Technology Roadmap for
UK Construction & National Infrastructure
Journey to date

The launch of i3P on October 18th 2016, with 22 major client and supply chain organisations, confirmed that the construction and infrastructure sector had now committed to a future based on, and leveraged through, collaborative innovation.

We committed to using the same platform, approach and categorisation for innovation, with people from across all member organisations sharing ideas, innovations, and participating in industry-wide collaborative projects.

The development of a strategic relationship between i3P and the MTC has enabled us to accelerate our ambitions. With the support of the MTC, i3P has developed a Technology Roadmap for UK Construction and National Infrastructure, aligned with the three strategic themes in the CLC Sector Deal.

The Roadmap work will be supported by the i3P Collaborative Innovation Fund to pursue feasibility, scoping and proof of concept studies to develop the required technologies to address the challenges faced by our industry.

I am confident that this industry-wide collaborative ‘Innovation Plan’ will drive the delivery of infrastructure fit for the 21st and 22nd centuries, for the benefit of users, the industry and for UK plc.

Andy Mitchell
Chair of i3P, CHIEF EXECUTIVE OFFICER, Tideway

“The development of this technology roadmap represents an important step forward in the drive to significantly improve productivity and make the UK construction industry world class. By collaborating on research and development projects, this will help to mobilise and accelerate innovative solutions that will transform the whole sector.”

Lord Prior
Parliamentary Under Secretary of State at the Department for Business, Energy and Industrial Strategy
Strategic Theme 1 - Digital Transformation

- Consistency of Performance
  - Accreditation, KPI’s, Standards
  - Skills, diversity and cultural evolution

Business and Design Toolkits
- Digital OPEX platforms
- Standard product platforms
- Change
- New product implementation configurator tools
- BIM 3A Common data environment/exchange
- Augmented Reality (AR) and Virtual Reality (VR) construction projects
- Next generation
- BIM 3B - embedding ‘Internet of Things’
- BIM 3C - international
  - Connectivity in harsh environments – 5G
  - Digital connected cities – interconnectivity, big data technology platforms
  - Development of mixed reality
  - Digital connected cities – interconnectivity, big data technology platforms
  - Connectivity in harsh environments – 5G
  - Automation, analytics, deep learning, machine learning

Legacy data management strategy
- Develop BIM template for standardised products
- Secured shared networks


Cross cutting themes
- Consistency of Performance (Accreditation, KPI’s, Standards)
- Skills, diversity and cultural evolution
Strategic Theme 2 - Manufacturing Construction

New product implementation programmes across sector - standard methods and guidance, testing certification process, embedding knowledge from automotive and aerospace manufacturing techniques Inc. robotics and automation

Linked digital logistics tools and assembly

Other technology safety enhancement deployments, Exoskeletons, neural control plant and devices

Automated grouting verification for tunneling

Large volume metrology

Platform designs – standardised solutions for prisons, schools, hospitals, housing

Standardisation of components

Modularisation of key construction components

Logistics of small/large manufactured components

Pre-assembly and assembly approaches

Wearables for health, safety and wellbeing

Proximity sensing technologies for safety & security

Electrical construction vehicles

On- and off-site construction (‘Flying factories’)

Additive manufacturing development

Drone, robotics and autonomous plant, human-machine cooperation

Use of robotics for construction processes

Automated grouting verification for tunneling

Alternative survey technology – satellites

Configuration/specification tools, transport logistic tools linked to BIM 2/3

Configuration/specification tools, transport logistic tools linked to BIM 2/3

Large volume metrology

Skills, diversity and cultural evolution

Cross cutting themes

Consistency of Performance (Accreditation, KPI’s, Standards)

Products and materials

Strategic Theme 3 - Life Cycle Performance

- Power and heat by the hour building demonstration
- Linked performance data information for lifecycle management
- Smart asset management
- Renewables, battery storage, community energy
- Asset Management Lifecycle & Smart systems
- Sensor technology development
- Future-proofing technology - managing sensor lifecycle
- Intelligent connected urban spaces
- Smart material development
- Low carbon high performance materials
- Self-healing materials
- Self-feeling materials
- Circular economy open platforms
- Low carbon high performance materials
- ‘Zero disruption’ asset management
- Additive manufacturing and maintenance
- Renewables, battery storage, community energy
- Servitisation of infrastructure and construction assets by technology
- Energy generation infrastructure components
- Power and heat by the hour building demonstration
- De-commissioning of assets/end of life management
- Rapid refurbishment solutions
- Smart asset management
- Legacy management
- Advanced Product Quality Planning (APQP) methods across supply chain
- Common global lifecycle platforms
- Consistency of Performance (Accreditation, KPI’s, Standards)
- Cross-cutting themes
- Skills, diversity and cultural evolution
Non-Technology - Critical Elements

- An Enterprise approach (Project 13)
  - Governance (Project 13 work stream)
  - Organisation (Project 13 work stream)
  - Integration (Project 13 work stream)
  - ‘The Capable Owner’ (Project 13 work stream)
  - Capability audits/maturity Model
  - Competency framework
  - Appropriate forms of contract

- Address uncertainty & inertia
  - Define the ‘Concept Project’
  - Deliver elements of the ‘Concept Project’
  - ‘Concept Project’ the ‘New Norm’

- New projects raise the bar
  - ‘The New Norm’

- New generation jobs & digital skills
  - Digital skills phase 1
  - Digital skills phase 2
  - ‘New generation jobs & digital skills’

- Innovation culture & community
  - An enterprise culture
  - Identify the ‘unknown unknowns’

- A ‘new’ diverse workforce
  - Explore the markets
  - Learning & new skills
  - ‘A ‘new’ diverse workforce’

- A ‘new’ culture
  - ‘A ‘new’ culture’

- Exploration of the markets

Client Leadership

- Client, supply chain, Academia collaboration
- Skills, diversity and cultural evolution

Cross cutting themes

- ‘Now’ 2018
- ‘2019’
- ‘2020’
- ‘2021’
- ‘2022’
- ‘2023’
- ‘2024’
- ‘2025’
- ‘2030’
Next Steps

We have commenced our journey but the next critical step is to further develop and refine the Technology Roadmaps. These will be completed collaboratively with i3P membership, MTC, BRE, industry institutions and academia. The establishment of pathways and dependencies between Technology, Industry and Manufacturing Readiness Levels (MRL’s) for each key technology area will enable the industry to form coherent programmes of work which will transform how construction and infrastructure is delivered.

Non technology areas identified will also be closely considered to provide a culture and framework conducive to one driven by investment in collaborative innovation.

For more information please contact:-
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“The adoption of digitally-enabled technology solutions will transform productivity and performance in the built environment. BRE supports i3P and MTC in evolving this roadmap and working with industry to deliver against it.”

Dr Peter Bonfield OBE FREng
Chief Executive, BRE Group

“We support this as an important step in informing the long term strategy and direction of our infrastructure industry.”

Roger Bailey
Asset Management Director, Tideway

“The roadmap articulates the crucial next steps of our industry’s accelerating journey to a more productive, engaging and rewarding future.”

Rob Ewen
Delivery Director, Heathrow Expansion Programme

“The road mapping provides a focused industry approach to allow collaborative innovative solutions to be developed that will address our customer needs and improve the performance of the industry.”

Tim Embley
Costain

“The passion shown by the i3P Industrial Players to collaborate for the benefit of the whole industry has impressed me. That is why I’m so pleased to have been part of the team which delivered the first National Technology Roadmap for the Industry.”

Neil Rawlinson
Strategic Director, MTC
The i3P membership is made up of

Bentley
Balfour Beatty
SKANSKA
MORGAN Sindall
COSTAIN
amey
Environment
ferrovial
LAING O’ROURKE
Heathrow
Crossrail
highways england
Tideway
NetworkRail
ATKINS
HPC
ch2m
KIER
VINCI
BECHTEL
ARUP
love every drop
anglianwater
M
MOTT MACDONALD

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