Climate Change Adaptation and Transport – UK and Rail

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UNECE Expert Group November 2011

The talk…

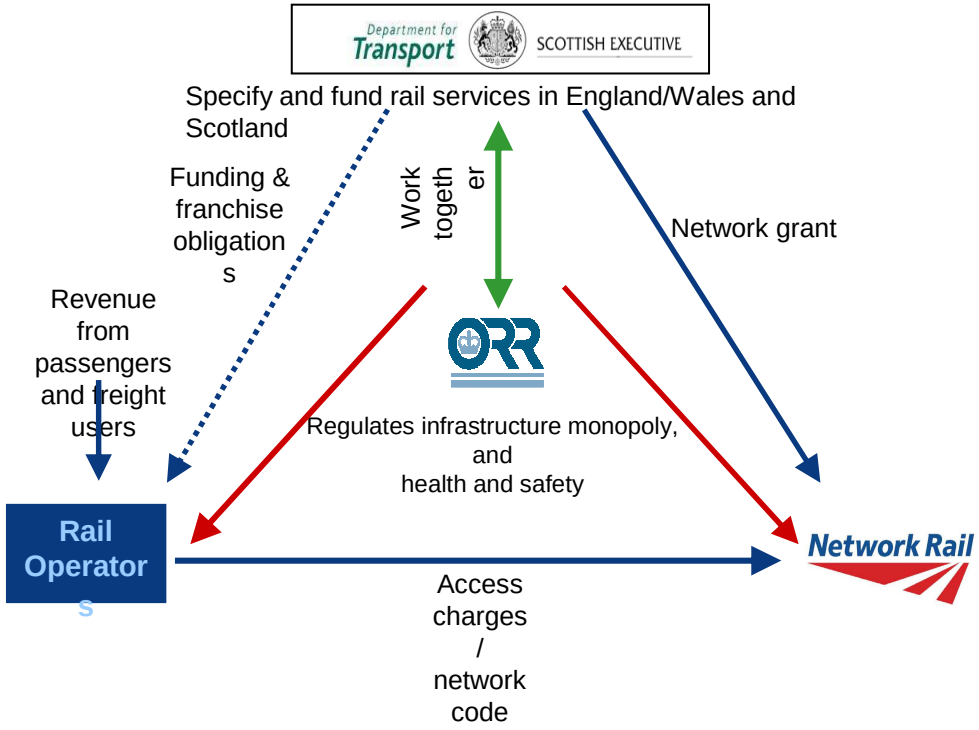
- Network Rail in UK context
- UK Government context
- Rail context
- CCA NR engagement
- Rail CCA studies – TRaCCA
- Going forward

Hyperlinks are shown at the end of the presentation

Network Rail in the UK

- Network Rail in UK
  - GB Rail Infrastructure owner
  - Regulated
  - 5-year Control Periods
  - 30-year Technical Strategy

Currently working towards CP5 (2014 -2019)



Infrastructure portfolio

31,000 km track	¾ Earth's Circumference
12,000 km electrified railway	2/3 Overhead line – 1/3 third rail
38,000 bridges	Largest single bridge owner in UK
700 tunnels	200 miles of railway in tunnel
23,000 culverts	250 miles of subterranean water courses
300 coastal and estuarine defences	150 miles of coastal railway
2500 stations	Large property portfolio
25,000 km of major earthworks	Twice the length of UK's entire motorway and trunk road network

"Maintain, enhance and renew the existing network" (GB Rail Regulator)

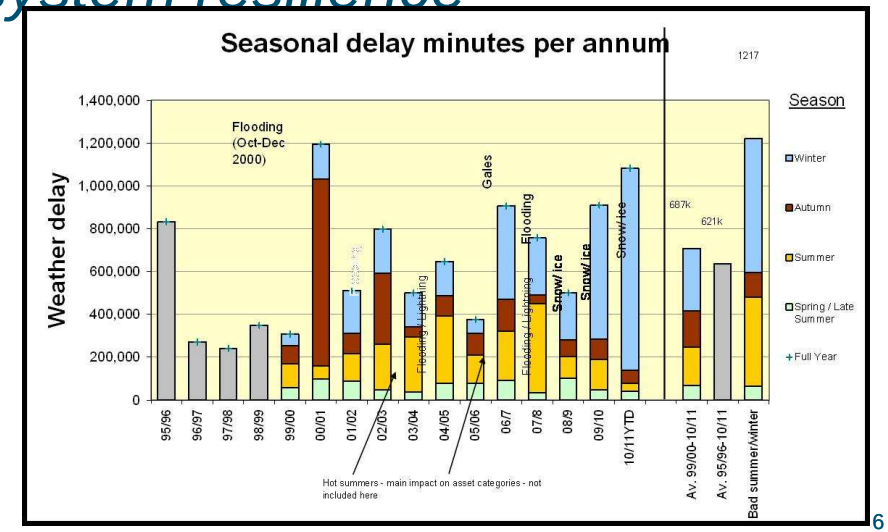
Government context

- Nick Stern ‘Economics of Climate Change’ report, 2006
- Climate Change Act 2008 requires:
  - 5 yearly *Climate Change Risk Assessments*
  - National Adaptation Plan (both ‘work in progress’)
- Act has a Power to require organisations to report on Adaptation
- Power invoked on Network Rail early 2010
  - Over 90 organisations reporting

Rail context

- Past studies by GB Rail (RSSB, NR), and the Environment Agency show 'business as usual' is not an option
- Flooding costs £50M pa – this could be £500M by 2040s
- The rail industry appetite for:
  - a safe, affordable and highly reliable railway with increased capacity – better *system resilience*
  - Now and into long term
- TRaCCA* study initiated

*Tomorrow's Railway and Climate Change Adaptation



CCA – NR engagement

Government

- Adaptation Report
- Climate Change Risk Assessment
- National Adaptation Plan
- UKCIP and Environment Agency

Network Rail

- Weather resilience, Climate resilience
- Reorganisation – Systems

CCA engagement

Industry

- CP5 - Business Plan for Rail includes CCA provision
- Rail Research and Adaptation Network
  - R&D Projects' synergies, incl. FP7
- TRaCCA

International activity

- CER
- UIC
- UNFCCC

Rail CCA studies - TRaCCA

- TRaCCA aimed to provide tools and knowledge to improve the reliability for the railway network – **solutions not problems**
- Phase 1 sanctioned by Rail Research Leadership group (TSAG) in November 2009:
  - UK Met Office Hadley Centre expertise
  - a prioritisation and scoping exercise to meet statutory reporting deadlines and aligned to CP5 work
  - covering 2020s, 2030s, 2040s
- Continued funding agreed May 2010 for Phases 2 and 3 for:
  - detailed climate impact analyses on the selected priorities

What we've learned – some Headlines

- A marked difference in climate north/ south is likely
- Cold winters will become increasingly rare
- Track buckle risks increase
  - Today's processes mean reduced System Reliability
- NR budget for c500,000 minutes for weather-related delays pa = £37M
- Adaptation has wider benefits

Heat related non-work days – 2040s

Learning points

- TRaCCA is a *unique amalgam* of MO Hadley Centre Science with Rail expertise
- Infrastructure life-cycle important – what will be affected?
- Timing for Adaptation Action - £70M identified for CP5….
- Heightened level of awareness in Rail regarding weather resilience now, and adaptation investment for longer term resilience
- Much interest wider than Rail
- Research is key
- Technical solutions approach is good – think ‘how do we fix this’

Some 'Positives'

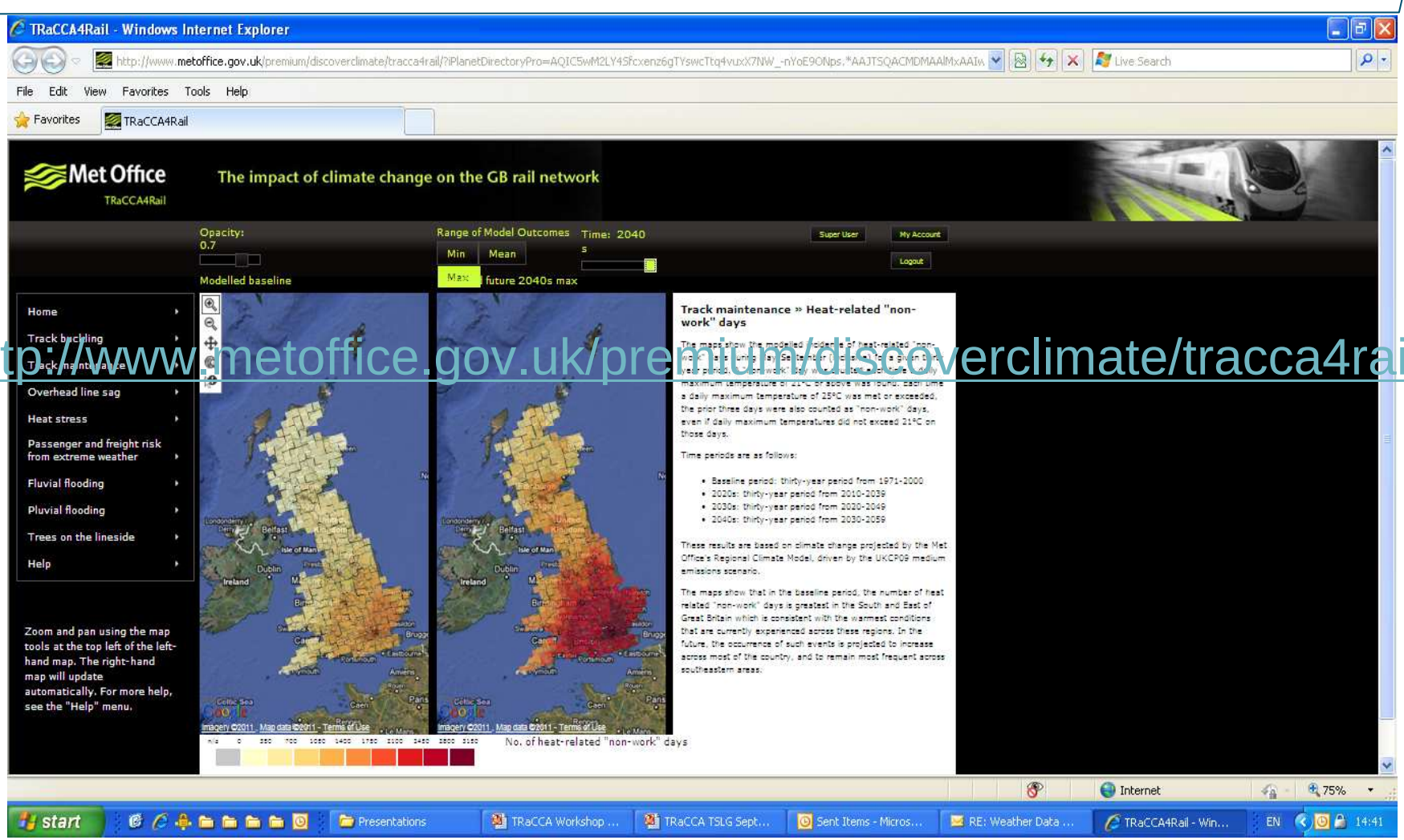
- Investment in adaptation measures can improve railway *system* resilience and *system* reliability
  - Investment can be prioritised - phased at Asset Renewal
- Differentiated standards can reduce costs
- Climate change and adaptation modelling can help to prioritis and target investment to the right place
  - Engineering solutions, Forecasting tools

(Example: RSSB study *T643 Impact of climate change on coastal rail infrastructure)*

Some limitations

- Engagement at outset was patchy
- TRaCCA worked to timescales set by Government - this limited the scope
- The available data were not ideally suited to modelling:
  - Delay minutes developed for *delay attribution*
  - Rolling stock, human factors – no data
- There are limits to what current science can predict:
  - cf: wind, humidity, urban heat island

Visualisation tool



http://www.metoffice.gov.uk/premium/discoverclimate/tracca4rail/

Interest in TRaCCA

Government

- DfT, Transport Scotland, Defra, SEPA
- Infrastructure UK

Academia

- Oxford University (ITRC)
- Birmingham University (Futurenet)

Infrastructure Owners

- TfL, National Grid, EA

International

- UIC
- OeBB, DB, SNCF
- United Nations

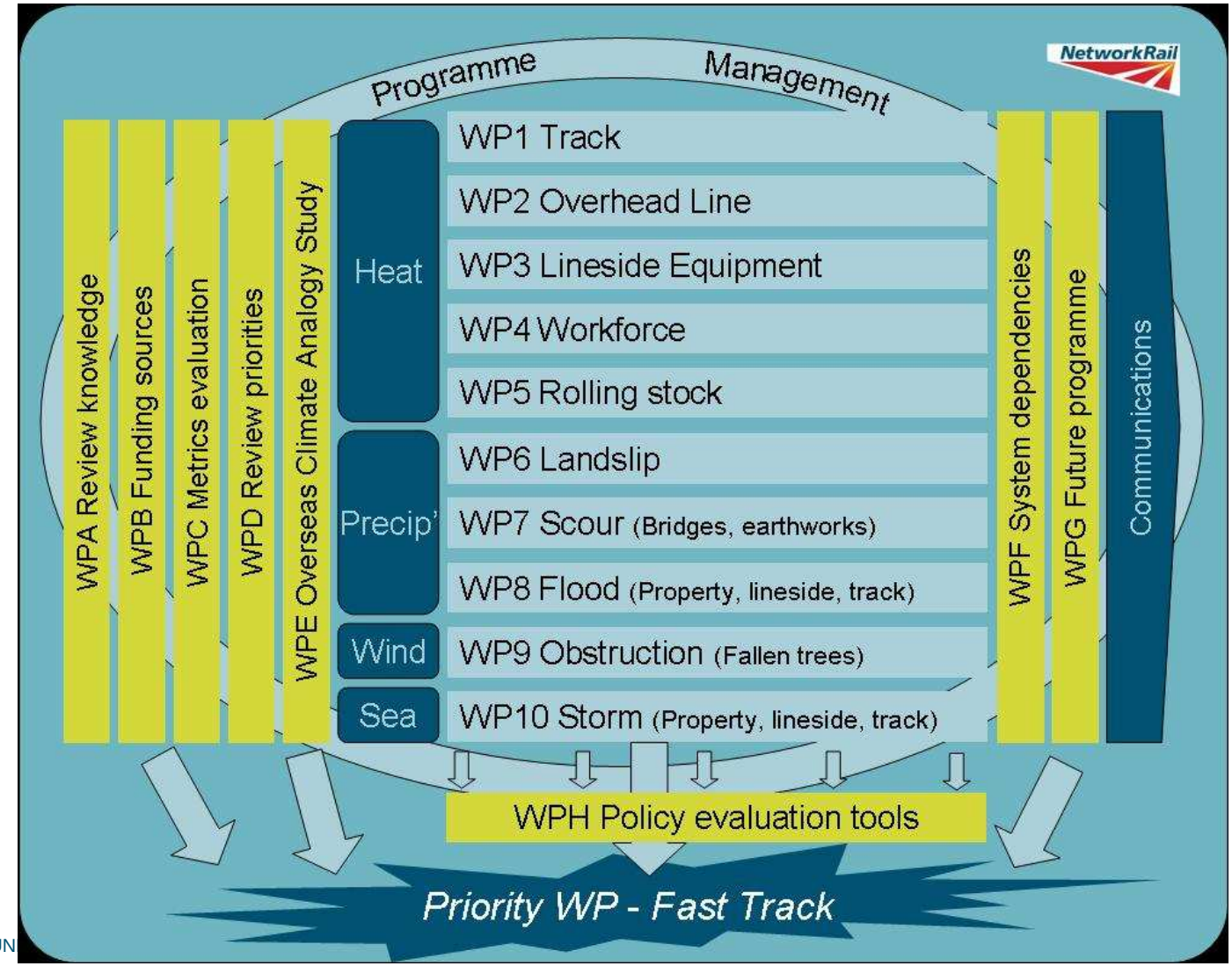
Network Rail:

- IIP/ SBP CP5 Strategy
- Systems Engineering
- Systems Analysts
- Reliability Team

Going forward…

- TRaCCA was a defined *project* and has led the way
- Many benefits in being more ambitious:
  - Broader scope (in terms of participation, activities and time, with a *systems approach*)
  - Build on external R&D and Science
  - Improvement the data/ invent new metrics
  - ‘Fast-track’ packages to bring early benefits (especially in ‘local weather management’)
  - Bring other countries’ experiences **now** to help show the **future for the UK** and vice-versa

Current proposal



Estimated Cost to Rail: £5M

Timeline: 5 Years

Expect UK Research to match funding – £10M possible

Links

Network Rail: www.networkrail.co.uk

Rail Industry CP5 Plan: www.networkrail.co.uk/iip.aspx C:\Documents and Settings\Jdora\Local Settings\Temp\wz4c20\Buckled track.jpg

RSSB Research: www.rssb.co.uk/RESEARCH/Pages/main.aspx; www.rssb.co.uk/SiteCollectionDocuments/pdf/reports/Research/T643_rb_final.pdf

TRaCCA: www.rssb.co.uk/SiteCollectionDocuments/pdf/reports/Research/T925_rb_final.pdf

Adaptation and Resilience Research www.ukcip-arcc.org.uk/; www.arcc-futurenet.org; www.itrc.org.uk

UK Government Adaptation Reports: www.defra.gov.uk/environment/climate/adapting

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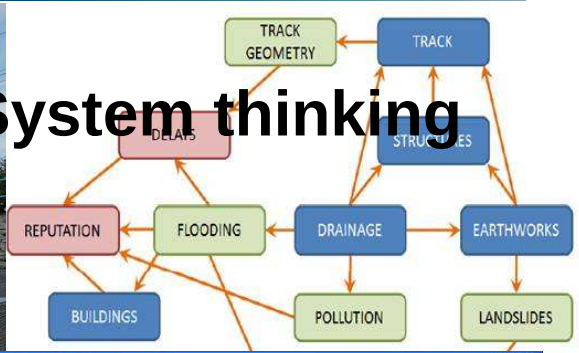
Problems??

Some solutions!

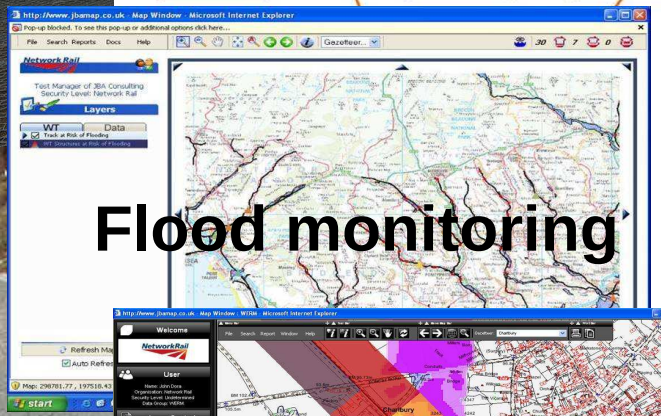
New Drainage

Remediated Bank

System thinking



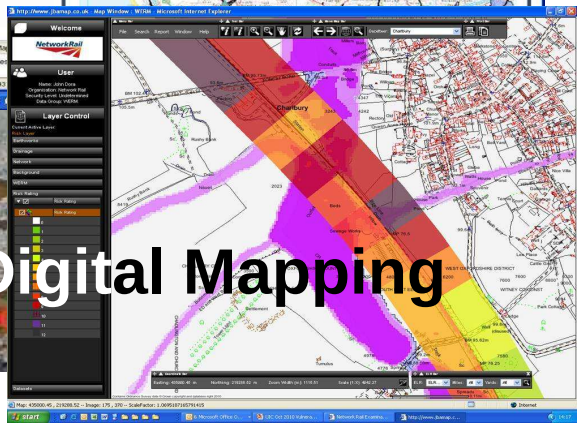
Targette weather forecasts



Flood monitoring

Emergency kit

Reconstructed hillside



Digital Mapping

Last slide.

THANK YOU