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

Growth is an Imperative

We Are Relationship-based

People Are Our Greatest Asset
Jacobs: Worldwide resources 71,000 in over 120 countries
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)

Immingham
- Construction
- 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

- Thailand: 67
- Malaysia: 314
- Singapore: 806
- China: 684
- Hong Kong: 381
- Philippines: 87
- Indonesia: 33
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

- Maximise Efficiency (reduce cost)
- Manage Risk
- Maintain a required ‘Level of Service’
- Sustain condition (long term)

Additional benefits

- Demonstrate Compliance
- Demonstrate Funding Requirement
- Monitor Delivery (operators & contractors)

Cost of service

- CapEx projects
- OpEx maintenance
- Whole life costs
- Access costs
- Outage costs
- Service states
- Penalties

Level of service

- Frequency
- Capacity
- Criticality
- Redundancy
- Availability
- Reliability
- Safety
- Operational
- Reputation
- Commercial

Risk to service

All in a sustainable manner
Our approach: A typical pyramid/hierarchy of needs

- Asset Knowledge (DNA) is Key
  - Inventory
  - Condition
    - (objective as possible)
  - Capacity
  - Criticality
  - Costs
  - Accessible format

- It is the foundation to good asset management
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:
  - Information management systems
  - Examining assets, condition monitoring
  - Modelling and analytics
  - Engineering subject matter expertise
  - Strategic consulting, audit, training & best practice
  - Design of maintenance & renewal schemes
  - Asset life extension & advanced composites
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

Mainline

Strategic planning / modelling

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
Case Study - MainLine

- MAINtenance, renewaL and Improvement of rail transport iNfrastucture 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
Rail Asset Management