

Industry 4.0 – Redefining our professions

CitA BIM Gathering Virtual
Conference 2021

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A woman and a young boy are standing on a train platform, looking out at a yellow train. The woman is holding the boy's hand, and they are both looking towards the train with anticipation. The background shows the platform and the train tracks.

THE FUTURE OF INFRASTRUCTURE

CREATING OPPORTUNITY
FOR EVERYONE

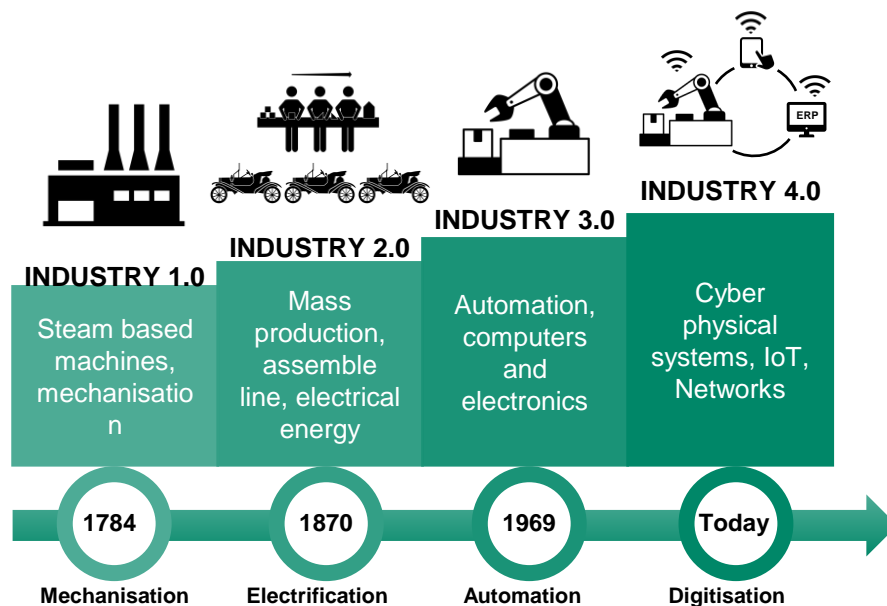
Investment in infrastructure has the power to alleviate today's economic distress and create opportunities for tomorrow.



FUTURE OF **WORK**

Work as we know it has been disrupted. As a result, the concept of work is changing, commute journeys are varying, employee values are shifting, and workplaces are no longer just offices. The time to consider the holistic Future of Work is now.

Demystifying 4.0



Industry 4.0 is a descriptor for the current trend of **cyber-physical systems with automation and data exchange** in manufacturing technologies it includes Internet of things (IoT), cloud computing and cognitive computing.

Melody



Baidu's AI Medical Assistant provides medical diagnostic services. Please describe the patient's symptoms.

My baby was born prematurely. His skin looks yellowish and so are his eyes. What is happening?



How old is the patient?

2



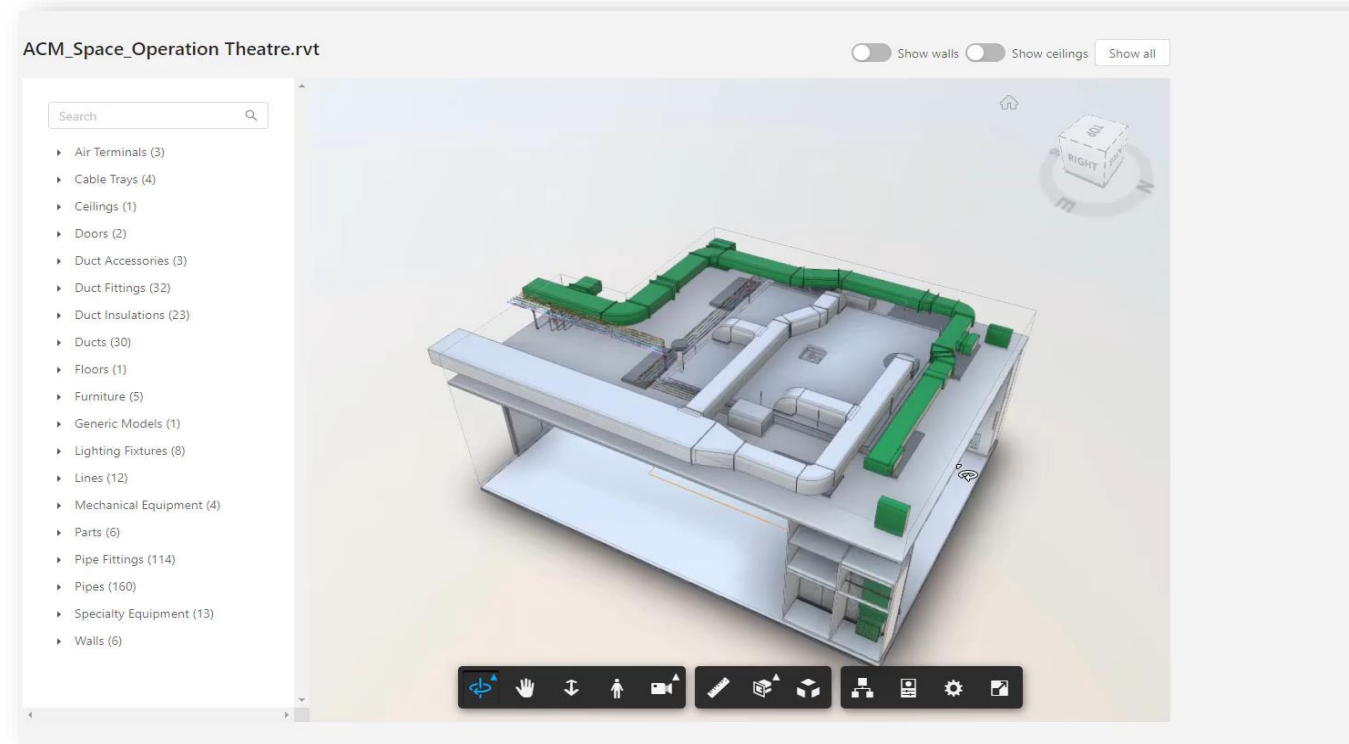
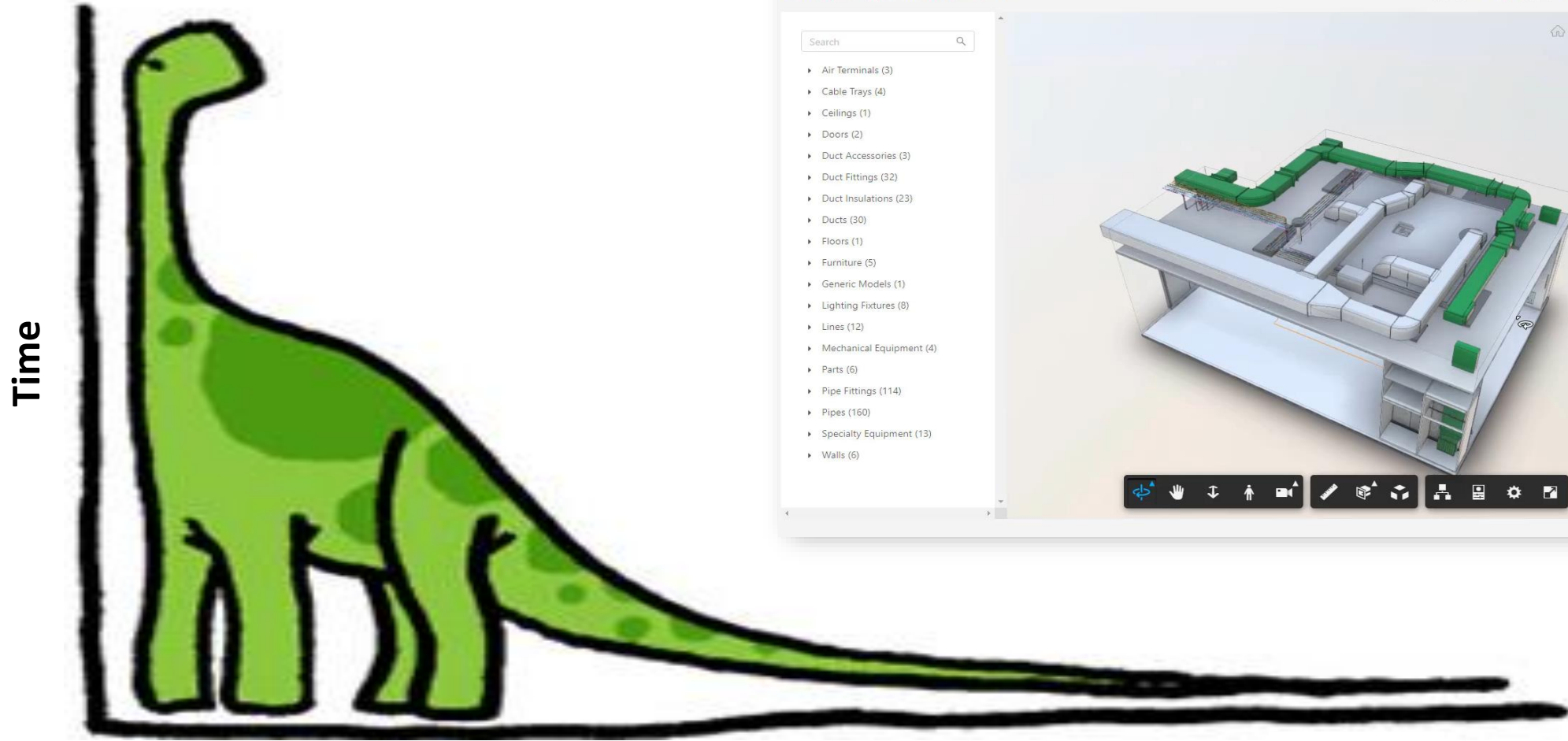
Is the patient experiencing any of the following?

- ☐ Diarrhea
- ☐ Vomiting



The long tail of making change happen

In the built environment



A need for construction sector reform

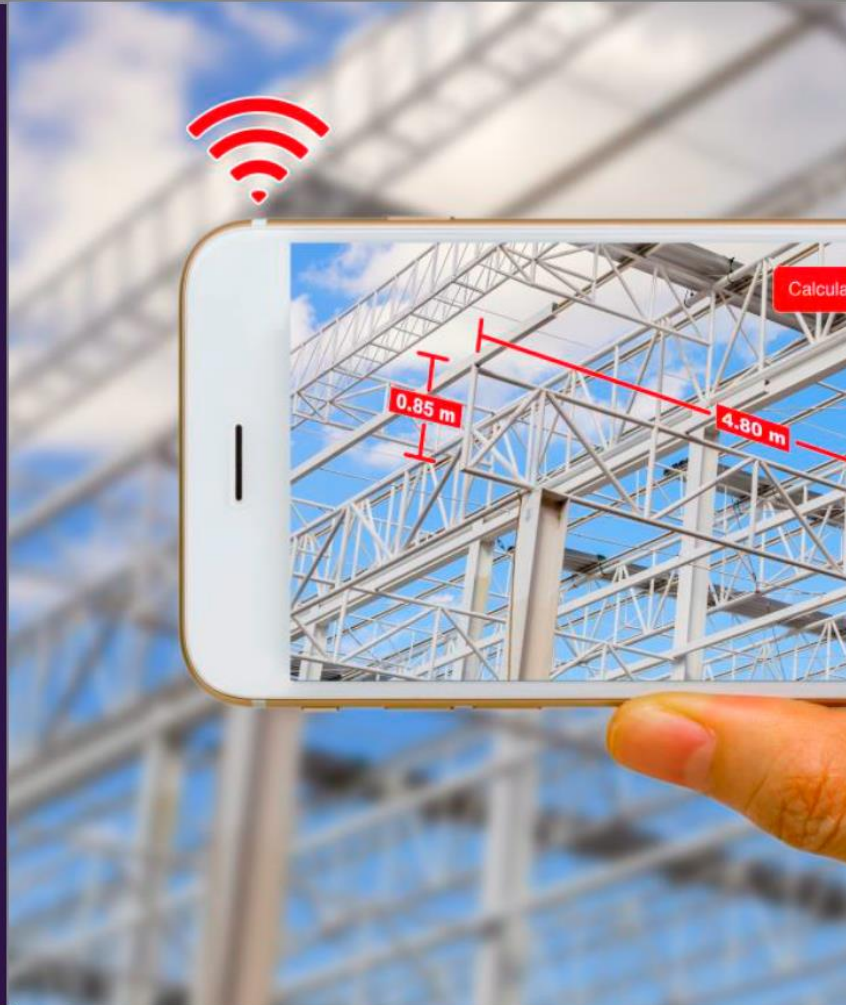
“Improve the efficiency of the construction sector through procurement reform, a more collaborative approach with earlier contractor involvement and better training.”

The Simon Report
1944



Industry 4.0

- Interoperability
- Information transparency
- Technical assistance
- Decentralised decisions



- Internet of things
- BIM
- Construction robots
- Autonomous machines

Internet of Things

Asset Sensor Network &
Telemetry

Additive Manufacture &
Industrial 3D Printing

Manufacture & Logistics
4.0

Cyber Security

Outcome &
Performance Based

Data driven
Design



Advanced Materials
& Nanotechnology

Big, Open and
Cognitive Data

Autonomous Plant
& Robotics

Cloud Computing /
(Serious) Gamification
& Simulation
of business models

Self procuring
Self Refining Performance
Real-time (POE)

Lightning speed
Decision Making

**Constructs of
Construction Industry 4.0**

Construction 4.0

A physical and digital built environment

*Fusing technology
and innovation
for a safer and greener
Built Environment that
will enhance society*

AECOM Imagine it.
Delivered.

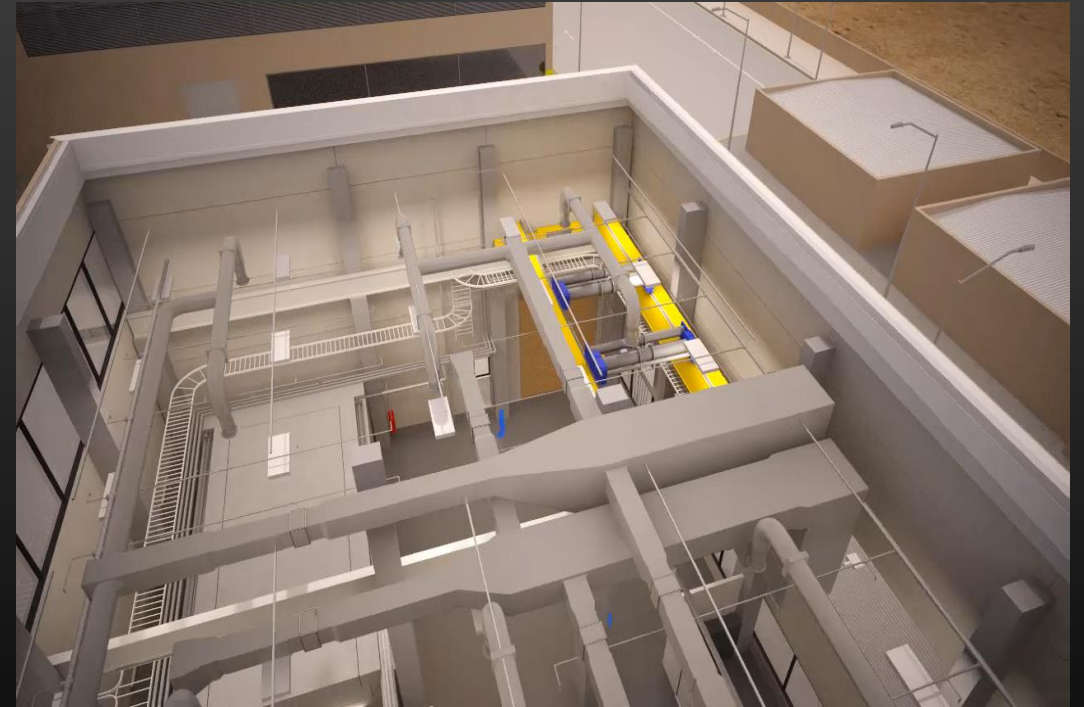
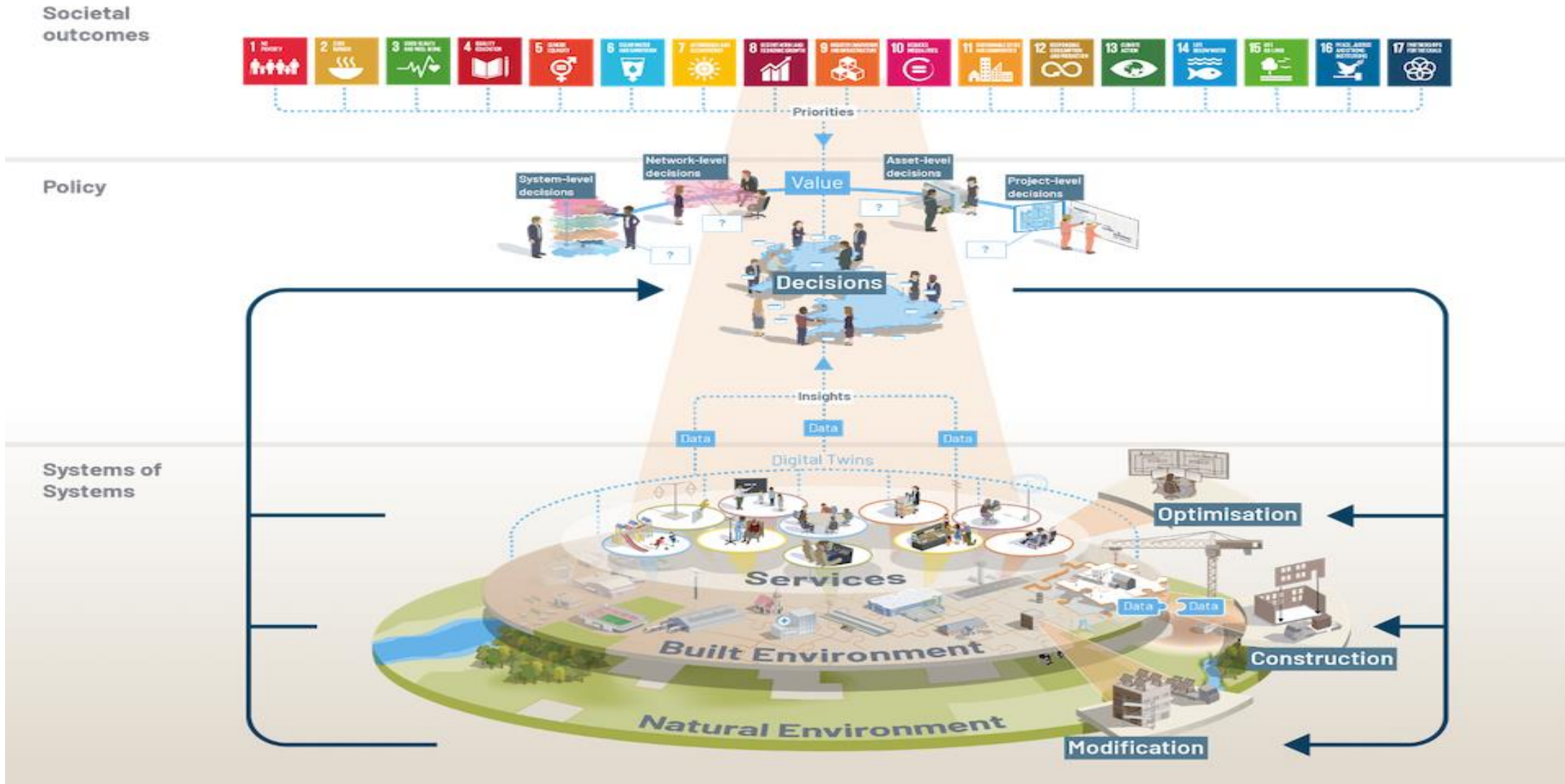




Image: World Economic Forum, Boston Consulting Group

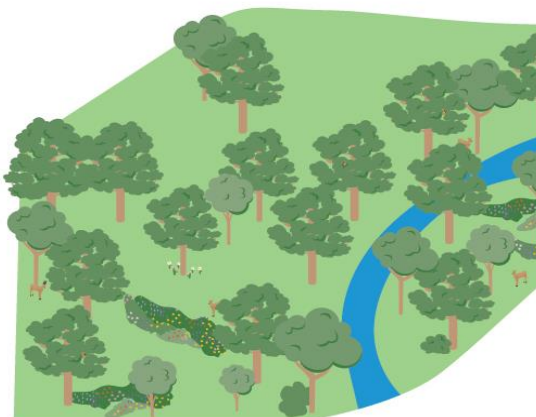
The Fourth Industrial Revolution is about to hit the construction industry. Here's how it can thrive (2018)

The Built Environment Model

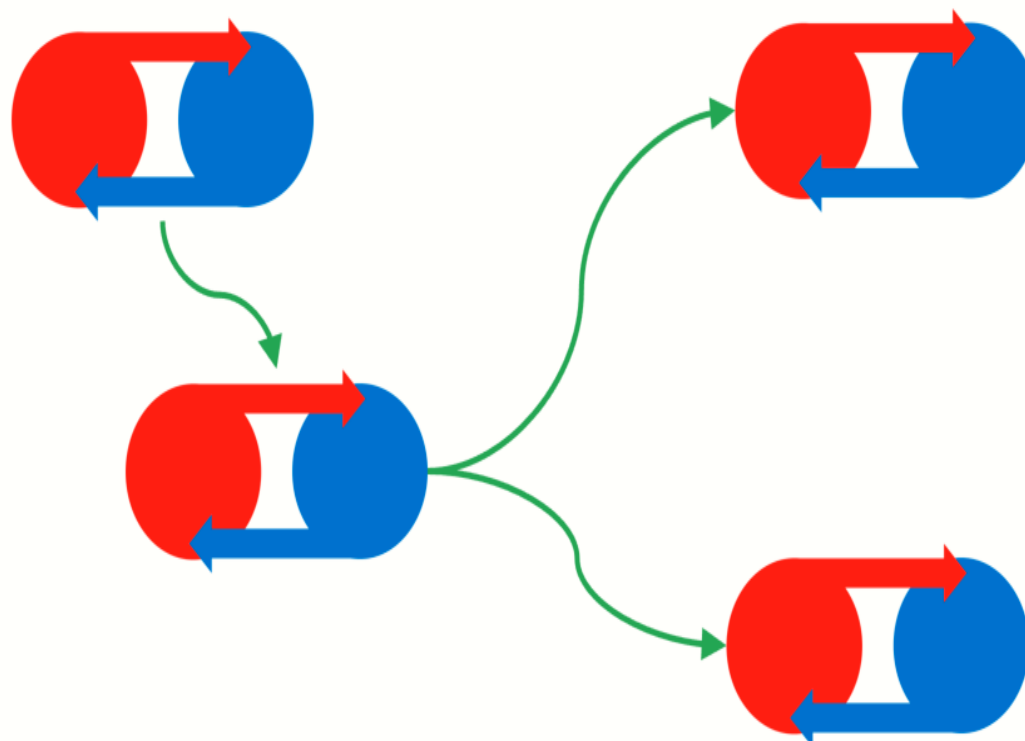


A shared vision of flourishing systems

Built systems



Natural systems



Information Model Framework & GIIG





SUSTAINABILITY

Digital – tackling the climate emergency

Value Drivers For
Construction 4.0

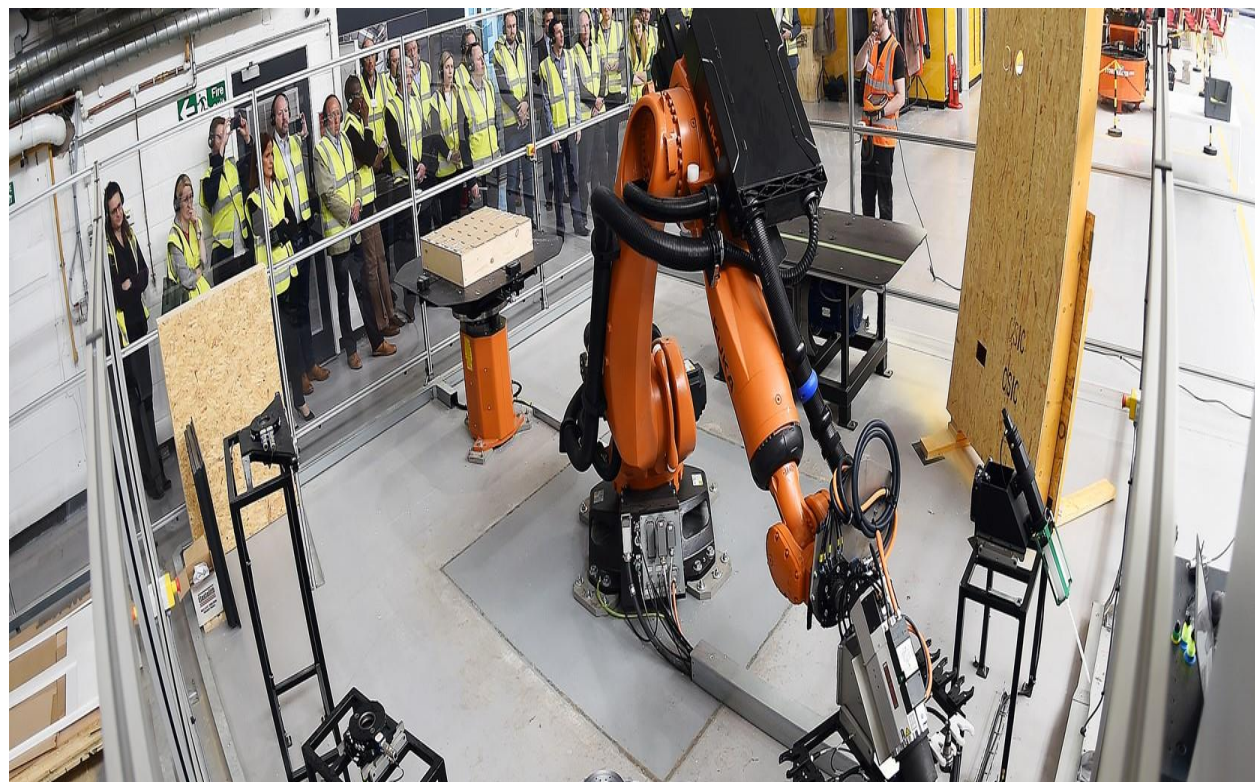




Unfortunately they were right! Change has to come from culture and behaviours

Transforming construction through digital and advanced manufacturing technologies

Since launching in October 2014, our industry-led team have been linking together businesses, university experts, the public sector and the economic development network including Scottish Enterprise and Highlands & Islands to support businesses to deliver transformational change in construction.



What is the Platform Design Hypothesis?

We are developing a platform construction system, consisting of a standardised kit of parts, (sub-assemblies), that we believe will be able to deliver a large proportion of social infrastructure buildings procured by government departments. It will offer significant benefits in quality, cost, delivery time and whole life value.

As part of the Construction Innovation Hub Platform project, we're working in partnership with government departments, industry and end-users to determine the needs for these buildings and feeding these into the Platform specification and design development. As part of this requirements capture phase of the project, we'd love to hear your opinions on this hypothesis, or where you think any gaps exist.

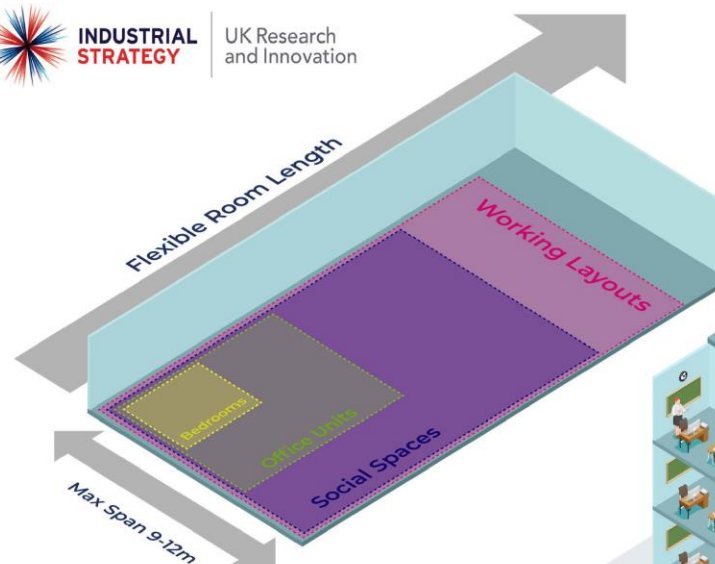
Please feel free to comment on the assumptions listed or email your feedback and comments to construction@the-mtc.org so we can consider them in our analysis.

Platform system sub-assemblies may include:

- | | |
|---|--|
|  Active Roof |  Ground Floors |
|  Building Control System |  Incoming Services |
|  Ceiling Cassette |  Internal Walls |
|  Cores Incl. Vertical Circulation |  Plant Room |
|  External Walls |  Risers |
|  Foundation System |  Structural Frame |
| |  Volumetric Pods |

Greenfield /
Brownfield
Compatibility
Flat Site Only

Up to
4 Storeys



Floor to ceiling heights up to 3m

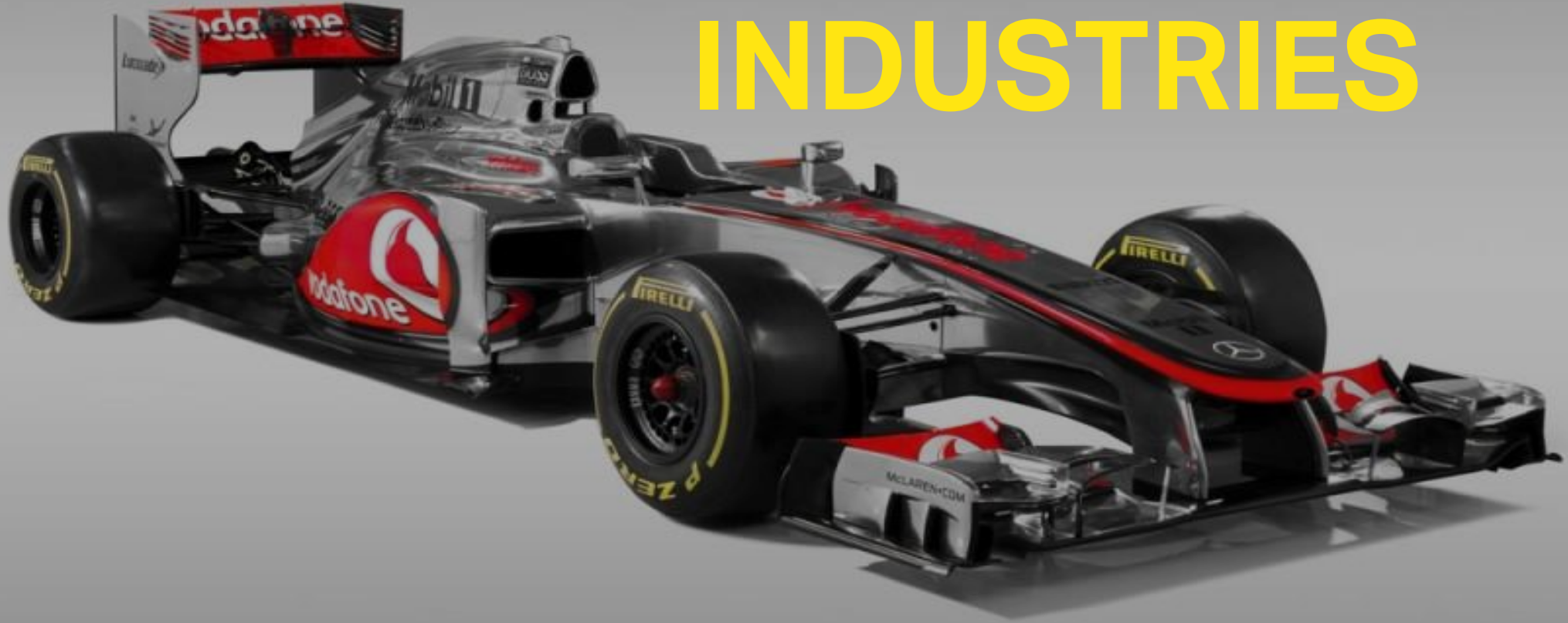
Not suitable for wide single span areas
e.g. Warehouses and Sports Halls

Suitable for **Schools, Offices, Apartments**
And many more...

Benefits

- | | |
|---|--|
|  Improved assurance of buildings |  Reduction in delivery time |
|  Reduced whole life costs |  Reduced greenhouse gas emissions |
|  Improved Health and Safety |  Higher level of lifetime build performance |

LOOK AT OTHER INDUSTRIES

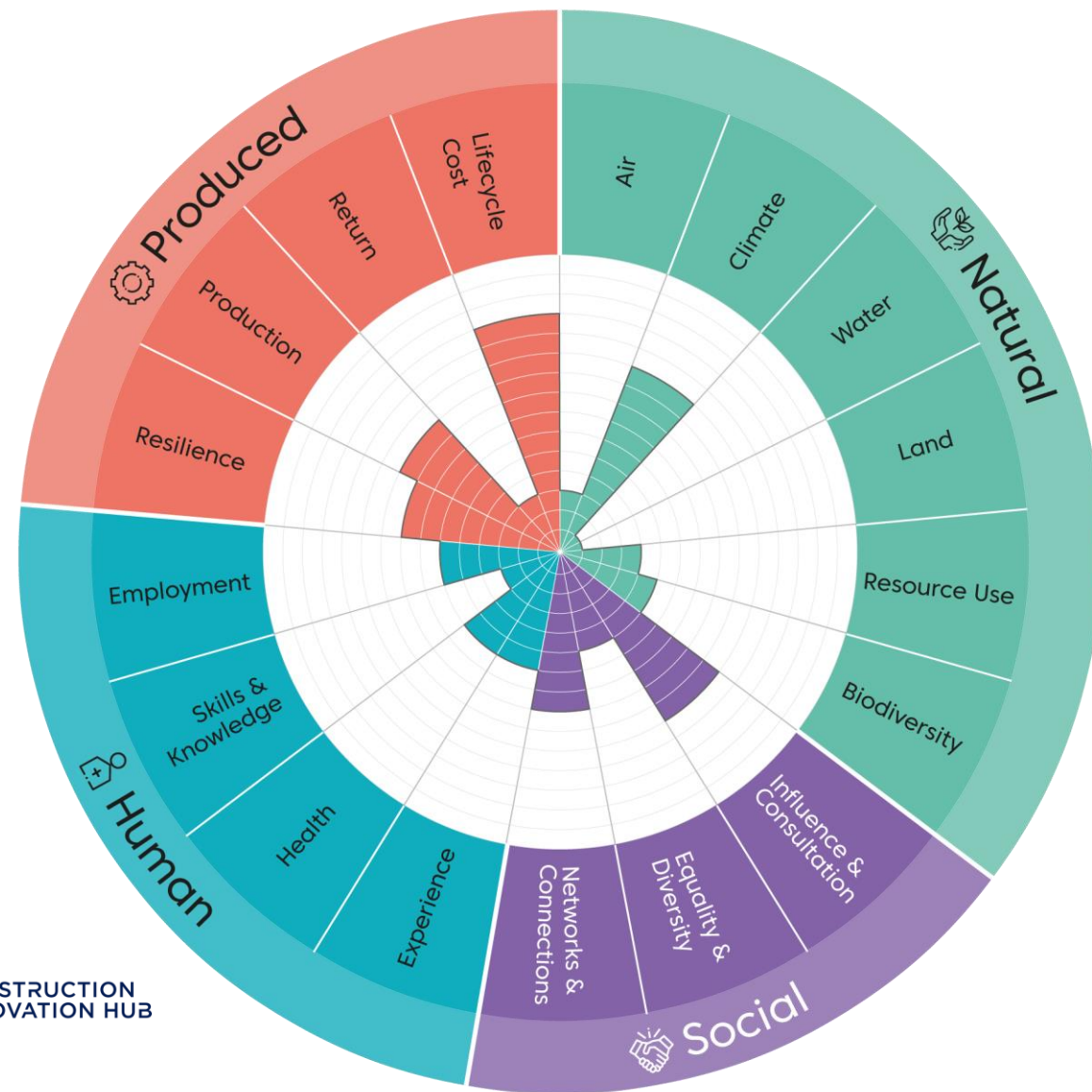
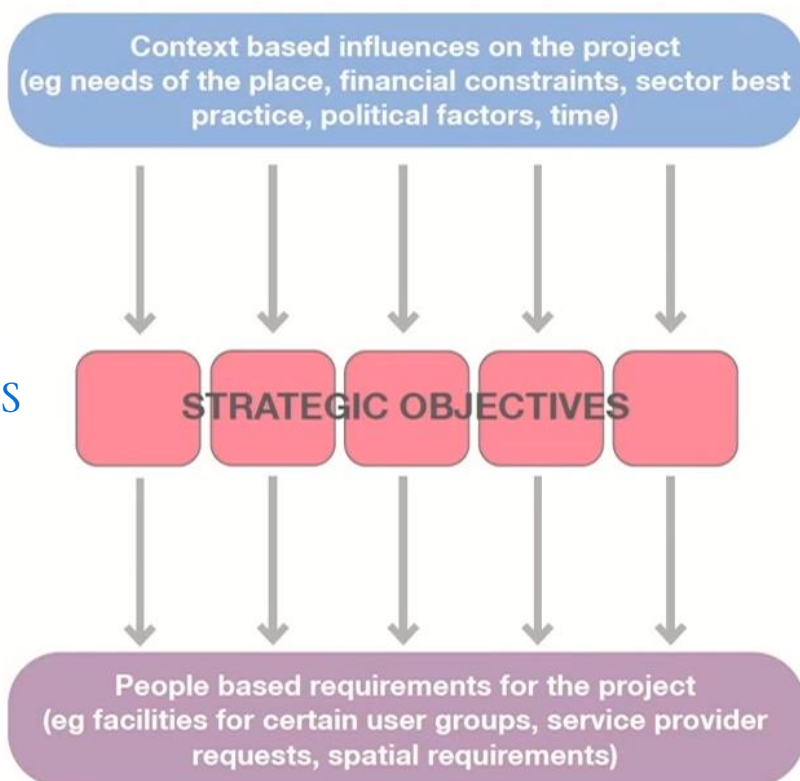


We are competing against them for the best new talent

Establishing Value, Better Briefing and Evaluation

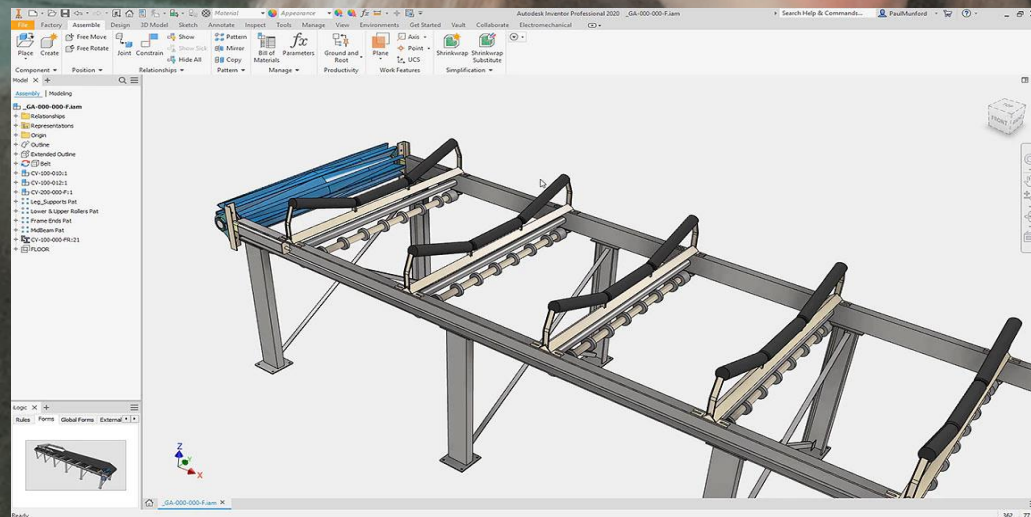
- Solutions that meets a need to drive greater value from our investment in the built environment.

SCOTTISH
FUTURES
TRUST



The Future Gen Z

- Ethical
- Global
- World Changer
- Hyper connected
- Experience driven



The Present Gen X

What skills will she need?

Construction 4.0

The Built Environment

Mindful Security

Data science / Analytics

MMC / Advanced Manufacture

Coding and Machine Learning

Agile Project Management

Science of innovation

Disruptor, Story Teller and Communicator



Image courtesy: Soluis

Future Skills Strategy

AGENTS OF CHANGE

INSPIRING SCHOOLS

School students are shown the future of construction and inspired to pursue a career in an innovative sector.

FUTURE PROOFED LEARNING

Colleges and universities are equipped to provide innovative construction skills, knowledge and experience to design and professional discipline students.

LEADING THE TRANSFORMATION

Industry leaders have the skills and knowledge to implement innovative construction methods.

SMART CLIENTS

Clients have awareness and knowledge of innovative methods and their benefits to drive industry adoption.

VISION

Catalyse the digitisation, industrialisation and sustainability of the industry by equipping key agents of change with the skills, knowledge and behaviours in cutting-edge innovation.



CULTURAL CHANGE



DIGITAL TRANSFORMATION



ACCELERATE INDUSTRIALISATION



BUILDING SUSTAINABILITY



CORE PRINCIPLES

- CAPACITY BUILDING THROUGH PARTNERSHIPS
- BRING INNOVATION TO LIFE
- PIONEER INNOVATIVE LEARNING SOLUTIONS

ENABLING ASSETS

- INNOVATION CASE STUDIES
- FACTORY FACILITIES
- EXPERT NETWORK

CONSTRUCTION
SCOTLAND
INNOVATION
CENTRE

Summary



Choose a future to explore... 



Resigned to our fate



Too little, too late



A legacy of hope



Generation zero

<https://www.cdabb.cam.ac.uk/fourfutures>

An aerial photograph of a city skyline at sunset. The sun is low on the horizon, casting a warm orange glow over the city. Several skyscrapers are visible, including one with the AECOM logo on its roof. The sky is filled with wispy clouds, and a single contrail from an aircraft is visible in the upper right.

AECOM

Imagine it.
Delivered.

Thank You For Listening

David Philp - AECOM