InfraTech Value Case & InfraTech Policy Toolkit

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Reference Note | Value Case

The Value Case will provide the conceptual framework for assessing the economic growth, and understand the impact of InfraTech on achieving the Sustainable Development Goals. The reference note is structured as a comparative analysis of InfraTech vis-à-vis traditional infrastructure investments -- to understand the economic, social, and environmental challenges that should be addressed to meet societal expectations.

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Chapter 1 | Context & Overview

Chapter 2 | Understanding InfraTech

- Key technologies that drive value for infrastructure
- Foundational technologies
- Potential costs of InfraTech
- Three Types of Value Created By InfraTech

Chapter 3 | Key risks and challenges of InfraTech

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- Economic risks
- Social risks
- Environmental risks

Chapter 4 | Capturing value across the asset lifecycle

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- Finance and funding
- Project delivery
- Operations and maintenance
- Renewal and disposal

Chapter 5 | Key sector trends that will drive InfraTech value

- Digital | Energy | Transport | Water | Cross-sectoral
- Technology maturity, ease of implementation and country readiness

APPENDICIES

Appendix A | Sector Profiles

- Digital | Energy | Transport | Water

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Key Technologies that Drive Value for Infrastructure

Outlined below is the aggregation of technologies into categories based on their key value proposition for infrastructure. These categories allows us to articulate more effectively the multiple InfraTech value propositions across the asset lifecycle which impact infrastructure delivery.

Connectivity & Communica-tions	Analytics & Computation	Cloud & Data Storage	Devices & Automation	Platforms & Interfaces	Materials, Energy & Construction
Wired or wireless technologies that connect people or devices and enable data transfer.	Advanced analysis that uses machine learning to process large amounts of unstructured data.	Tech solutions that enables efficient mass movement and storage of large data sources.	Physical interfaces and components that perform specific tasks or enhance automation.	Complex systems combining multiple technologies or have whole of system design thinking.	Applied science and engineering directly related to efficiency or quality for OPS and construction.
▪ **Broadband (e.g. 5G Mobile)*** ▪ LEO Satellite ▪ Wireless ▪ Industrial IOT ▪ **Sensors / IOT*** ▪ GIS / GPS	▪ Big Data ▪ Data & Analytics ▪ AI Augmentation ▪ Auto Cognitive ▪ Edge Computing	▪ **Cloud*** ▪ HD Video ▪ BIM	▪ Robotics ▪ UAVs (e.g. Drones) ▪ Sensors / IoT ▪ Batteries ▪ Wearables ▪ Biometrics	▪ **Cybersecurity*** ▪ Autonomous Cars ▪ Fintech and DLT (e.g. Blockchain) ▪ AR/VR ▪ Digital Twin	▪ 3D Printing ▪ 4D Printing ▪ Nano-materials ▪ Modular Construction ▪ Concentrated Solar Power

■ Foundational technology

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Three Types of Value Created by InfraTech

1	**Improving efficiency and reducing costs** through enhanced analytical functions, data management, communications and automation are producing material cost savings across the lifecycle of the asset. New data driven decision making with faster decision cycles and alternative service solutions will multiply the value in both greenfield project delivery and brownfield asset prolongation.
2	**Enhancing economic, social, and environmental value** by connecting service offerings across sectors will unlock new pools of customer value and generate new or alternative revenue streams**.** These will create not just economic value through market exchanges, but also create positive externalities in terms of improving social and environmental impact compared with traditional infrastructure services.
3	**Reshaping demand and creating new markets** has the potential to change the underlying mechanics of an infrastructure demand model through two models: i) creating demand for new infrastructure services that previously did not exist (e.g. mobility as a service, charging of electric vehicles); and ii) reducing demand for traditional infrastructure services that are superseded by another technology (e.g. 3D printing, 5G eliminating traditional forms of connectivity)

However, InfraTech adoption may also result in significant up-front or recurring economic, social, or environmental costs that may reduce the net value ultimately achieved

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Potential Cost of InfraTech

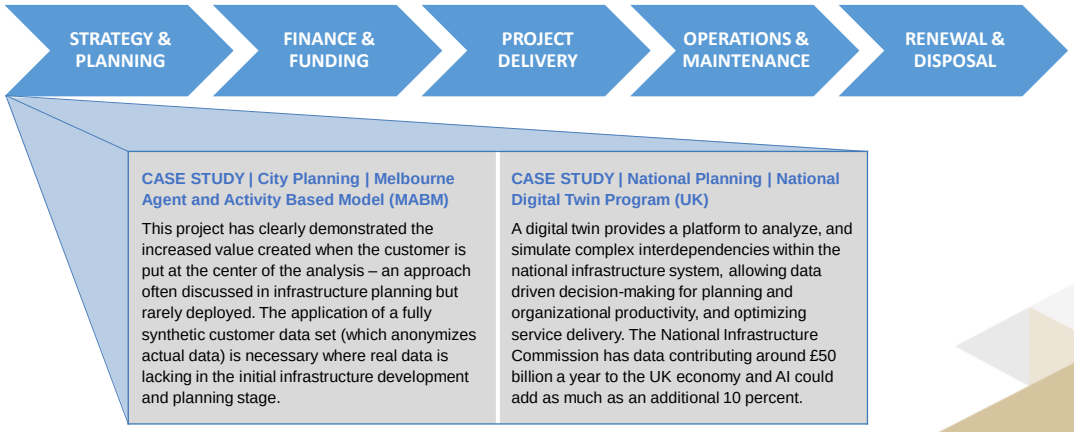
Potential Cost	• While the technologies can offer value, particularly over the lifetime of the asset, the implementation and deployment of InfraTech can come with **significant up-front or recurring costs**. • Many technologies will **not be economically or financially viable at their current cost structure**, although cost structures in many of these technologies have shown the ability to shift rapidly once the technology achieves a certain level of scale (e.g. renewable energies). • Cost structures may also vary based on the **country or local market context**. • Even for technologies which have a favorable cost-benefit structure, **poor implementation could result in significant cost overruns or underutilized cap**acity. • The business models for technologies with large upfront capital costs, such as 5G, will need to be evaluated carefully from a cost-benefit perspective. • Other technologies, such as AI tools, sensors, drones, currently have fairly low upfront capital costs with significant near-term benefits.

Key risks to Achieving Potential Value

Implementation Risks	• **The transformation will not be uniform**. It will be driven by a complex interplay between different sector requirements, a specific location adoption readiness, the technology maturity and market dynamics. • **Delivery differences between infrastructure and technology cycle times** for both innovation and adoption of disruptive infrastructure technology are materially different to the cycle times for infrastructure development itself. • InfraTech **procurement capabilities require agile and flexible management approach** required to continually develop viable technology solutions. • **Public-sector skills gap** must recognize and plan for the fact that the role of government in infrastructure is materially changing.
Economic risks:	• Process automation, sensors and AI are just a few of the technologies that will have **human capital impacts and potential job losses** associated with their implementation. • **Traditional business models may be disrupted** in favor of integrated ecosystems and new delivery models are being applied to increasingly diverse supply chains.
Social risks:	• **Widening digital divide** if adoption exacerbates existing divides, including regional. • **Data's role in the changing nature of the social contract** will enable the data holder to have unprecedented knowledge on the movement and activity of its citizens. • **Solving the data challenges** around ownership, monetization, sharing, trust, security, privacy and its use for the public good.
Environmental risks	• **Increased energy costs** will have a material impact on a countries energy consumption. • New technology hardware is drawing on **scarce natural resources** where environmental and social standards along the supply chain may be lacking. • Some technology led solutions could lead to **higher rates of pollution** or worsening air quality. For example, ride sharing services have in some cities led to an increase in cars on the road.

Capturing Value Across the Asset Lifecycle

In developing an understanding on the potential level of value that could be delivered by InfraTech, we look at the value expectations for InfraTech across the five major asset lifecycle stages providing a view of the key value drivers and some examples of how this might be translated into practical activity.



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Reference Note| Policy Toolkit

The Policy Toolkit will collect and curate policy tools that will assists governments in creating the enabling environment for the implementing of the InfraTech Agenda. The reference note highlights the key priorities and case studies for the leading tools by policy lever.

MAIN DOCUMENT

Chapter 1 | Context & Overview

Chapter 2 | Cross-cutting priorities

- Priority 1: Play an active role in leading and enabling the InfraTech agenda
- Priority 2: Take a forward-looking approach to technologies and risks
- Priority 3: Put data at the center across all infrastructure sectors
- Priority 4: Support sector convergence and systems thinking, particularly in cities
- Priority 5: Employ decentralized solutions

Chapter 3 | Policy Tools and Levers

- Legislation and regulation
- Procurement and contract management
- Funding and financing
- Building institutions
- Fostering a future enabled workforce

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Cross-cutting Priorities

The policy toolkit establishes a basic set of principles which guide development of a set of cross-cutting government priorities at the outset to guide policymaking.

1	**Play an active role in leading and enabling the InfraTech agenda** in assessing the benefits and costs of various technologies, and acting as both leaders and enablers for technologies with significant value potential.
2	**Take a forward-looking approach to technologies and risks** by designing regulation, legislation and procurement guidelines that should be flexible and focused on outcomes and categorical rather than specific technologies.
3	**Put data at the center across all infrastructure sectors.** Data needs to be open and integrated to develop innovation and collaboration.
4	**Support sector convergence and systems thinking, particularly as cities** are set to be the focus of InfraTech development in the coming years. If established effectively, city systems will leverage InfraTech technologies, allowing far greater integration across different stakeholders and sectors.
5	**Employ decentralized solutions** to shift infrastructure from a top-down, centralized approach, to a bottom-up, citizen-led, decentralized model. These solutions offer the potential to 'unpackage' large infrastructure so they are delivered as a number of smaller, more flexible future-enabled projects which are more nimble to react to technology changes.

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Policy Tools and Required Change

Legislation and Regulation	• InfraTech adoption will require legislation and regulation that create an enabling environment to foster innovation and market growth while addressing information asymmetries, cyber security and data privacy concerns.
Procurement and Contract Management	• To be better suited for InfraTech, governments must look to incorporate flexibility and focus on outcomes, with a balance between local capacity and global expertise.
Funding and Financing	• To mitigate this perceived (or actual) higher risk of InfraTech projects, an appropriate governance structure and clear decision making mechanisms are vital.
Building Institutions	• Institutions need to be equipped to change or adapt the regulatory environment to enable adoption of InfraTech.
Foster a Future Enabled Workforce	• Governments can address this issue through support for training initiatives, increased collaboration with educational institutions and industry and through global knowledge exchange.

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