Keeping the trains running

System complexity

Helen Hunter-Jones and Alex Deas
A day in the life of Network Rail

Every day, 22,000 passenger trains and 2,000 freight trains use the rail network.

At peak times, critical parts of the network now run at close to 100 per cent capacity.

The railway network has over 20,000 miles of track, 30,000 bridges and tunnels, 40,000 signals and almost 6,000 level crossings.

Trains run 24 hours a day, 365 days a year
Timetable in numbers

• 24,000 trains
• delivering over 4.5 million passengers
• travelling over 900,000 track miles
• to pass over 1.5 million signals on green
• to arrive at 220,000 station stops
• to arrive at the advertised minute
• 23 franchised Train Operating Companies
• 4 main freight operating companies
• 1000s of NR access requirements for maintenance, renewals and enhancements

Brighton Main Line – Peak, Weekday morning
Validating a single Junction

Source texts for 1 validation:
- What has been bid by the operator and has been uploaded into TPS
- Train planning rules
- National sectional appendix (line speeds)
- Signalling diagrams
- 5 Mile diagrams
- Stock Diagrams (train formation)
- Trust (TOPS)
- Network Code Part D
**Edinburgh-Glasgow Improvement Programme (EGIP)**

The Edinburgh Glasgow Improvement Programme (EGIP) is a comprehensive package of improvements to Scotland’s railway infrastructure. A Scottish Government priority, the £742m EGIP is being delivered by Network Rail and includes modernisation and upgrades to...

**Crossrail**

With the Elizabeth line open fully in 2019, 1.5 million more people will be able to get to central London within 45 minutes. Crossrail is a very important and exciting project for rail users in...

**Derby resignalling project**

£200m has been invested in the railway in Derby. This project was the biggest rail investment in Derby station for decades and is a key part of the Midland Main Line upgrade which will improve journeys...

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**Enhancement programmes in numbers**
In 2017 we delivered over £6bn in new infrastructure.

This equated to: **22%** of UK infrastructure

Around **5000** Projects across the UK
Sources of Complexity for Capital Delivery
Managing Complexity Risk

- Risk Registers
- Quantitative Risk Analysis
- Risk Reporting and Oversight
- Lessons Learned
- Peer Reviews
02:48 - An incident near Cheltenham closes the line

08:48 - Six hours later, the impact is being felt around the area

15:18 - 12 hours after the incident, much of the network is affected

22:48 - 20 hours on and the effects are being felt across the country

How impact spreads