Transforming Asset Management through new technologies

The example of the UK High Speed Network

Step forward on developing Asset Management in Railways

Joao Rocha
Network Rail (High Speed) Overview

Key notes

Contractor of choice for Operations, Maintenance & Renewals for HS1 LTD

109km connecting central London to Pan-European services

Maintain Infrastructure related delays to under 5 seconds per train

Commissioned in two stages 2003 & 2007

First national Railway Infrastructure company to achieve ISO 55001 in the U.K
Asset Management vision

NR (HS) vision to increase its asset management capability and develop the organisation to deliver its short and long term goals effectively and efficiently

- An organisational competent and confident, aligning accountability with corporate goals. And penetrating all areas of the business through maturing asset management suite of best practices

- Establish a lean and agile asset management planning and delivery organisation that combines all operational activities

- Adding ‘teeth’ to our contracts, holding those to account able and ensuring our staff can manage proactively

- A genuinely global leading asset management engineering framework to deliver best practice in Asset Management

- Modernising our tools, technology and process – delivering an information rich and future proof asset decision making systems

- Supporting a collaborative & data led negotiated platform to maximise value from our activities
Why do we feel innovation is important?

There are significant opportunities for supporting our people through enhanced sharing & learning – including modern training.

SAFE

Innovation and knowledge Transfer

Less time in harms way
Effective training
Improved rostering
Confident
Competent

Wellbeing
Confidence
Knowledge
Performance

Safety increase
Greater capability to perform tasks
Increased utilisation
Reduced lost time
Smart Glasses – Remote support/video
Smart Glasses – Remote support/video
Utilising information for out-performance

By using asset management best practice and detailed MTBSAF/i analysis NR(HS) is proud to have some of the U.K’s highest railway reliability preforming assets under it’s management.

**Asset Management**
- Reliability
- Availability
- Maintainability

**FAB Analysis**
1. Early identification of trends: Enabling specific management
2. Benchmarking: Offers capability to benchmark reliability with others
3. Comparisons: Enables comparative asset analysis and makes sharing lessons learned easier
4. Greater clarity: Enables the use of enhanced statistical analysis
5. Greater collaboration: Cross discipline RCA performed

**Note:** Safety and performance go hand in hand

Notes:
1. CENELEC - EN 50126-1 - Railway applications
2. HIRG stands for High speed infrastructure reliability group

www.railway-asset-management.org
Example of fault data
Fault forecasting – Poisson process

Illustrative example of forecast modelling

Poisson forecasting
Random process that counts the number of events that have occurred up to some point in time

Assumption that faults are independent events

The average occurrence rate is fixed and constant in time

Confidence intervals based on the Poisson process used to estimate an appropriate range

Data covering 7 years used to create the forecasting models
Forecasting to enhance performance

Next thirteen periods – Fault forecasts.
What does the forecast mean in terms of performance, fault and cost implications

Forecasted Faults

Number of aP Faults

Civil
S&T
E&P
Track

Predicted severity 1 & 2 faults over the next thirteen periods

Predicted service affecting faults over the next thirteen periods

Notes:
(1) Assets shown are representative of tier 1 asset groups
(2) Upper and Low stochastic failure simulations based on Poisson distribution
(3) All incidents last 3 years 2015-16 - 2018-19p0 Graph for WIU Ops Strategy.xls
Forecasting to enhance performance

Next thirteen periods – Fault forecasts. What does the forecast mean in terms of performance, fault and cost implications.

Notes:
1. Assets shown are representative of tier 2 asset groups
2. Upper and Low stochastic failure simulations based on Poisson distribution
3. Percentage of assets delay minutes shown, based on cumulative delays average multiplied by upper forecast.
Reporting Dashboards

Network Rail High Speed1 Intelligent Asset Management

iAsset Management Dashboard

High Level Dashboard - Technical Details - Coating Information - Asset Information

Network Rail High Speed - Unifier

Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - Network Rail High Speed - 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What is Augmented/Mix Reality

Mixed Reality Holograms technology enable users to place life like holographic 3D objects into the world around them, viewed as if the objects were actually in that space.

AR vs VR

- Embeds digital objects (Holograms) into the current environment without artificially creating the world around
- Simulate in the real world context of a user whilst using digital twinning
- Possible to enhance the real world through digital holographic overlay – BIM

Microsoft HoloLens enables Holographic 3D Projection of digital objectives into the real world
Example: HPSS Holographic training

The NR(HS) Asset Management team have created a Holographic and interactive Maintenance training programme that enables workforce to familiarise themselves with sensory replacement. This is a world leading innovation and the use of Holograms has been applied for interactive training of safety critical assets.
Example: Design & build environment

Integrated digital design benefits – embedded interaction and overlay with digital augmentation
Take homes

**Focus on your people** – The best digital strategies put people in centre, but use technology and automation where you can to remove high volume repetitive tasks.

The old methods of Information Architectures are **not always suitable** - lightweight, RAD often produces more tangible results

**Follow the Gartner Hype cycle** – a careful choice of technology is vital but time and its maturity level play an important role in its success
Thank you for your attention!

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