



Rail Asset Management

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Agenda

- Jacobs: Brief Overview
- Asset Management – how does it add value
- Who are we? – Our core capabilities
- Summary of Experience with Network Rail
- Other recent projects
- Case Studies
 - Strategic Planning and Modelling
 - Structures Dashboard
 - MainLine
 - Asia Pacific Projects
- Lessons Learned
- Summary

Our Core Values



Jacobs: Worldwide resources 71,000 in over 120 countries

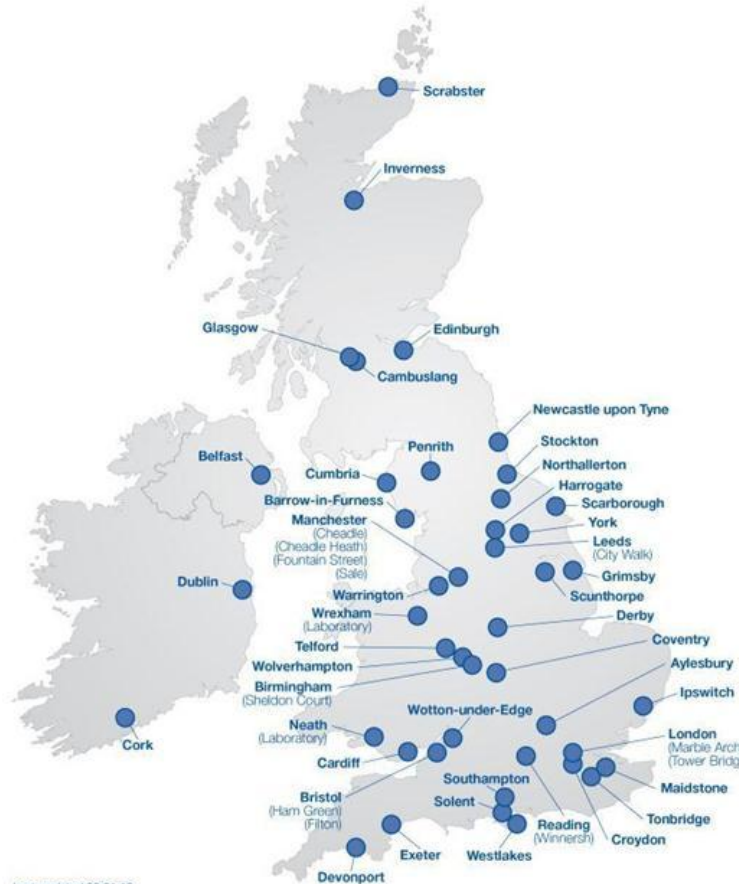
Global Presence



JACOBS: UK Resources – 8,000 in 49 offices

Ireland	
Pharma JE Facilities	Transport & Development Environmental Managed Prof Services
(Total Ireland Resources: 780)	
Glasgow	
Process Nuclear & Defence Facilities	Transport & Development Environmental Managed Prof Services
(Total Glasgow Resources: 990)	

JACOBS[®] UK and Ireland Office Locations



Last updated 29.01.13

Immingham	
Construction led Design, Build and maintenance for Minor refurbishment works to large capex installations	
(Total Immingham Resources: 900)	
London	
Process Facilities Consultancy Services	Transport & Development Environmental Managed Prof Services
(Total London Resources: 430)	
Manchester	
Process Nuclear & Defence Facilities	Transport & Development Environmental Managed Prof Services
(Total Manchester Resources: 1070)	
Reading	
Process Nuclear & Defence Facilities ME FEED, PMC	Transport & Development Environmental Managed Prof Services
(Total Reading Resources: 1040)	
Stockton	
Metals, Process, Water, Energy and Nuclear	
(Total Stockton Resources: 710)	

Jacobs: Asia Resources – 2,372 in 6 countries

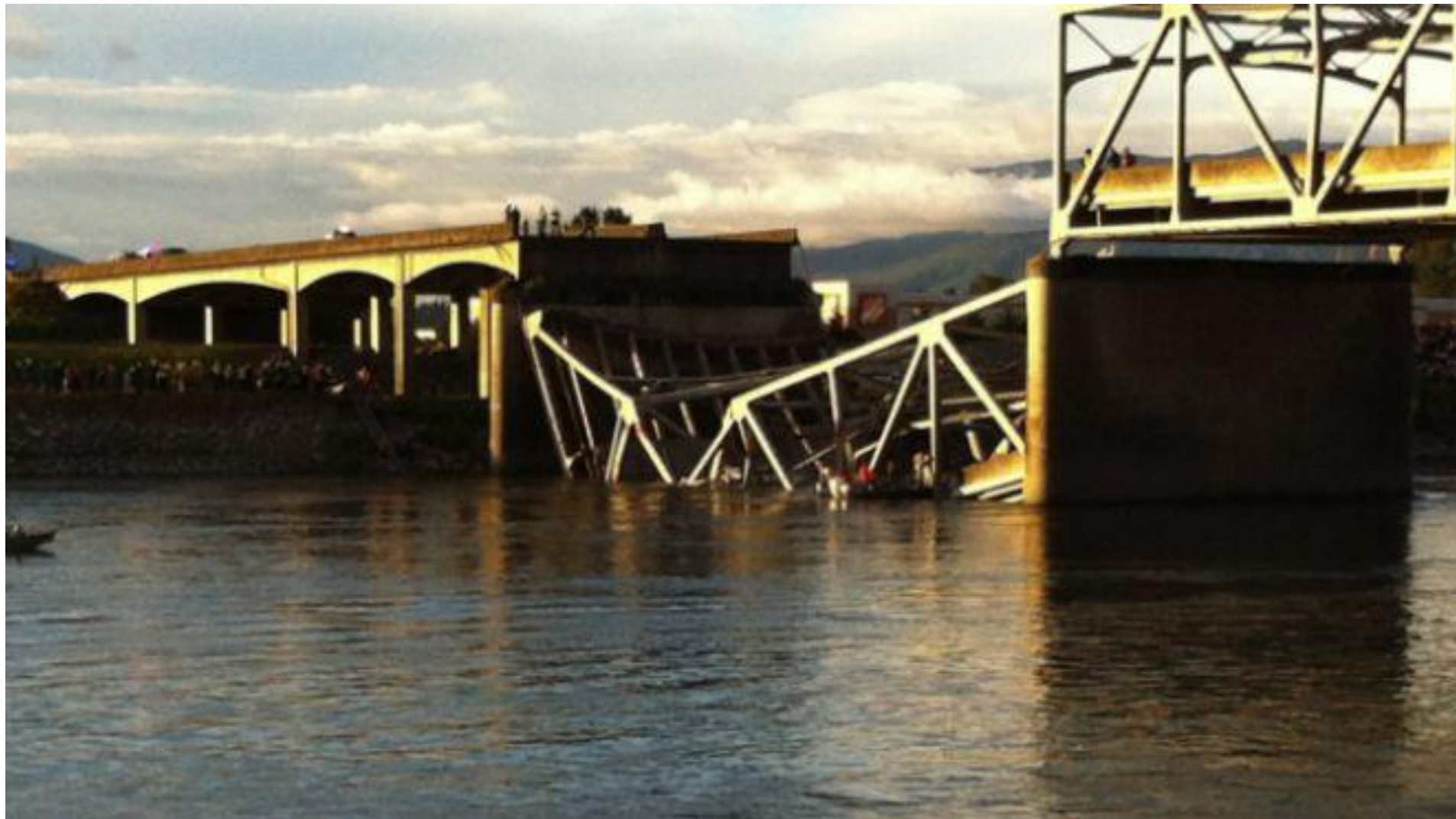


Key Transportation Challenges– UK / Europe

- Huge growth in travel (>19% in rail)
- Congestion on roads, overcrowding on trains
- Ageing Infrastructure - 35% of assets >100 years old
- Existing infrastructure will bear the brunt
- Under-investment - Maintenance was ignored for many years
 - Particularly railways, roads and bridges
- Increased degradation due to additional volumes and loads
- Major financial and regulatory constraints in place
- Key focus on Sustainability and Climate Change
- Need for robust systems & policies to understand assets & manage spend
- Need for novel technologies for life extension and new build

**INNOVATION COMBINED WITH TOTAL & EFFECTIVE
ASSET MANAGEMENT
IS VITAL FOR SUCCESS**

US Bridge Collapse 2013 – this should be prevented

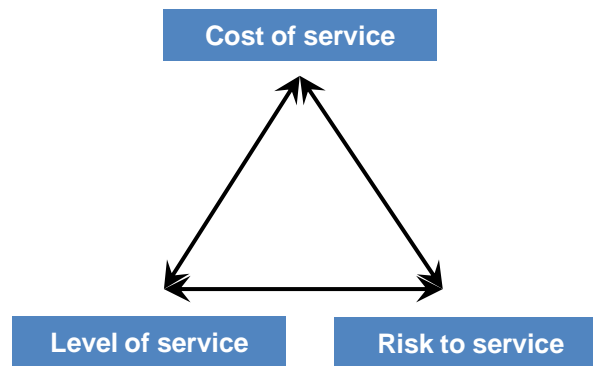


UK Bridge Collapse, 2009 – and this!!



What is Asset Management?

- “Coordinated activity of an organisation to realize value from assets.” (ISO 55000:2014)

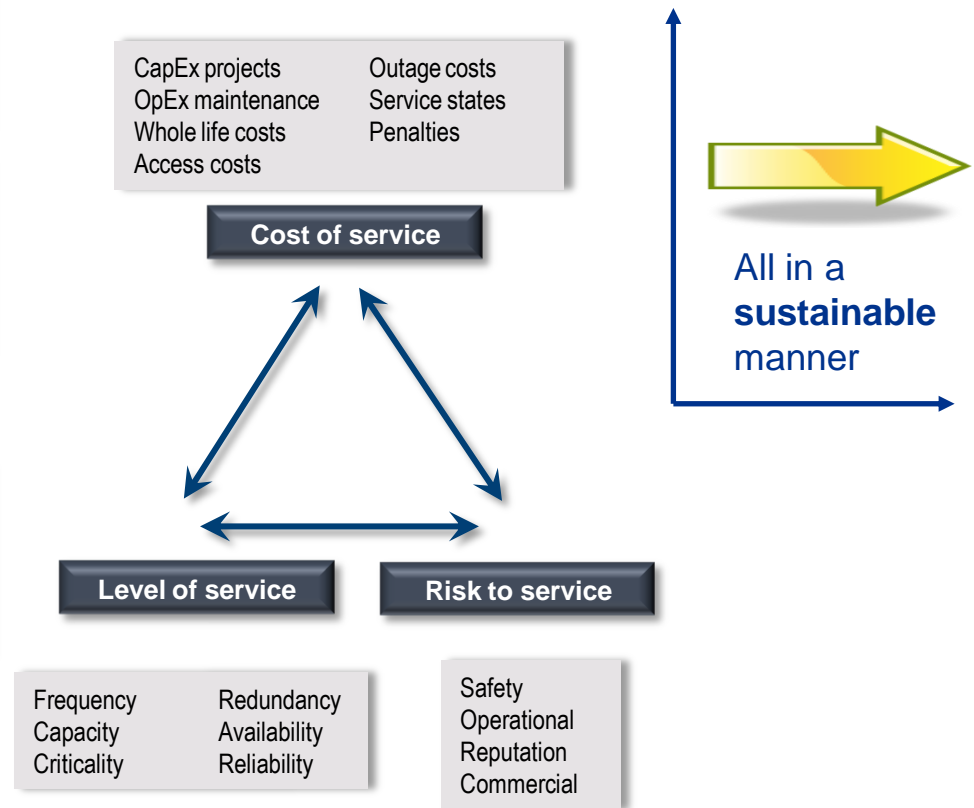
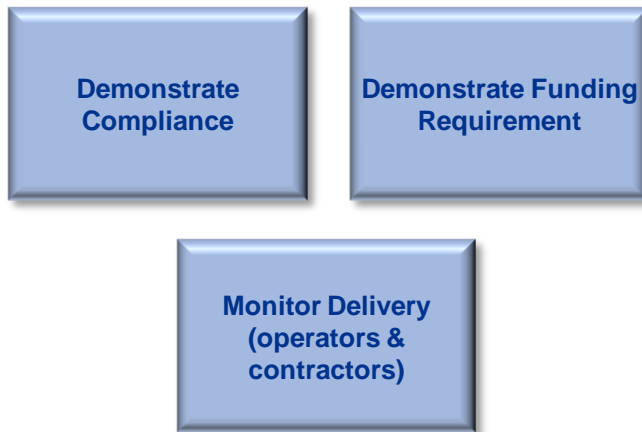


Asset Management – how does it add value?

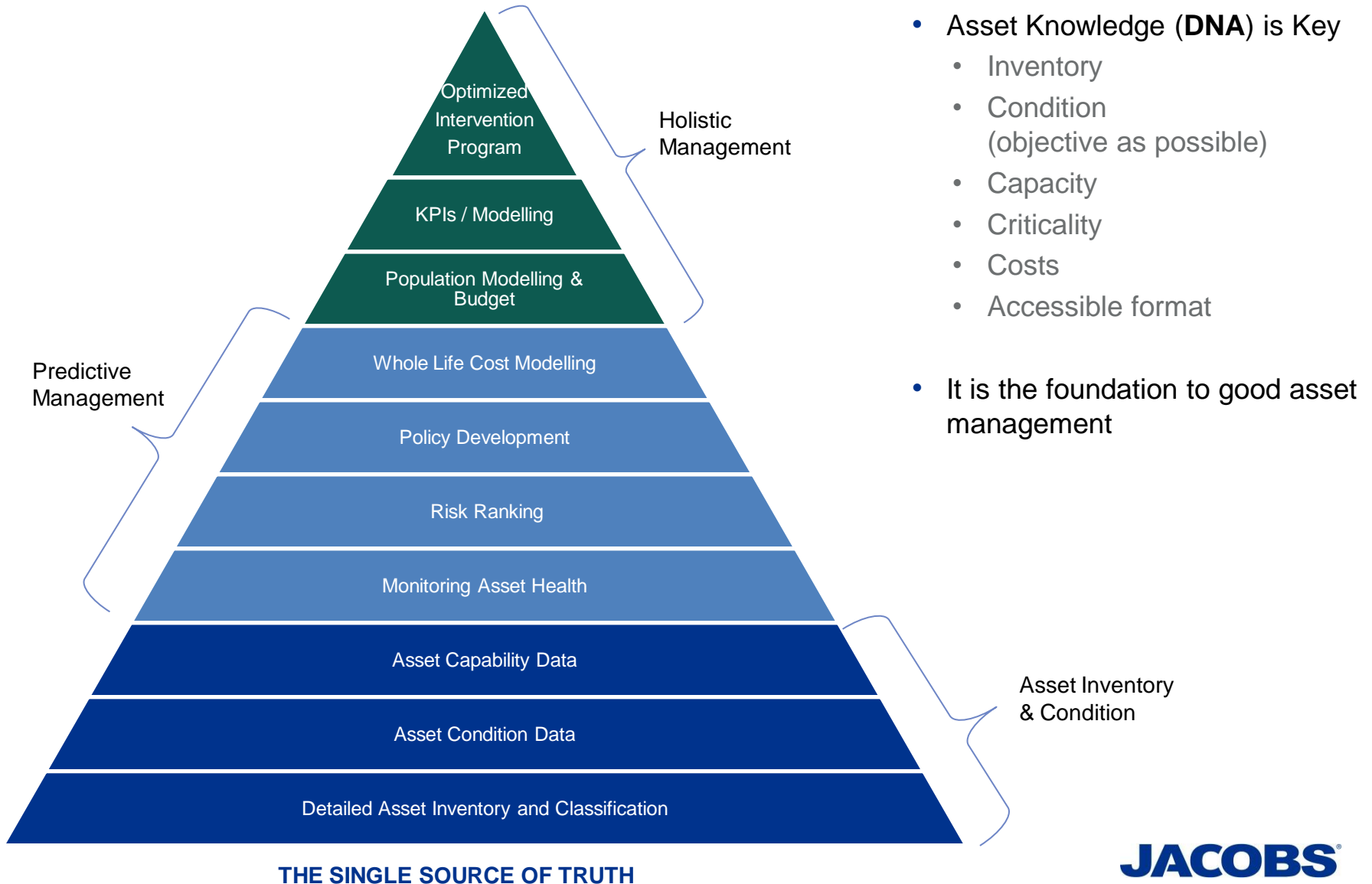
Manage assets optimally



Additional benefits



Our approach: A typical pyramid/hierarchy of needs



Jacobs Asset Management Team

- Help clients make informed decisions regarding their infrastructure
 - Detailed understanding of asset behaviour
- Provide bespoke/unique solutions based on available data and what clients want to achieve
 - Asset management policies and strategies
 - Asset databases and data systems (inventory, condition, capability, etc)
 - Whole-life cost models
 - Predictive models (single asset or asset population)
 - Scenario Planning

What do we do?

- Our core asset management capabilities include:



Who are we?

A UK based team growing into Asia with a broad range of skills:

- Engineers with an in-depth understanding of asset behaviour
- Project managers
- Asset management specialists
- Analysts and modellers
- System developers
- Web interface developers



European Experience

- Strategic partnership with Network Rail since 2003
 - Life cycle modelling for CP3, CP4 and CP5 for civils & earthworks assets
 - Support with development of strategy / policies / objectives / plans
 - Relationship with the ORR and Independent reporters
 - Secondments into Centre – Structures lead for civils assets (since 2011)
 - Secondments into RAM teams for Anglia, Wessex, LNW, Kent Routes
 - Developed databases and decision support tools
 - Development of Network Rail Standards
 - Strong background in Condition and Capability Assessment (CEFA/CAFA)
 - Feasibility, design, implementation of several schemes
- London Underground since 2005
 - Business Case development & Life cycle modelling
 - Asset Condition Assessment and Certification
 - Feasibility, design, implementation of several schemes
- European Commission (2011 – 2014)
 - Project MAINLINE – Development of LCC & LCA models for Railway Assets

Experience with Network Rail

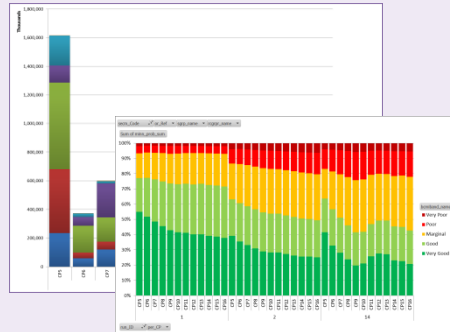
FRP



SEC/SAC



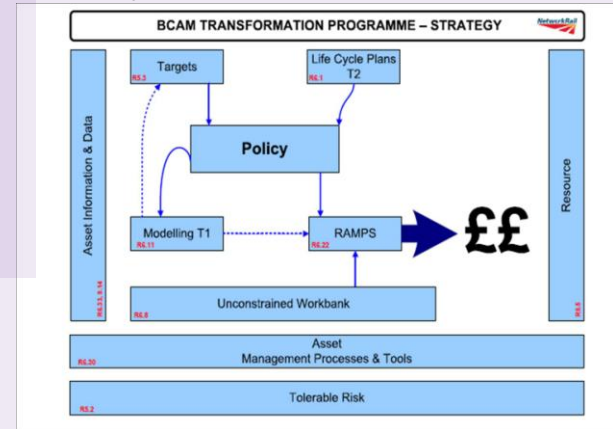
Strategic planning / modelling



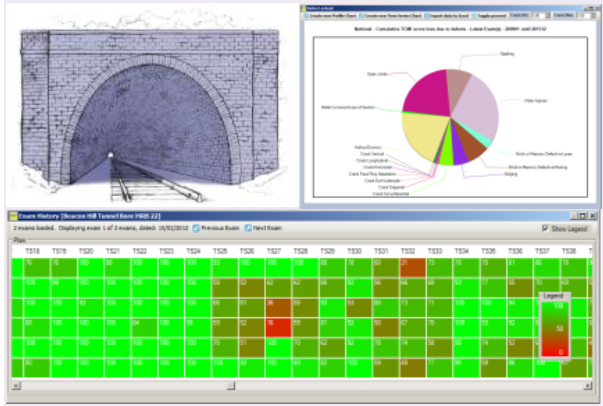
Mainline



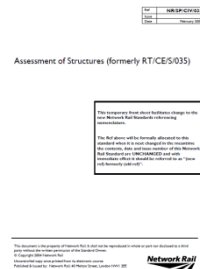
Policy development



Tunnels Data Base (TCMI)



Authors of technical standards



CASE STUDY: Network Rail Strategic Planning

Intro to NR:

- 80,000 structures assets
- Bridges, tunnels, culverts, retaining walls & coastal defences
- Long-life, avg 125 years old, complex & heterogeneous

Client's Problem:

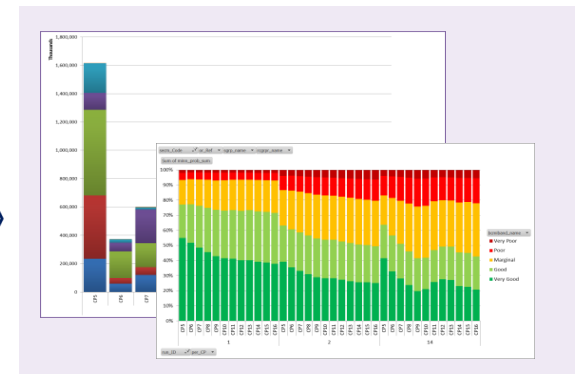
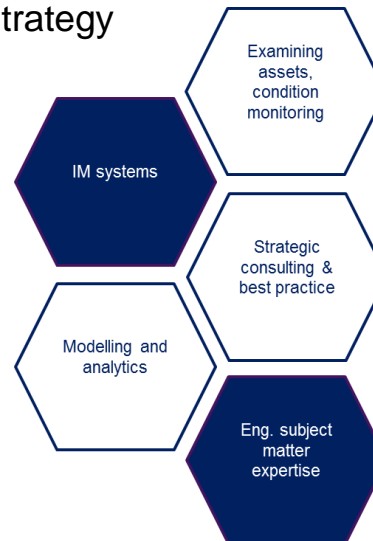
- **March 2011:** Major incident followed by independent review
- shortfalls in stewardship of the assets
- concern that NR could not demonstrate a robust investment decision process

Our Role:

- Supported development of asset policy & strategy
- Led WLC modelling
- Led the Investment planning submission

NR Business Benefits:

- **Oct 2014:** Structures AM framework that supports its vision
- Restored confidence from the rail regulator
- Increased spending over CP5



CASE STUDY: Network Rail Dashboard

Intro to NR:

- 80,000 structures assets

Client's Problem:

- ~55 different systems
- No holistic view
- Data not accessible
- Inefficient asset evaluation process

Our Role:

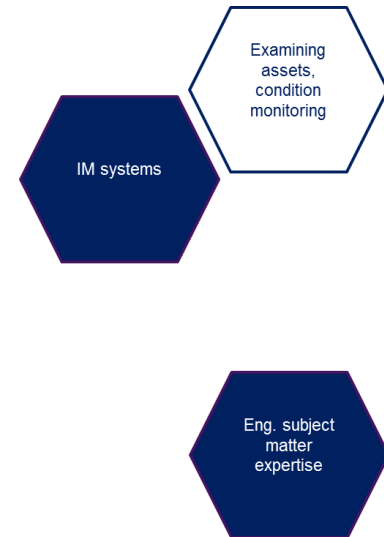
- Create data structure
- Map 12 core systems to the master inventory
- Make the joined-up data accessible through a user-friendly front end

NR Business Benefits:

- ~400 users in centre and routes using system daily
- Allows NR engineers to search for structures based on multiple asset condition properties for the first time
- They now have access to the **SINGLE SOURCE OF TRUTH**
- Senior Asset Engineer:
 - *“The Structures Dashboard is the most useful IT solution I’ve seen developed over my 2 years at NR... Superb job. Well done”*
- Estimate OPEX saving of **£1.3m/yr**

The screenshot shows the 'Structures Dashboard' for 'RIVER LEA'. It displays a table with columns for Asset Level, GUID, Railway ID, SLR (Primary), Start Miles, Start Years, Asset Description, Primary Material, Group, Asset Type, Territory, Area, Owner (Opening Party), Operational Status, Data Availability, and Reports. The table lists four entries for different spans of the RIVER LEA bridge.

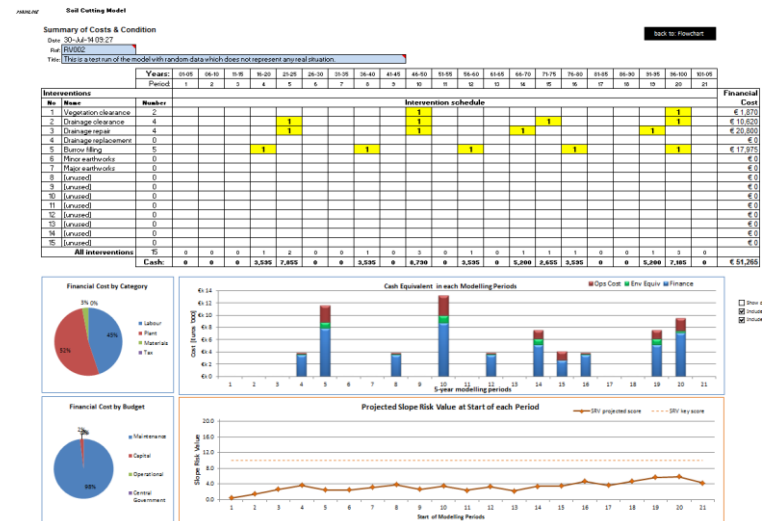
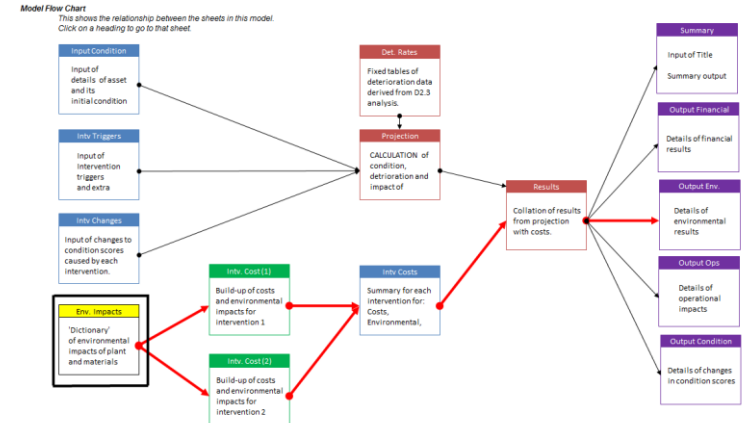
Asset Level	GUID	Railway ID	SLR (Primary)	Start Miles	Start Years	Asset Description	Primary Material	Group	Asset Type	Territory	Area	Owner (Opening Party)	Operational Status	Data Availability	Reports
Parent	3978959D326A4D0E9449030E4AD01A	1	BDM	0	000	RIVER LEA	not applicable	Bridge	Underline Bridge	Anglia	Romford	Network Rail (C-E-Strat)	Functionary	Yellow	Reports
Child	3978959D326A4D0E9449030E4AD01A	141	BDM	0	000	RIVER LEA - Span 1	not applicable	Bridge	Bridge Span	Anglia	Romford	Network Rail (C-E-Strat)	Functionary	Red	Reports
Child	3978959D326A4D0E9449030E4AD01A	142	BDM	0	000	RIVER LEA - Span 2	not applicable	Bridge	Bridge Span	Anglia	Romford	Network Rail (C-E-Strat)	Functionary	Red	Reports
Child	3978959D326A4D0E9449030E4AD01A	143	BDM	0	000	RIVER LEA - Span 3	not applicable	Bridge	Bridge Span	Anglia	Romford	Network Rail (C-E-Strat)	Functionary	Yellow	Reports
Child	3978959D326A4D0E9449030E4AD01A	144	BDM	0	000	RIVER LEA - Span 4	not applicable	Bridge	Bridge Span	Anglia	Romford	Network Rail (C-E-Strat)	Functionary	Yellow	Reports



Case Study - MainLine

**MAIN
LINE**

- MAINTenance, renewaL and Improvement of rail transport iNfrastructure to reduce Economic and environmental impacts
- European Commission research project
- Life Cycle Assessment Tool (LCAT) to compare different maintenance and replacement strategies
- Models created for track, bridges and earthworks using NR data sources
- Excellent understanding of earthworks and bridge data



Asia Pacific projects

- Benchmarking and optimising maintenance intervals and asset management practices
- Conducted condition assessment of MRT and LRT lines. Reviewed maintenance and asset management practices against best practice
- Currently undertaking Gap Analysis & Road Map against ISO 55001 and developing the Singapore RTS Rail Asset Management Framework
- Developing a consistent framework for investment planning



Asset Management Lessons Learnt

- **UK: Network Rail**
 - Embedment of AM Principles is fundamental
 - Needs to be driven top/down
 - Cultural change – zero tolerance approach to compliance
 - Need to invest in data and systems to achieve the Single source of truth
 - Development of LCC models
 - Keep them simple
 - No black box perception
 - Need to be able to explain all aspects to a lay person!
- **Singapore: Land Transport Authority**
 - Comparatively new assets can fail and cause system wide disruption if not properly maintained
 - AM principles embedded from day one!
- **Australia: Sydney Trains**
 - Early negotiation with Unions
 - Zero tolerance to “internal blockers”
 - Acknowledgement of successes
 - Appreciation of Best Practice from elsewhere

Summary

- Detailed understanding of rail assets & systems
- Currently delivering:
 - **Network Rail:** Dashboard, Civils Adjustment Mechanism, Secondments
 - **LTA:** AM Framework, ISO55001 Gap Assessment & Training
 - **Sydney Trains:** Benchmarking & AM review
 - **MRWA:** Development of Levels of Service Approaches & Investment options
- Teams working in Asia, UK and Australia
- We can help with
 - Asset Management (Strategy, Policy, Objectives, Planning)
 - Asset Information
 - Asset life cycle modelling
 - Engineering understanding of rail assets and their behaviour
 - Understanding of rail systems & processes
 - Requirements specification & system design
 - Data migration (ETL)
 - Database Development
 - Front End Web Development

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