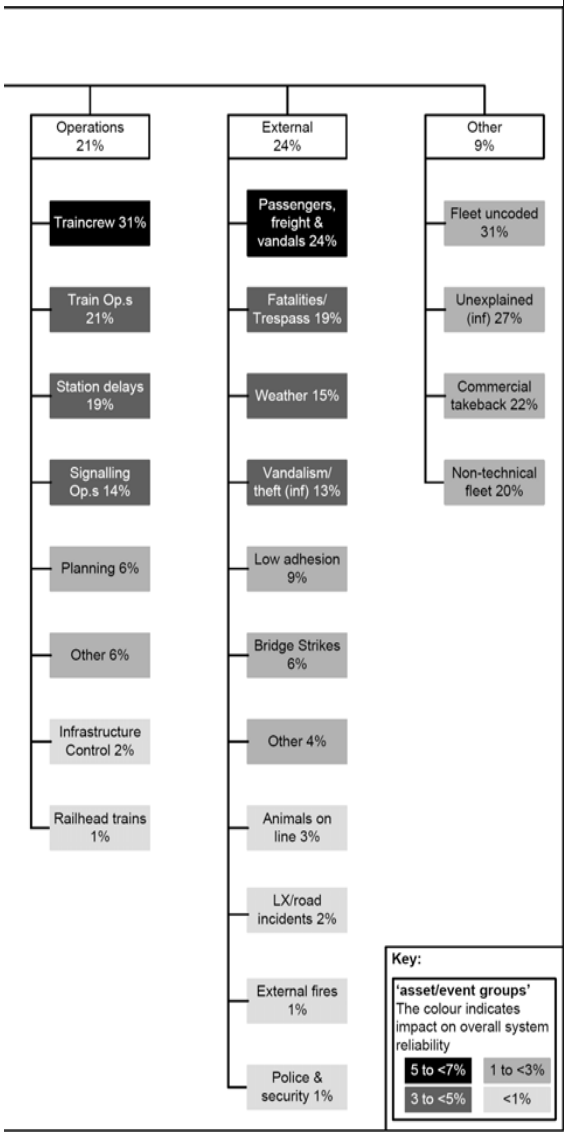
System Thinking: Where is the reliability problem?



- **44% of system unreliability is caused by Infrastructure and Trains**
- **These are traditionally considered amenable to technological solutions**
- **Only one issue – Train Detection – causes more than 5% of the total system unreliability**
- **Another 3 issues cause between 3 and 5%**

System Thinking: Where is the reliability problem?

- **45% of system unreliability is caused by Operations and External Factors**
- **Another 9% is 'Other'; fleet uncoded, unexplained, commercial takeback, non-technical fleet**
- **There is a challenge to understand whether and how technology and process improvement can be applied**



Remote Condition Monitoring

Department for Transport

- Short term output
  - c45% of current delays technically related
  - ‘straight forward’ RCM could reduce this by a quarter i.e. save 10-12% of delay minutes
  - this equates to roughly one ‘PPM point’
  - ‘advanced’ RCM could potentially double the benefit
- ‘Non-technical’ delays
  - What are we doing to reduce this c55%?
- Longer term
  - System reliability approach (not just hardware; people)
  - Support innovation
  - Longer term plan, ….vision

High Reliability/ High Capacity

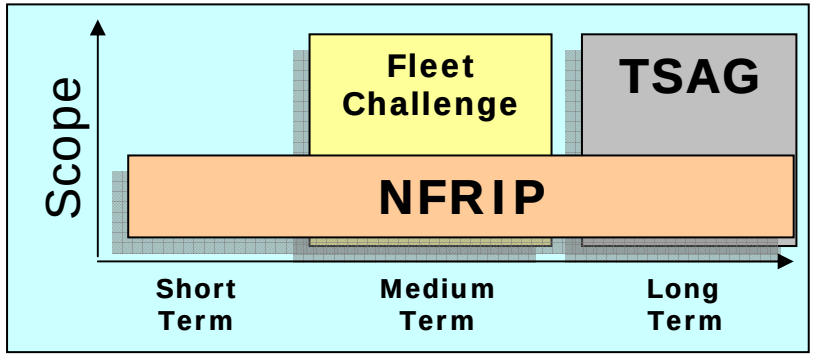
Department for Transport

- Industry is already focussed on delivering the CP4 target
- TSAG working closely with NFRIP, Fleet challenge and Network Rail to develop integrated rail reliability programme for the longer term – needs different thinking
  - High level approach ‘launched’ at 7 October NFRIP seminar
- Research being commissioned
  - Innovation analysis and strategy development
  - Assessment of UK rail systems engineering capability

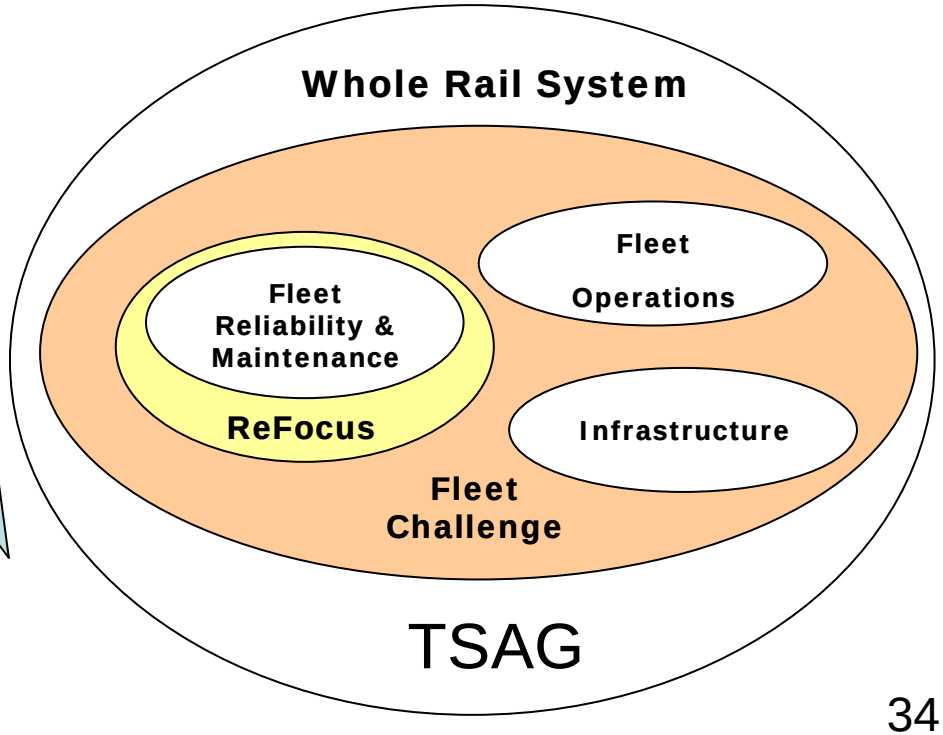
Cross cutting themes eg: reliability

- Strong engagement with other players to maximise overall effectiveness

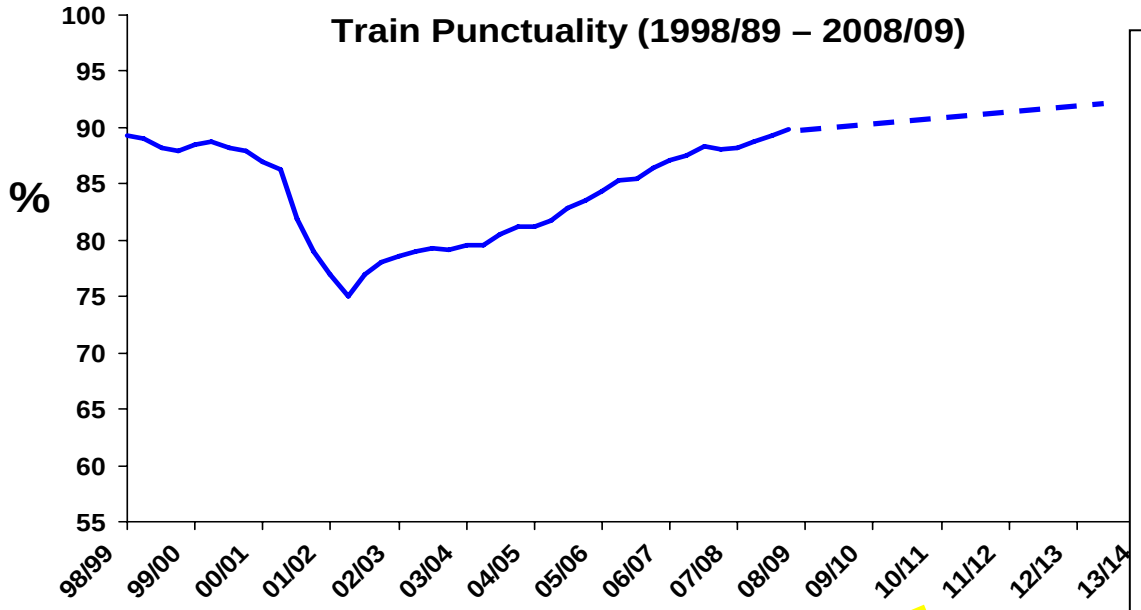
From this



To a joined up collaborative approach



Reliability - Customer Expectations?



By 2014 we expect:

- Improvement to 92.0% punctuality (from current (Q1) 90.9%)
- 25% reduction in delays of more than 30 minutes

Is this really a challenge……

- Passengers priorities for improvement
  - Value for money fares
  - Frequency of services
  - Punctuality
  - Able to get a seat

Source: *Passengers' Priorities for Improvements in Rail Services*
Passenger Focus, June 2007

Benchmarking performance

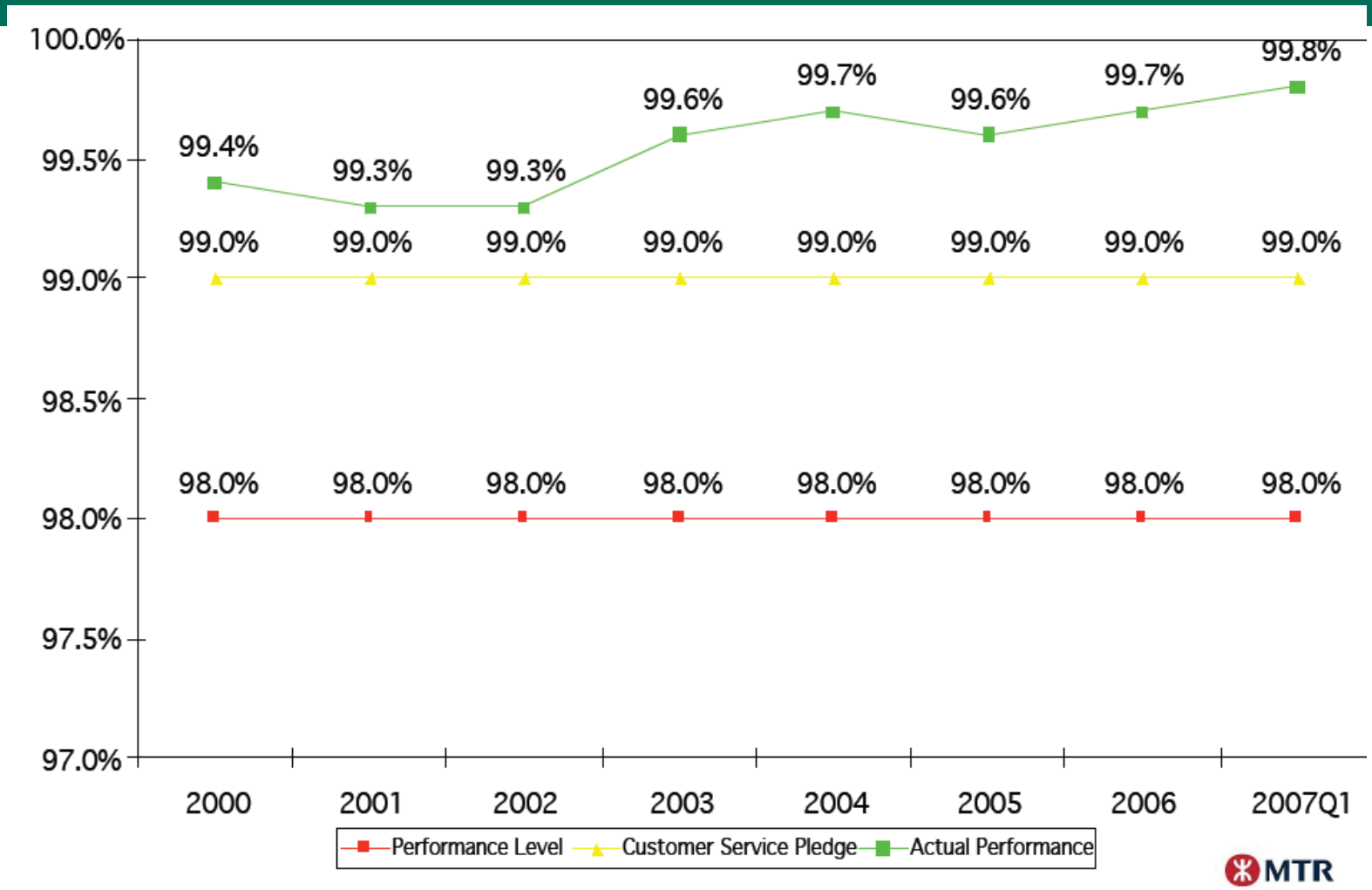
MTR network in Hong Kong

- 28 years of operation without any passenger fatalities
- Up to 85,000 passengers/hour/direction
- Only one delay per day of more than 5 minutes in 2006

MTR: 2006 operational performance

		Target (%)	Performance (%)
Train Service Delivery		99.5	99.9
Journey on time	MTR Lines	99.5	99.9
	Airport Express	99.0	99.9
Train Punctuality	MTR Lines	99.0	99.7
	Airport Express	99.0	99.9
Add Value Machine Reliability		98.0	99.4
Ticket Machine Reliability		98.0	99.6
Ticket Gate Reliability		99.0	99.8
Escalator Reliability		99.0	99.9
Passenger Lift Reliability		99.0	99.9

This level of train punctuality is not a one-off…



What can we learn?

- Benchmark performance and work with other railways to understand how improvements can be made
- Culture: continuous improvement and continuous change, a journey
- Adopting new technologies and approaches from elsewhere, overcome the NIH hurdle
- Rigorous fault reporting and data management
- Identifying root cause of problems (system perspective) – no “one-off” attitude
- Invest in people first, equipment will follow
- Work in partnerships with suppliers and infrastructure providers, share goals and rewards

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Rolling Stock

Department for Transport

- IEP preferred bidder negotiations ongoing
- Thameslink selected two bidders
- Electrification reduces need for new diesels and offers opportunities to cascade existing diesels
- Economic climate means less money available for new trains so need to develop life-extension options
- What does passenger of the future need/want? Is it just about journey time, …or more about what can be done whilst travelling, the ability to work and communicate on the move?
  - How would he value service offerings?

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Some strategic research themes

Department for Transport

Intelligent traffic management	Energy efficient timetables combined with real time traffic control feeding intelligence between track and train to manage perturbations.
Energy efficiency	Discontinuous electrification to reduce cost and complexity of electrification. Considering coasting vs on board energy storage
Station design and crowd control	Assessing how existing stations could deal with increased capacity by utilising technology to provide a safe/seamless/secure transition for customers