Tomorrow’s Railway and Climate Change Adaptation

‘TRaCCA’

Research supporting policy and practice

*Exploring the challenges, not all the answers!*

John Dora, ARCC Assembly 2014
• WCML 1830s
• Potters Bar Tunnel & Earthworks 1850
• St Pancras Station opened 1868
• Forth Bridge complete 1890

Standards? Records? (I’m not ageist!!)
Extreme weather v railways

- Past decade
  - “Extreme weather 8, Railways 3” (not verified…)

- Understanding systemic weather impacts is improving
  - From a siloed baseline 15 years ago…
  - Long way to go…

- Finding out how rail performs in the current and future climate?
  - Making strides
  - Complicated
  - Granularity of data required v that available…

- Serious research is required!
  - and has not been ignored
Extreme weather v railways

• The Future Railway (Rail Technical Strategy) needs to have:
  – High reliability
  – More capacity
  – Better value for money
  – A 'predict and prevent' ethos

• All against a background of increasing traffic
  – See EU White Paper on transport and modal shift
  – 50% to rail medium and long distance by 2050

.....and....

.... a changing climate
Climate change adaptation

• Adaptation studied by GB railways since 2003

• Catalysts included:
  – Stern review into the economics of climate change, 2006
  – NR dialogue with Government on the Climate Change Bill
  – Climate Change Act 2008
  – ARP 2010

• Government and rail industry desire for improvements in system resilience
Rail studies – T925 TRaCCA

- 2009 – the RSSB funded T925 TRaCCA was scoped to meet statutory adaptation reporting deadlines

- Aligned to help inform Control Period 5
  - Aimed to provide tools to improve long term reliability

- Utilised the UK’s Met Office Hadley Centre expertise

- Detailed climate impact analyses on selected priorities
  - Knowledge needed if we are going to get the tools right

- Limited in scope and revised to meet ARP schedule
T925 helped to:

- Inform Network Rail’s ARP report
- Engage part of the rail industry
- Set a marker for climate change adaptation in the Periodic Review process for CP5
- Set out what we didn’t know
- Provided a taster that supported more detailed work - T1009 TRaCCA
• A marked difference in GB climate north/south
• Cold winters become increasingly rare
• Track buckle risks increase
• Major floods and coastal storms become 6x more frequent by 2080s
• Safety standards mean reduced system reliability (all else being equal)
• Data and science issues
  – Granularity and fitness for analyses
Positive, practical messages

- Climate change and adaptation modelling is an enabler for prioritised, targeted investment => better vfm
- Asset lifecycle and a systemic approach important
  - Adapt at equipment renewal stage = a low cost high impact strategy
  - Investment in adaptation measures can improve current railway system resilience and reliability
- Forecasting example: RSSB study into climate change on coastal rail infrastructure
- Led to 36 hour forecasting system for GWML at Dawlish – (qv February 2014!)
T1009 aims to answer some of the questions raised by T925

- T1009 was authorised at TSLG June 2012
- £2.5M budget for ‘Foundation Projects’ for 2 years
- Size of Industry problem: *in excess of £4.6Bn over 30 years* – *note that this is mostly flood-related!! (data…!)*
- *Whole Industry, Whole System* approach advocated
- RSSB funded with NR support in kind – expertise, data, much analyses
- Not all the answers expected (it’s a *Foundation* Phase)
- Split into two *Work Packages*
• Stakeholders - Entire railway industry
  **Awareness has been raised**
  Recent winters did help!

• NR support vital but wider industry partners benefit:
  – ATOC, RIA, ROSCOs etc actively supporting
  – Stakeholders offering e.g. data, expertise
  – Watch for ‘knee jerk’ responses to recent events!
  – But be amenable to offering ‘quick wins’!

• Dissemination events from mid 2014
WP1 Deliverables

A comprehensive knowledge review
- Over 600 records logged

An analysis of operational weather thresholds
- Based upon railway standards and procedures

A summary of knowledge and knowledge gaps
- The unknowns!

A knowledge dissemination platform
- As part of RSSB’s ‘SPARK’ platform

Prioritisation for future work

Dissemination events
WP2 Task 1 - Economics
WP2 Task 3 - Metrics
WP2 Task 2 - Overseas analogy
WP2 Task 4 - Systems
WP2 Task 5 - GIS
WP2 Task 6 - Change Management
WP2 Task 7 - Priorities
WP2 Task 8 - Funding
WP2 Task 9 - Evaluation of Findings
Railway as a system of systems...
Further ahead—years 3 to 5 (6?)

Tackle the ‘known unknowns’

- Years 3 to 5 to try and answer the ‘too difficult’ questions
- Provide better tools with the better knowledge:
  - A system-wide vulnerability tool
  - Sub-system vulnerability tools
  - Decision support tools for local/policy managers
Affordable, targeted solutions...

New drainage
Remediated earthworks
System thinking
Weather forecasts
Flood monitoring
Reconstructed hillside
Digital Mapping
Emergency kit
..within a 30 year timeframe...


Investment in delivery 2020 - 2050
Preparation in ‘CP5’ 2014 -2019
Ideas going forward include linking across themes:

- Systems thinking
- Overseas analogies
- Economics
- GIS tools

Plan to link these themes with and engage with ARCC projects and others e.g. iBuild, ICIF, ITRC…
Vision:

- Provide support for long term policy and strategy development, with new knowledge and skills
- Inform NAP2/ ARP 2/ CCRA 2
- A 30 year Adaptation Programme from 2020

Many challenges…. 

….not all the answers!