


















# *Intelligent Infrastructure*



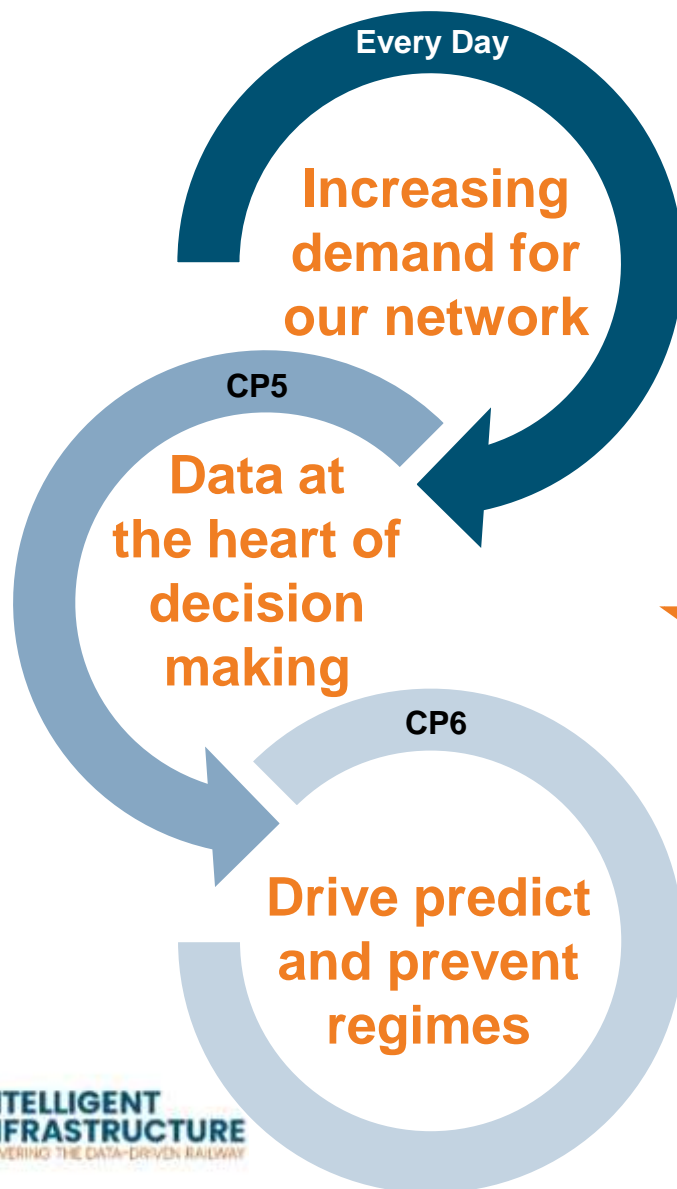
*Jacqueline Young*

# Supporting Network Rail's plans for CP6

 <p>Safe</p>	 <p>10%</p> <p>Improvement in train accident risk</p>	 <p>13%</p> <p>Improvement in level crossing risk</p>	 <p>54%</p> <p>Improvement in Lost Time Injury Frequency Rate</p>
 <p>Reliable</p>	 <p>12%</p> <p>Improvement in delayed trains in 2019/20</p>	 <p>28%</p> <p>Improvement in delayed trains by the end of CP6</p>	
 <p>Efficient</p>	 <p>3.5bn</p> <p>Incremental efficiency savings between 2019-2024</p>		
 <p>Putting people first</p>	 <p>50%</p> <p>Improvement in the number of women employed</p>	 <p>25%</p> <p>Improvement in occupation related mental health absence</p>	
 <p>Environmental impacts</p>	 <p>25%</p> <p>Improvement in carbon emissions</p>	 <p>18%</p> <p>Improvement in energy consumption</p>	



# Why Intelligent Infrastructure is a priority for Network Rail



## Every Day – One of our greatest challenges is...

- Our assets need to be able to accommodate more passengers and freight. We need to improve the reliability and availability of our infrastructure – know where things need to be done, when and how – to ensure safety and efficiency

## CP5 – Our response was a focus on data transformation...

- Supporting a digitally enabled, mobile workforce to capture data for the people who need it, when they need it
- Improving how we visualise our infrastructure

## CP6 – This transformation journey is evolving to now...

- Exploit the quality data captured through smart technology – turning it into intelligent information to prioritise work most critical to the operation of the railway
- Improve how asset management and maintenance teams perform their roles – right information, right time, right place to deliver efficient and effective interventions

## THE INTELLIGENT INFRASTRUCTURE PROGRAMME

# Our Vision and Mission



## INTELLIGENT INFRASTRUCTURE

DELIVERING THE DATA-DRIVEN RAILWAY

### OUR VISION

To enable Network Rail to be the world's most innovative and trusted rail infrastructure owner, delivering an outstanding experience for passengers and freight customers

### OUR MISSION

Delivering for passengers and freight by inspiring and collaborating across the rail industry to leverage data and emerging technologies

# What is Intelligent Infrastructure?

Intelligent Infrastructure is Network Rail's digital asset performance management transformation programme, using **technology to turn data into intelligent information** so the frontline and supporting teams can **work smarter and safer** to deliver **improved services for passengers and freight customers**

Intelligent Infrastructure is '**delivering the data driven railway**' by transforming the way Network Rail uses:

- Failure modes effects and criticality analysis (FMECA) to determine what should be designed out, what should be maintained and how it should be monitored
- Train borne and fixed condition monitoring
- Advanced data analytics
- Aerial surveys
- New decision support tools

All of these improvements to existing and new technologies across all our assets disciplines will **strengthen decision making capabilities** across Asset Management and Maintenance

**Shifting us** from traditional planning and maintenance schedules **to a more proactive, 'predict and prevent' approach**, will help shape a smarter, more cost-efficient approach to whole life asset costs



# What are the key benefits of Intelligent Infrastructure?

## II BENEFITS



1. Increased safety



2. Increased reliability



3. Optimised costs



4. Enhanced data



5. Future focused



6. Supports devolution



**Minimising unplanned activity** – improving our understanding of failure modes and asset condition will allow us to reduce rapid response

**Better planning tools** – aligning and visualising work, access and resources to reduce planner workload



**Right-time information** – expanding our on train and fixed asset monitoring capability

**Planned interventions based on failure risk** – analytics, reliability centred maintenance techniques and a systematic understanding of asset criticality prognose assets failure and prioritise remedial work



**Optimised whole life cost funding decisions** – improved understanding of asset condition will further optimise our long terms work bank and our strategic business plans

**Maintenance schedules based on asset condition** – intervention timescales utilise predictive information



**Asset and condition data is complete and managed and governed effectively** – capturing data to meet the Asset Information Specifications, and iterating these where necessary, with clear processes in place to share data across the industry. Data is treated as an asset in accordance with ISO55001



**Implement Network-wide Operating Model** – by offering training and establishing a competency framework to drive structured continuous improvement

**New products designed for reliable operation** – failure modes removed and maintenance needs minimised



**Aligned maintenance and asset management operation** – by meeting the international asset management standard, which recognises data as a critical asset and manages it accordingly

**Clear, business defined KPIs** – enabling maintenance to transition to ‘predict and prevent’ regimes.



# What is Intelligent Infrastructure delivering?

Intelligent Infrastructure is Network Rail's digital asset performance management transformation programme, using technology to turn data into intelligent information so the frontline and supporting teams can work smarter and safer to deliver improved services for passengers and freight customers

## II PROGRAMME BENEFITS



Increased safety



Increased reliability



Enhanced data



Increased value



Future focused



Supports devolution

## DELIVERING TECHNOLOGY FOR ASSET MANAGEMENT AND MAINTENANCE

### TRACK

Enhanced Decision Support Tool (DST)



### SIGNALLING

Digital Records Cards and enhanced condition monitoring



### ELECTRIFICATION & PLANT

Enhanced Decision Support Tool (DST)



### CIVILS

Aerial mapping, motion sensors and laser scanners



### OPERATIONAL PROPERTY

New property maintenance tracking system



### PLANNING

Optimised work planning system



ELLIPSE – Enabling new and existing capabilities in Network Rail's enterprise asset management system  
 II FOUNDATIONS – New analytics platform to drive advanced analytic solutions

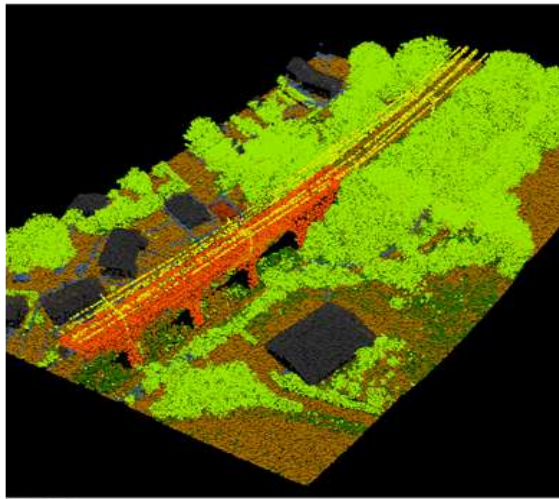
# Aerial Survey 2019

- Following the success of the original Aerial Survey, a second survey was carried out by the Intelligent Infrastructure programme to capture images and terrain data with improved clarity
- There are 4 key products that can be used from the aerial Survey data collected
  - Orthophotos (downwards facing imagery)
  - 3D Lidar data
  - Digital Terrain Model (DTM)
  - Digital Surface Model (DSM)

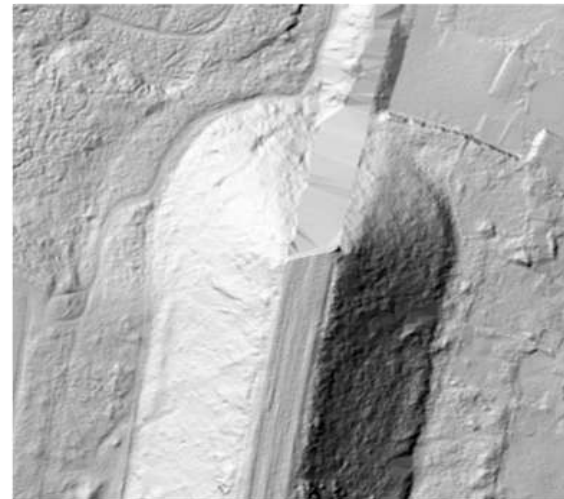
**Orthophotos**



**3D LIDAR Point Cloud**



**Digital Terrain Model**



**Digital Surface Model**





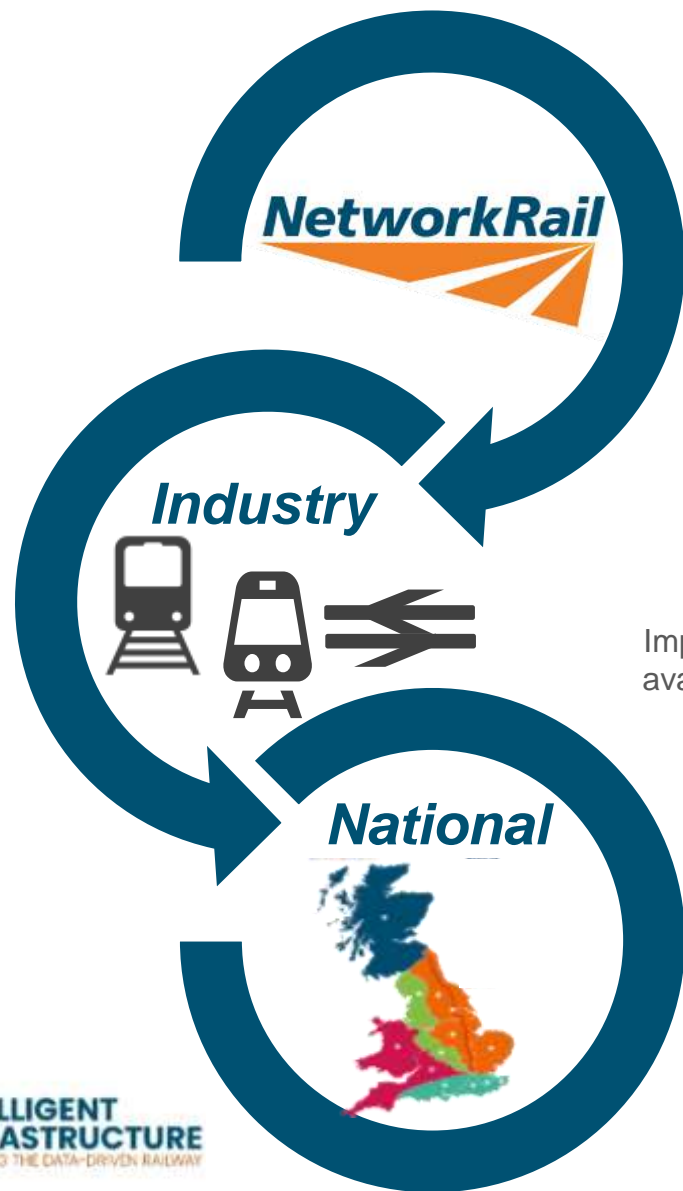
# Supporting today's engineers to make better decisions

## Intelligent Infrastructure will drive the data-driven railway:

- Giving our engineers access to up-to-data on assets when and where they need it
- Supporting engineering knowledge with trusted data to make better-informed decisions
- Allow the routes to carry out 'predict and prevent' maintenance and renewals
- Move away from outdated 'fix on fail' regimes
- Understand what is likely to go wrong and when and the impact a failure will have on railway
- Intervene 'with the right work, at the right time, in the right place'



# Collaborating with the whole rail industry



### Applying analytics to leverage existing technology

Using FFV to inform maintenance vegetation schedules, targeted interventions through predict & prevent



### Targeted rollout of proven technology

Data sharing with TOCs, increase in fleet availability, reduced rail damage, improved reliability and WLC



### PPM Improvements

Improved train performance due to availability, asset performance and reduction in SAFs



### Passenger Benefits

Better network reliability, growth of network services and improved passenger experience



### Sustainability

Industry-wide sustainability improvements due to increase in efficiency and performance



### Supporting Government Strategy

Increased productivity, performance, reliability and connectivity supporting wider government aspirations. Reduced carbon emissions and reduced road congestion driven by improved train reliability



## Inspiring tomorrow's engineers...



Network Rail have established a team of early engagement leads from its routes and functions across the country to support the educational drive to promote science, technology, engineering and maths – STEM – opportunities for young people

The Intelligent Infrastructure programme will take a leading role in supporting this ambition by applying real-world experience for children to make the connection between STEM subjects and the new economy

Britain needs to prepare more young people to fulfil jobs and opportunities in STEM fields due to an aging workforce and to meet the needs of an increasingly innovative and data-driven world market

## Contact

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