



THE PWI
EMPOWERING RAILWAY ENGINEERING

Milton Keynes Section

Value Driven Research, Development & Innovation

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THE PWI
EMPOWERING RAILWAY ENGINEERING

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RD&I: Delivery Industry and NR Strategy



Great British Railways

- Modern passenger experience
- Financially sustainable railways
- Cleaner, greener railways
- New offer for freight
- Increased speed of delivery and efficient enhancements
- Skilled, innovative workforce



Rail Technical Strategy

- Easy to use for all
- Low emissions
- Optimised train operations
- Reliable and easy to maintain
- Data driven



Network Rail

- Targeted cost reduction
- CAPEX cost reduction
- Keep people safe
- Environmental sustainability (net zero)
- Modernisation

Delivered by RD&I in CP6 onwards

Our Strategic Drivers

For NR RD&I will be:



Financially Responsible - focused on driving cost out of Network Rail



Driven by returns – primary benefits focused on outcomes delivering CP7 return on investment and realisation of societal gain



Priority led - strategy developed with the objective of supporting the delivery of regional & business priorities at pace



Focused to the end - RD&I that is regionally owned and supported throughout the control period, including implementation funding

Achieving NR business goals:

1



Cost Reduction (cashable efficiencies)
Cost or Scope efficiencies delivering a cash reduction in spend in CP7

2



Safety & Security
Public, Passenger, Workforce.



Performance, reliability and Capacity
Passengers & freight

3



Whole Life Cost Reduction
Greater asset sustainability

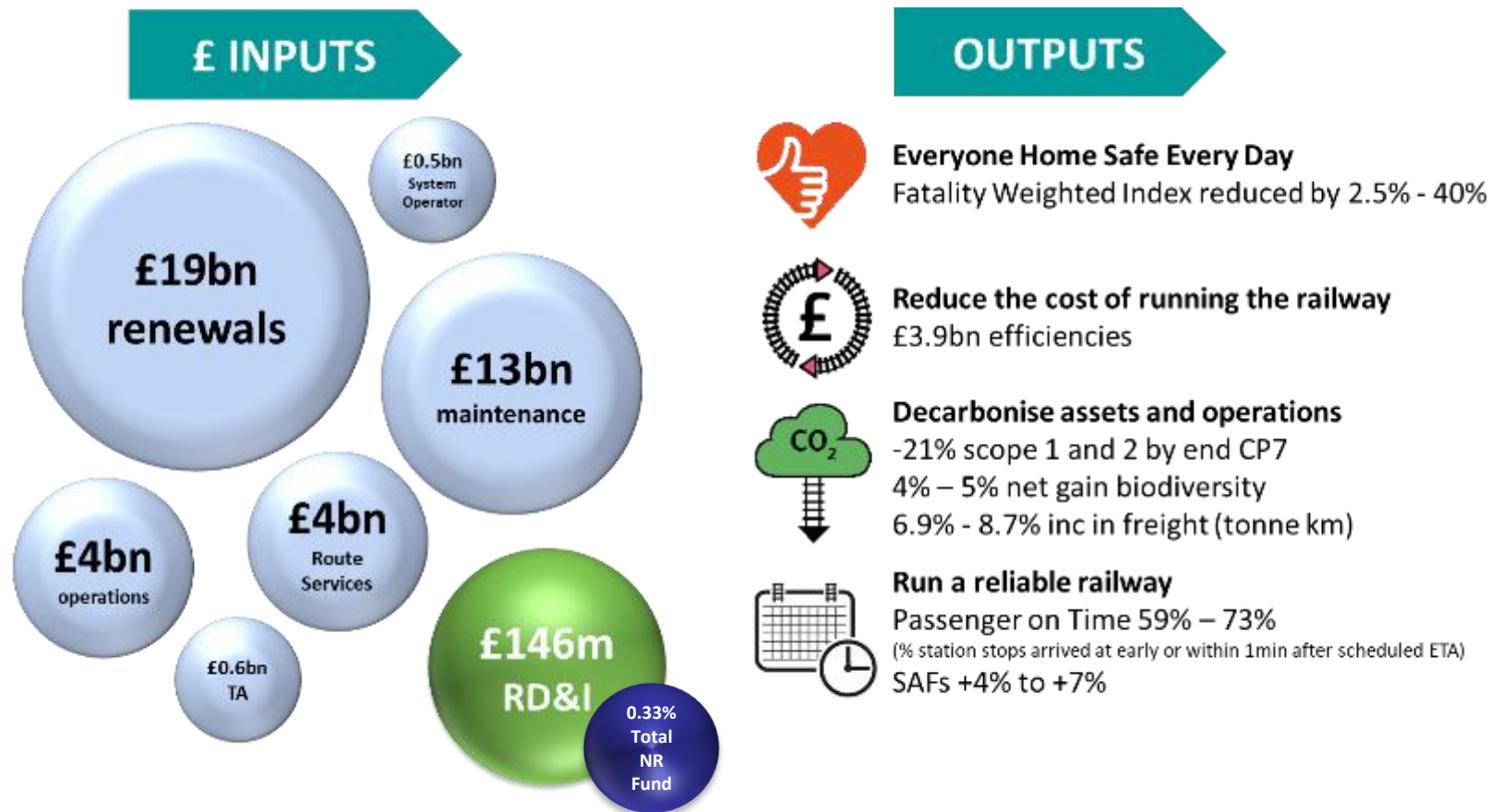


Carbon Reduction
Progress toward Net Zero

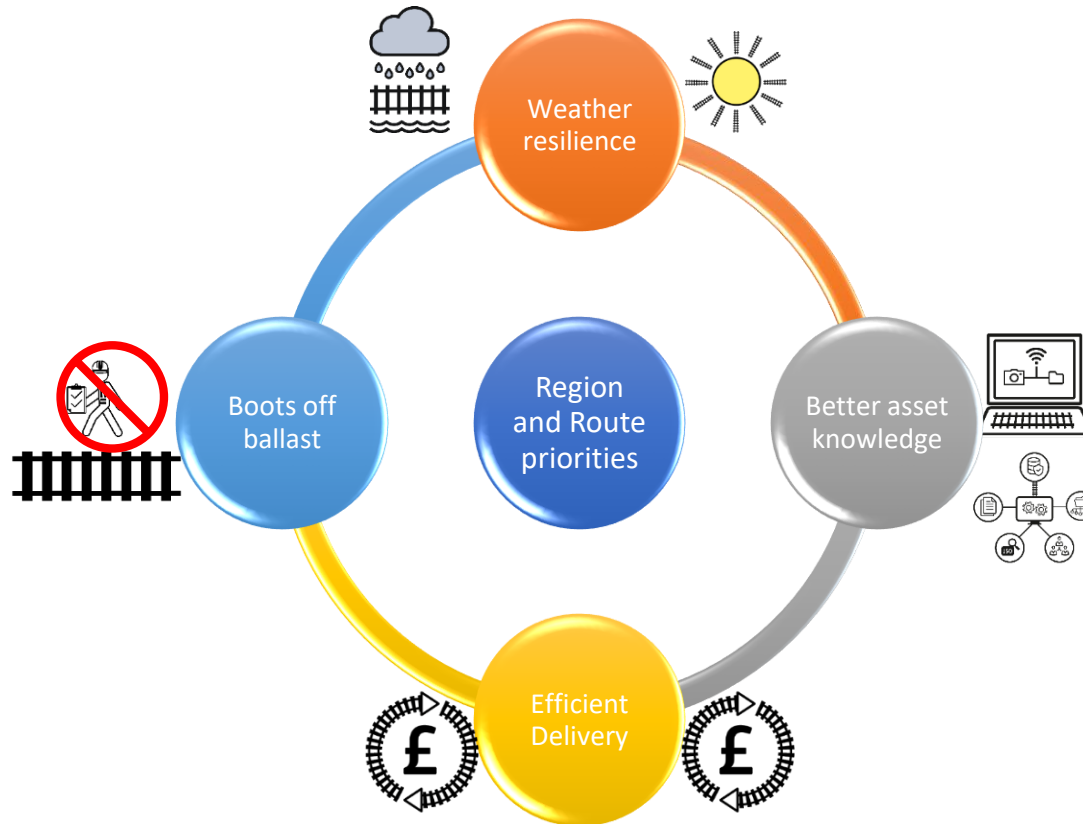
Aligned with government/Industry objectives:



CP7 in numbers



OFFICIAL Region and Route Priorities



Successes from CP6 RD&I

£230m

NR investment
in R&D

£63m

Matched
funding
secured



**£215m+ financial
efficiencies
delivered to regions**



**16 R&D products
ready for routes**

Automated bridge inspection

Automated tunnel
examination and
repair

Trackwater

**Digital lineside
inspection**

Cast crossing
improvements

PLPR deep
learning

**Cost efficient
electrification**

**Laser
measurement
of S&C(Felix)**

Examples of benefits from CP6 RD&I

Cost Efficient Electrification

>£150m

saving over last 5 years

East Mids
TRU
Scotland

Potential savings >£0.4bn over next 5 years – Scotland, East Mids & NW



Cast Crossing Developments

£20m

saving/control period

>350 units installed

£500k

saving/installation

NW
Wessex
Wessex



Interfaced Overlay Miniature
Stop Lights (active crossing protection)

Measuring benefits from RD&I

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Development of a framework and suite of tools enables us to quantify potential benefits/disbenefits of investment in new technologies and inform the business of the potential return of investment from the R&D projects

Benefits Measurement Framework



Project Name	Project Lead	Project Status	Project Start Date	Project End Date	Project Budget	Project Benefits	Project Risks
Project A	John Doe	Active	2023-01-01	2024-01-01	£100m	High	Low
Project B	Jane Smith	Active	2023-02-01	2024-02-01	£200m	Medium	Medium
Project C	Mike Brown	Active	2023-03-01	2024-03-01	£150m	Low	High
Project D	Emily White	Active	2023-04-01	2024-04-01	£120m	Medium	Medium
Project E	David Black	Active	2023-05-01	2024-05-01	£80m	High	Low
Project F	Sarah Green	Active	2023-06-01	2024-06-01	£90m	Medium	Medium
Project G	Chris Grey	Active	2023-07-01	2024-07-01	£110m	Low	High
Project H	Alice Blue	Active	2023-08-01	2024-08-01	£130m	Medium	Medium
Project I	Bob Yellow	Active	2023-09-01	2024-09-01	£140m	High	Low
Project J	Charlie Purple	Active	2023-10-01	2024-10-01	£160m	Medium	Medium

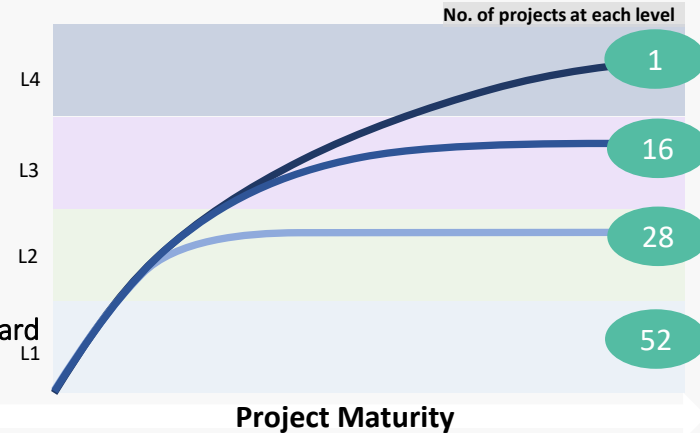
Project benefits & business case tool



Portfolio benefits & business case dashboard



As projects progress through delivery, their benefits cases are advanced through the business case levels, capturing benefit assumptions in a consistent manner until investment decisions are finalised.



Level 4

Very complex solution and deployment scenarios

Level 3

Baseline measures of current performance and potential improvements, investment requirements and confidence levels
Routes / Regions

Level 2

All potential benefits and dis-benefits assessed at a National level

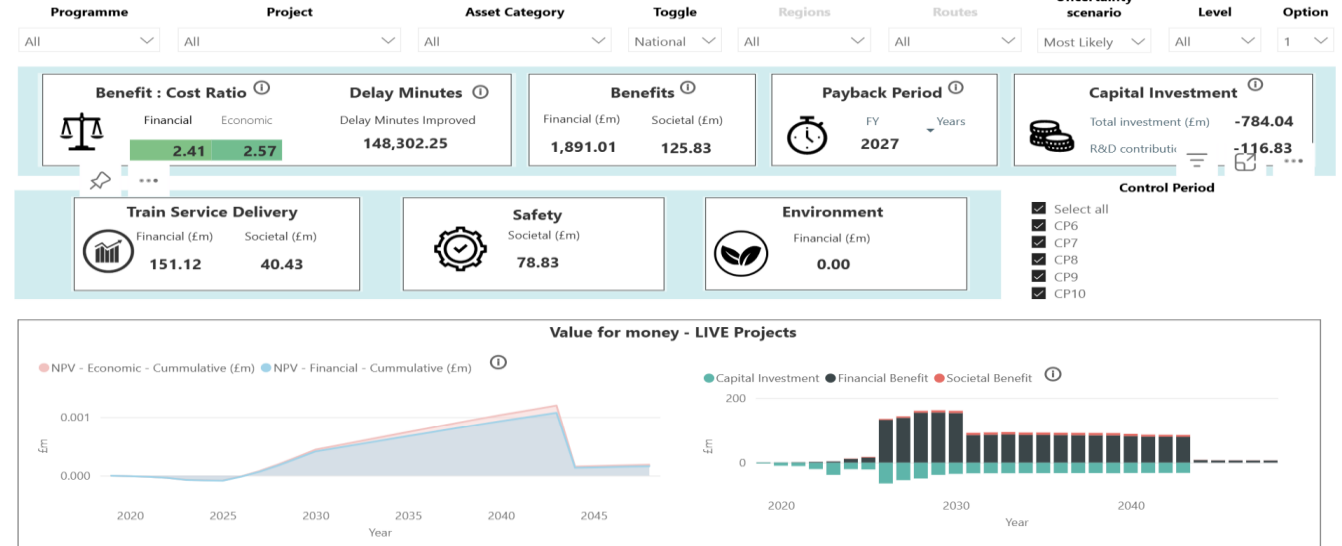
Level 1

Key potential benefits captured to confirm and validate investment

This approach helps ensure continuous assessment of value for money for Region and Route deployment, enabling the prioritisation of our technology projects. The robust approach has facilitated successful engagement with North, West and Central region operational, finance and performance teams and workshops are scheduled with Wales and Western.

NR RD&I Benefits Tool

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Project Count: 44						CRAM				FINANCIAL								ECONOMIC			
Project Name	Project Status	Level	Route	Option	Delay Minutes	Risk Score Prior	Risk Score Post	Benefit : Cost Ratio	Financial Train Service Delivery (£m)	Financial Environment (£m)	Financial Benefit (£m)	Payback period (FY)	Capex: R&D (£m)	Capex: Third Party Funding (£m)	Capex: Regions and Routes (£m)	Capex: Other National Programme (£m)	Benefit : Cost Ratio	Societal Train Service Delivery (£m)	Societal Benefit (£m)	Safety (£m)	
AiVR thermal Imaging - MR		Level 1	National	1	902.00	6	5.00	0.91	0.08	0.00	0.85		-0.20	0.00	-0.74	0.00	1.10	0.18	0.18	0.00	
ATE/TSIR	Live	Level 2	National	1	2,814.00			4.58	1.96	0.00	44.86	2031	-7.46	-0.32	-5.08	0.00	4.61	0.27	0.27	0.00	
Axle Bearing Monitoring System (HABD)	Live	Level 1	National	1	7,200.00			17.61	35.06	0.00	56.18	2024	-3.03	0.00	-16.57	0.00	18.05	1.40	1.40	0.00	

NR RD&I Benefits Tool

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For CP7 we made improvements to our existing benefits assessment process to enable the business to realise the necessary success criteria to better align to CP7 requirements



Cost Reduction (cashable efficiencies)

Cost or Scope efficiencies delivering a cash reduction in spend in CP7

- Power BI now allows project assessment over 5 years as well as the original 25 years used in CP6.
- Working with our Finance colleagues to enter new reports that allow them to better extract the information needed to engage the routes and regions and enable fishbone entry.
- Forecast (benefit cases) vs actual (recorded efficiencies) now available in powerBI.



Performance, reliability and Capacity

Passengers & freight

- Estimated Delay minute improvements generated by a project can now be reported by project.
- Schedule 4/8 rates updated, but have been maintained in the model.
- Performance and environmental metrics now on the prioritisation view.



Other Improvements

- KPIs and associated metric rates updated for CP7 values.
- User experience improvements such as step-by-step guide and user help for each metric
- Improving visibility of the benefit cases within Routes and Regions.

Delivering Value-add RD&I in NR

Focussed on Demand driven RD&I



Track



**Reliable,
Sustainable
Power**



**Buildings
& Civils**



**Future
Train
Control**



**Safety,
Security
& Ops**



Freight



**Capital
Delivery**

Data & Digitalisation

Innovation/Research accelerator

....and with more focus on....



Alignment with RTS and NR strategy

COTS solutions

Partnering opportunities

Business change for implementation

Pipeline of proposals

Upcoming development: RD&I in action – BVLOS drone deployment

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Dedicated Flight Operations Desk in Route
Control Centre



200Km air traffic visibility
from London to Sheffield
and coast to coast



Targeted benefits reducing Trespass & infrastructure failure delays estimated at £360m over a control period and improved safety & productivity from inspections



QUESTIONS?