2nd Workshop on Infrastructure Futureproofing: Futureproofing & Asset Management

- Introduction –

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Institute for Manufacturing

2nd April 2014
Overview

• Workshop Overview

• Futureproofing & the CSIC

• What is futureproofing?

• Value / relevance of futureproofing in asset management

• How do we integrate futureproofing into asset management practice?

• Issues / Questions to address today
Infrastructure Futureproofing Workshops

WORKSHOP 1
Futureproofing Best Practice For Infrastructure

- Terminology
- Current Best Practice
- Approaches

WORKSHOP 2
Integrating Futureproofing into Infrastructure Asset Management

Opportunities & Pathways for Integrating Futureproofing in Asset Management Processes
Aims of Workshop 2

• To capture value / relevance of futureproofing in asset management
• To determine challenges of futureproofing in whole-life asset management approaches
• To consider appropriate methods/frameworks of futureproofing in asset management
• To capture means of integrating futureproofing into asset management practice
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>0950-1015</td>
<td>Introduction (Duncan McFarlane)</td>
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<tr>
<td>1015-1030</td>
<td>Tea/Coffee Break</td>
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<tr>
<td>1030-1050</td>
<td>John Dora, John Dora Consulting</td>
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<tr>
<td>1050-1110</td>
<td>Andrew Ellis, Heathrow</td>
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<tr>
<td>1110-1230</td>
<td>Breakout/Discussion Session 1</td>
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<td>1230-1330</td>
<td>Lunch + CSIC Project Meeting [1300]</td>
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<tr>
<td>1330-1350</td>
<td>Keith Waller, Infrastructure UK</td>
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<td>1350-1410</td>
<td>Navil Shetty, Atkins</td>
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<tr>
<td>1410-1615</td>
<td>Breakout/Discussion Session 2</td>
</tr>
<tr>
<td>1615-1630</td>
<td>Wrap Up</td>
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Outcomes Workshop 2

1. Identification of value/relevance of futureproofing in asset management

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CSIC - The Future of Infrastructure

**MISSION**

Transforming the future of infrastructure through smarter information

**VISION**

- **Enable** step changes in construction practice
- **Establish** a world-leading sensing and monitoring industry
- **Extend** asset life & reduce management costs

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### Construction Sector:

- Halcrow
- ARUP
- Skanska
- Costain
- Atkins
- WSP
- Soldata
- Itm
- Capita Symonds
- BRE

### Infrastructure Owners/Operators:

- IRL
- National Grid
- Highways Agency
- Transport for London
- Tube Lines
- Network Rail
- Infrastructure UK
- Humber Bridge Board
- Transport Scotland

### Systems / Solution Providers:

- Toshiba
- imec
- Omnisense
- Thales
- GE Aviation
- Sencors
- Aeroflex
- Horizon
- Roataube
CSIC – Smart technologies & Approaches

**CITIES:** Planning major urban infrastructure
   – at city and national scale

**ASSETS:** Whole life approaches to asset management

**SENSORS:** Novel sensing and measurement approaches for
   performance based design
   structural health monitoring
   construction process and supply chain efficiency
CSIC – Asset Management Programme

Project 1: Whole Life Asset Cost/Value Assessment

Project 2: Whole Life Information Requirement Specification

Project 3: Asset Information Futureproofing

Project 4: Futureproofing of Infrastructural Assets

Tools & Approaches to Improve Current Infrastructural Asset Management Practices

Tools & Approaches to Support Infrastructural Asset Management in the Future
CSIC – Asset Futureproofing Project

- Establish best practice for infrastructure futurepoofing
- Examine futureproofing approaches in other industries / sectors
- Identify common taxonomy, barriers, economic basis
- Propose approaches for integrating futureproofing into infrastructure asset management practices
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Defining infrastructure futureproofing

“The process of making provision for future developments, needs or events that impact on particular infrastructure through its current planning, design, construction or asset management processes.”

(i) Resilience to unexpected / uncontrollable events and circumstances

(ii) Capability to adapt or respond to changing needs, uses or capacities
What is infrastructure futureproofing?

- **Infrastructure futureproofing**

- **Having asset longevity and asset management for future revenue**

- **Sustainability** – not creating new risks and liabilities

- **Developing Resilience**

- **Considering dimensions of Capacity, suitability, usability, desirability**

- **Allowing future growth**, building or managing a business to avoid / reduce impact of future events

- **Long term ability to efficiently serve society**

- **Planning flexibly for wider social, demographic, environmental and commercial changes**

- **Having assets that support business critical functions**

- **Being prepared to adapt for the future by having safe and adaptable structures i.e. the way we build**

- **Taking account of future drivers** (climate, carbon, resources, population) in decision making

- **Having corporate and scientific support to look into long term 50+ years**

- **Making informed plans and decisions, tracking impacts and progress**
Aside... Futureproofing challenges for Equipment Assets

Key Themes

• Obsolescence
• Customer requirements
• Economics
• Regulation
• Sustainability
• Knowledge
Futureproofing Strategies for Equipment Assets

### Design
- Energy efficient design
- Data-driven design
- Modular design
- Embedded Sensors
- COTS parts

### Management
- Scenario planning
- Better asset management
- Through-life monitoring
- Risk management
- Stakeholder analysis
- Partnering with suppliers
- Standard procedures
- Training

### Asset-oriented
- Redundancy
- Obsolescence forecasting
- Retrofitting
- Cannibalisation

### System-oriented
- Documented design
- Documentation
- Engaging stakeholders
- Standard procedures

### Futureproofing Strategies
- Partnering with suppliers
- Engaging stakeholders
- Technical data
- Engaging stakeholders

### Better Asset Management
- Through-life monitoring
- Risk management
- Stakeholder analysis
- Partnering with suppliers

### Effective Replacement Strategies
- Technical data
- Engaging stakeholders
- Functional analysis
- Through-life monitoring

### Scenario Planning
- Futureproofing strategies
- Through-life monitoring
- Risk management
- Stakeholder analysis

### Effective Replacement Strategies
- Partnering with suppliers
- Engaging stakeholders
- Functional analysis
- Through-life monitoring
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Relevance of Futureproofing in Asset Management

“An asset is an item, thing or entity that has potential or actual value to an organization.....” [ISO 55000:2014].

Relationship between key terms [ISO 55000:2014]

Fundamentals of Asset Management relevant to Futureproofing

Value  |  Alignment  |  Leadership  |  Assurance
Value of Futureproofing in Asset Management

**Value:**

“Assets exist to provide value to the organization and its stakeholders” (ISO 55000:2014)

Futureproofing is centered around life cycle value based approach

**Alignment:**

“Asset management translates the organizational objectives into technical and financial decisions, plans and activities” (ISO 55000:2014)

Futureproofing is centered around planning for future

**Leadership:**

“Leadership and workplace culture are determinants of realization of value” (ISO 55000:2014)

Futureproofing is centered around leading the planning & change for future in advance

**Assurance:**

“Asset management gives assurance that assets will fulfill their required purpose” (ISO 55000:2014)

Futureproofing is centered around assurance for serving the purpose in long-term
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### Key criteria for futureproofing – From 1st workshop

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
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<tbody>
<tr>
<td>Self-reinforcing</td>
<td>Works with, rather than against, natural processes</td>
</tr>
<tr>
<td>Resilient</td>
<td>Able to withstand shocks and recover quickly</td>
</tr>
<tr>
<td>Flexible/Adaptive/Reconfigurable</td>
<td>Can be readily adapted/ reconfigured if understanding of risks/requirements change</td>
</tr>
<tr>
<td>Robust</td>
<td>Not overly sensitive to design assumptions</td>
</tr>
<tr>
<td>&quot;No regrets&quot;</td>
<td>Won’t close-off potentially attractive alternatives</td>
</tr>
<tr>
<td>Replaceable</td>
<td>Can be replaceable during or at the end of life/use</td>
</tr>
<tr>
<td>Reusable</td>
<td>Can be reused/ extended if deteriorated/ failed</td>
</tr>
<tr>
<td>&quot;Fail soft&quot;/ Fail safe</td>
<td>Won’t fail catastrophically / won’t make situation worse if it fails</td>
</tr>
<tr>
<td>Recyclable/ Demolishable</td>
<td>Can be recycled/ demolished at the end of life/use</td>
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**Institutions**

- CSIC, Cambridge Centre for Smart Infrastructure and Construction
- EPSRC, Engineering and Physical Sciences Research Council
- Technology Strategy Board
  - Driving Innovation
- UNIVERSITY OF CAMBRIDGE
How do we integrate futureproofing into asset management practice?

- Adopting standardized approaches to futureproofing in asset management practice
- Establishing criteria for futureproofing assets
- Implementing futureproofing criteria across asset life cycle stages
- Planning for change earlier on and managing change in operations
- Understanding the requirements earlier on and fully to deliver long-lasting assets
- Allowing for future growth across life cycle stages
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Issues / Questions

1. Review 'what is futureproofing' - is there anything you would add / take away?
2. Review key criteria for futureproofing - is there anything you would add / take away
3. Review barriers to futureproofing - anything you would add / take away
4. What do you think the value of futureproofing is in an asset management context- i.e. the value of having done future proofing at different points in the asset’s life-cycle?
5. How do we integrate futureproofing into asset management practice