Infrastructure Futureproofing Workshop 1
- Introduction -

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Institute for Manufacturing
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Overview

• Workshop Overview

• Futureproofing & the CSIC

• What do we mean by Futureproofing for Infrastructure?

• Why futureproof? And why not?

• How do we / might we go about it?

• 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
Aim & Objectives of Workshop 1

AIM: To assess the need and desire for futureproofing of key infrastructure

OBJECTIVES:
1. To agree on terminology and broad approach for futureproofing in infrastructure
2. To capture current industry practices in preparing infrastructure and systems for the future
3. To capture key issues in establishing a business case for futureproofing as part of development of new infrastructure
Agenda

0930-1015  Introduction (Duncan McFarlane)
1015-1030  Tea/Coffee Break
1030-1100  Will McBain, Arup
1100-1130  Kate Avery, Network Rail
1130-1230  Breakout/Discussion Session 1
1230-1330  Lunch
1330-1400  Andrew Ellis, Heathrow
1400-1430  Jon May, Lend Lease
1430-1530  Breakout/Discussion Session 2
1530-1600  Wrap Up
Outcomes Workshop 1

1. Summary of key terminology and issues in futureproofing
2. Summary of industrial perspectives on Why and How to futureproof infrastructure.
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**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

**Construction Sector:**
- Halcrow
- Laing O’Rourke
- ARUP
- Skanska
- Costain
- Atkins
- WSP
- Soldata
- Itm
- Capita Symonds
- Mott MacDonald
- Bre

**Infrastructure Owners/Operators:**
- TRL
- National Grid
- Highways Agency
- Transport for London
- Network Rail
- Infrastructure UK
- Humber Bridge Board
- Transport Scotland

**Systems / Solution Providers:**
- Toshiba
- IMETRUM
- Omnisense
- Thales
- GE Aviation
- Zulu
- IBM
- Sensea
- Horizon
- Aeroflex
- RolaTube
CSIC – Smart technologies & Approaches

- Planning major urban infrastructure
  - at city and national scale

- Whole life approaches to asset management

- Novel sensing and measurement approaches for
  - performance based design
  - structural health monitoring
  - construction process and supply chain efficiency
CSIC – Asset Futureproofing Project

• Establish best practice for infrastructure futureproofing

• Examine futureproofing approaches in other industries / sectors

• Identify common taxonomy, barriers, economic basis

• Propose approaches for integrating futureproofing into infrastructure asset management practices
CSIC – Asset Management Programme

Tools & Approaches to Improve Current Infrastructural Asset Management Practices

Project 1: Whole Life Asset Cost/Value Assessment

Project 2: Whole Life Information Requirement Specification

Tools & Approaches to Support Infrastructural Asset Management in the Future

Project 3: Asset Information Futureproofing

Project 4: Futureproofing of Infrastructural Assets
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Definition for 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.”
Futureproofing Dimensions?

(i) Resilience to Unexpected / Uncontrollable Events & Circumstances

(ii) Capability to adapt or respond to changing needs, uses, capacities
What is Futureproofing?: Partner Views

**Planning**
- Having regional strategy
- Conducting scenario planning

**Resilience**
- Having resilience to future changes

**Sustainability**
- Having sustainability

**Adaptability**
- Having flexibility for future changes in use or design
- Easier reuse of substructure elements and buried structures
- Allowing the life of infrastructure to be extended, such as by ‘bolting on extra lanes on a bridge’, or by building more floors on an existing building.

[CSIC Study July/August 2013]
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Why futureproof infrastructure?

Why futureproof infrastructure?

(i) Resilience
  • Long term climate change effects
  • Disruptive Events

(i) Adapt/Respond
  • User driven changes
    – Design changes
    – Adaptability / capacity changes
    – Need changes
  • Population growth and aging
Why futureproof? Partner Views

**Changing future**
Understanding the value of adding flexibility and reconfigurability for infrastructure response to changes.

**Wider social, economic and environmental benefits**
Particularly important for infrastructure with high vulnerability and lower capacity to respond to risks.

**Interconnected risks typologies**
- For energy intensive infrastructure with significant carbon footprint;
- For major climate hazards;
- To regional support systems (such as water and food systems);
- For multiple risks e.g. risks of disaster, earthquake, etc.

**Responsiveness**
- to climate change
- to drought threats
- to population growth

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How to futureproof infrastructure: Key Questions?

- **Strategy:** What approach to take?
- **Methods:** Which steps to follow?
- **Measures:** What measures to assess state of futureproofing?
- **Costs:** How to assess costs and value?
- **Practice:** How to integrate into current practices?
Strategies for futureproofing [infrastructure]?

Plan for
Design for
Construction for
Maintain for

Reuse
Extension
Reconfiguration
Recycling
Replacement
Demolition
Solutions for Future of Infrastructure [*]

- Flexible structures
- Sustainable resources
- Reactive facades
- Community integration
- Smart Systems

[*] J. Hargrave, “It’s Alive – Can you imagine the urban building of the future”, Arup Foresights, Jan 2013
# How we Futureproof: Industry Partners

## Long-term Scenario Planning
Conducting long term scenario planning while looking into strategic growth planning documents. For new assets, scenario planning has long term view considering resilience of network with capacity, security and climate change views.

## Sustainability
Sustainability is a form of future proofing that could either be in general or as material sustainability.

## Security Supply Index
Security Supply Index is used as an indicator of water supply futureproofing.

## Example futureproofing considerations
E.g. in a bridge may include instrumentation, 50 years life, dismantling and cost.
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Issues / Questions

1. What is Futureproofing? What does it mean for major infrastructure? Who does it best?

2. Why Futureproof …. Or why not? Can we afford it?

3. How to futureproof? Or partially futureproof?