NSW Infrastructure Digitalisation and Data Policy

Acknowledgement of Country

Infrastructure NSW acknowledges the Traditional Custodians of the lands where we walk, work and live. We pay respect to their Elders past and present.

We acknowledge and respect their continuing connection to the land, seas and waterways of NSW, and the continuation of their cultural, spiritual and educational practices.

We acknowledge the importance of Aboriginal and Torres Strait Islander peoples' unique history of land and water management, and of art, culture and society, that began more than 65,000 years ago.

Contents

Glossary of terms

Term	Definition	Source / Author
Agency	Refers to NSW Government entities. In this Policy, the term 'agency' refers to NSW Government entities involved in the planning, delivery, construction, and operation and maintenance of state-funded public infrastructure.	Infrastructure NSW
Agency's Infrastructure Digitalisation and Data Policy (Agency IDD Policy)	An authoritative statement of the agency's commitment to effective infrastructure digitalisation and data management, as required under the NSW Infrastructure Digitalisation and Data Policy.	Infrastructure NSW
Agency Infrastructure Digitalisation and Data Strategy and Implementation Plan	An agency's medium-term strategy and plan for implementing agency-wide infrastructure data and digitalisation actions over a 5-year time horizon, as required under the NSW Infrastructure Digitalisation and Data Policy.	Infrastructure NSW
Artificial Intelligence (AI)	A technical and scientific field devoted to the engineered system that generates outputs such as content, forecasts, recommendations or decisions for a given set of human-defined objectives.	ISO/IEC 22989:2022
Asset data	Data that lists and describes an asset. Data supporting asset management decision-making. Asset data can exist in a number of formats such as structured data, documented information, sensor data etc, requiring different approaches to their management.	ISO 55013:2024
Asset Information Requirements (AIR)	Information requirements in relation to the operation of an asset.	ISO 19650-1:2018
Asset lifecycle	Encompasses all stages of an asset from conception to decommissioning. This includes planning, design, acquisition, delivery (including construction), operations and maintenance, and disposal. In this Policy, 'asset lifecycle' and 'infrastructure lifecycle' are used interchangeably.	NSW Asset Management Policy (TPP19-07)
Asset management	The coordinated activity of an organisation to realise value from assets, present and future. Value can represent financial return and/or be measured by the contribution the assets make to service delivery.	NSW Asset Management Policy (TPP19-07)
Assets	All non-financial assets recognised by the agency including, but not limited to, land and buildings, plant and equipment, infrastructure systems, leased assets, works in progress, cultural and heritage collections, ICT systems and digital services. Note that this Policy is focused on capital assets in the built environment including buildings and other physical infrastructure, and their associated ICT and digital systems.	NSW Asset Management Policy (TPP19-07)

Term	Definition	Source / Author
Building Information Modelling (BIM)	Use of a shared digital representation of a built asset to facilitate design, construction and operation processes to form a reliable basis for decisions.	ISO 19650-1:2018
Common data environment (CDE)	A CDE is an agreed source of information for any given project or asset for collecting, managing and disseminating each information container through a managed process.	ISO 19650-1:2018
Common data model (CDM)	A shared common data language for organisations to define how infrastructure data is structured, stored, and related within a common data environment. It provides a consistent framework for standardised, extensible infrastructure data schemas including entities, attributes, semantic metadata and relationships and must be integrated with the organisation's enterprise data model.	Infrastructure NSW
Data governance	The practice of implementing a set of policies, processes, structures, roles and responsibilities to ensure that an agency's data is managed effectively and that it can meet its current and future business requirements.	NSW Data Governance Toolkit
Data management	Data Management is the development, execution, and supervision of plans, policies, programs, and practices that deliver, control, protect, and enhance the value of data and information assets throughout their lifecycles.	Data Management Association (DAMA)
Digital engineering (DE)	A collaborative way of working, using digital practices and processes, to enable more productive methods of planning, designing, constructing, operating and maintaining assets.	Digital Engineering Framework, Transport for NSW
Digitalisation	The development and application of digital and digitalised technologies that augment and dovetail with all other technologies and methods. This causes fundamental changes in the connection of individuals and their behaviours as well as in the organisation of companies and their processes.	Global Forum on Maintenance & Asset Management (GFMAM)
Digitisation	Digitisation is the process of converting hard-copy, or other non-digital, records into a digital format. This includes taking digital photographs of non-digital source records or imaging non-digital source records (also known as scanning).	ISO/TR 13028
Exchange Information Requirements (EIR)	Production, management and characteristic requirements for information to be submitted under a contract.	ISO 19650-1:2018
Geographic Information Systems (GIS)	A system to capture, store, manipulate, analyse, manage, and present all types of geographical data using geospatial mapping tools.	Infrastructure NSW
Information and Communications Technology (ICT)	The common term for the entire spectrum of technologies for information processing, including software, hardware, communications technologies and related services. In general, ICT does not include embedded technologies that do not generate data for enterprise use such as stand-alone Operational Technology projects.	NSW Asset Management Policy (TPP9-07)

Term	Definition	Source / Author
Infrastructure	The set of foundational facilities and systems that support the provision of goods and services essential to enable, sustain or enhance societal living conditions. For the purposes of this Policy, infrastructure refers to the physical structures in the built environment, including those related to water, wastewater, transport (including road, rail, ports, airports etc), sport and culture, power, telecommunications, police and justice, health, education, family and community services, and other NSW Government owned and managed infrastructure assets.	Infrastructure NSW
Infrastructure Digitalisation	The use of digital practices, processes, technologies, and the associated data to optimise the planning, design, construction, operation, and disposal of infrastructure. This can include the use of digital tools such as building information modelling (BIM), digital twins, geographic information systems (GIS), artificial intelligence (AI), internet of things (IoT), and other smart technologies.	Infrastructure NSW
ISO 19650	ISO 19650 – Organisation and digitisation of information about buildings and civil engineering works, including building information modelling (BIM). The international standard for collaborative management of information over the whole lifecycle of a built asset using BIM.	International Organization for Standardization
Metadata	Metadata is 'data about data'. It provides context, meaning, and structure for other data, making it easier to understand, use, and manage. It can be classified into different types of metadata, e.g. business, technical or operational metadata.	Data Management Association (DAMA)
NSW Infrastructure Digitalisation and Data Policy (the Policy)	Refers to this document. The NSW Infrastructure Digitalisation and Data Policy outlines the requirements for NSW Government agencies to apply infrastructure digitalisation and data management practices throughout the built infrastructure lifecycle.	Infrastructure NSW
Organisational Information Requirements (OIR)	Data and information requirements to achieve the organisation's high level strategic objectives.	ISO 19650-1:2018
Operational Technology	Operational technology is hardware and software that detects or causes a change, through the direct monitoring and/or control of industrial equipment, assets, processes and events.	NSW Government – Digital NSW
Project Information Requirements (PIR)	Information requirements in relation to the delivery of an asset.	ISO 19650-1:2018
RASCI	RASCI stands for Responsible, Accountable, Supportive, Consulted, and Informed. It's a framework that assigns specific roles and responsibilities to stakeholders involved in a project or process.	ISO 27001

Executive summary

The NSW Government has allocated more than $118 billion for infrastructure investments over the forward estimates to 2027-28.[1] Fiscal pressures, stagnant construction productivity, and a lack of digital maturity and data integration across the sector are hindering the efficient delivery of the NSW infrastructure program. These challenges also impact the NSW Government's ability to optimise the value of assets today and in the future.

To address these challenges, the NSW Infrastructure Digitalisation and Data Policy (the Policy) aims to expedite the adoption of digital practices and technologies. This will enhance productivity, improve infrastructure outcomes, reduce waste, optimise resources, and promote safety, sustainability, and resilience.

Infrastructure digitalisation refers to the use of digital practices, processes, technologies and the associated data to optimise the planning, design, construction, maintenance and operation, and disposal of infrastructure. It involves the integration and application of advanced digital technologies across all infrastructure assets.

The Policy promotes the application of advanced technologies such as modular construction, robotics, building information modelling, digital engineering, digital twins, artificial intelligence, Internet of Things, 3D printing, and augmented and virtual reality (AR/VR). It also emphasises the importance of ensuring that infrastructure data is both secure and interoperable.

The Policy requires agencies to commit to, prioritise, manage, and invest in digitally enabled practices and technologies to realise productivity gains. It also aims to unlock the value of information sharing across the sector.

To demonstrate adoption of the Policy and application of its principles, agencies are required to complete 13 mandatory actions.

The Policy includes an initial 18-month transition period allowing agencies to assess their baseline digitalisation maturity levels, define future goals and targets, and develop their 5-year Strategy and Implementation Plan to meet those targets. This initial transition period allows agencies to determine their priorities and transition pace, based on their operating context and internal assessment of return on investment. Following the Policy release, any new additional resources sought by agencies to achieve their 5-year Strategy and Implementation Plan will be subject to the annual Budget process.

Infrastructure NSW will develop and manage a fit-for-purpose policy evaluation, monitoring and assurance process to drive the successful implementation of the Policy across the sector. Resources and support for agency Policy implementation will also be provided.

Achieving the Policy's objectives will require sustained commitment, leadership and collaboration within and across agencies. Effective change management and capability building is fundamental to achieving lasting change. Infrastructure NSW will support agencies in building capability by notably developing dedicated guides, delivering training, and coordinating a cross-sector community of practice.

Summary of principles and mandatory actions

The Policy principles are the foundational values and behaviours that agencies are to adopt and apply across all aspects of their activities.

The **mandatory Actions** stipulated in this Policy are the outputs or artefacts that agencies must produce to demonstrate compliance with the Policy. Each action is underpinned by **minimum Requirements**, which stipulate what each action must achieve, in terms of outcome, and how it should be carried out.

Together, the policy Actions and Requirements represent the mandatory obligations that agencies must demonstrate to comply with the Policy. Part 3: Actions and Requirements of this document provides detailed information on each policy action and its associated minimum requirements.

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1   NSW Government, 2024-25 Budget Paper No.03 Infrastructure Statement, 2024

Figure 1: Policy principles and mandatory actions

Principle 1

Commit to digitalisation to improve infrastructure delivery and asset management outcomes

Action 1.1 Agencies shall establish and maintain an Infrastructure Digitalisation and Data (IDD) Governance Structure.

Action 1.2 Agencies shall establish and maintain an Agency IDD Policy.

Action 1.3 Agencies shall establish and maintain an IDD Strategy and Implementation Plan which identifies clear strategic objectives, outcomes, 5-year maturity targets, and planned initiatives to achieve them.

Action 1.4 Agencies shall conduct IDD Maturity Assessments to inform their IDD Strategy and Implementation Plan.

Principle 2

Prioritise the adoption, application, and enablement of digital practices, processes, and technology

Action 2.1 Agencies shall develop, document, and maintain data and information requirements to enable infrastructure digitalisation outcomes.

Action 2.2 Agencies shall establish an Infrastructure Common Data Model to inform the development and operation of an Agency Common Data Environment (CDM).

Action 2.3 Agencies shall establish data standards to ensure a unified approach to information and data management across the infrastructure asset lifecycle and for all relevant disciplines.

Principle 3

Manage technology and data as an asset throughout the infrastructure lifecycle

Action 3.1 Agencies shall establish and maintain a Common Data Environment (CDE).

Action 3.2 Agencies shall develop and implement an IDD Technology Plan to support their IDD Strategy and Implementation Plan.

Action 3.3 Agencies shall reflect their information requirements and data standards in procurement processes and contracts to enable data sharing and information reliance.

Action 3.4 Agencies shall document and formally agree an IDD Operating Framework that outlines the organisation's approach to day-to-day activities, processes and decisions from an operational perspective.

Principle 4

Invest in capability to advance infrastructure digitalisation

Action 4.1 Agencies shall identify critical roles and responsibilities to execute the IDD Strategy and Implementation Plan, and ensure these roles are filled.

Action 4.2 Agencies shall develop and execute an IDD Capability Uplift Plan to acquire, grow and retain the required skills and drive lasting change.

Part

1

Part 1 | Policy overview

1.1 Purpose

The purpose of the NSW Infrastructure Digitalisation and Data Policy (the Policy) is to expedite adoption and use of digital practices, systems and technologies across all aspects of public infrastructure that is planned, delivered, managed and operated by the NSW Government.

Infrastructure digitalisation, including the use of technologies and effective information management, is essential for enhancing productivity, sustainability, social outcomes, and government services.

The Policy will ensure that NSW Government agencies consistently apply infrastructure digitalisation practices that align with international standards, and integrate them with existing agency policies, practices and systems.

The Policy has been designed to ensure agencies embed infrastructure digitalisation and data management practices in a manner that supports effective and efficient management of NSW Government built infrastructure assets.

Among other objectives, the Policy will support more standardised designs, promote design for Modern Methods of Construction (MMC), improve cost estimates and realise procurement efficiencies of scale. It will also de-risk the project delivery phase, support carbon impact analysis, optimise asset handover processes and subsequent maintenance and operations support contracts, and enhance service levels and citizen outcomes.
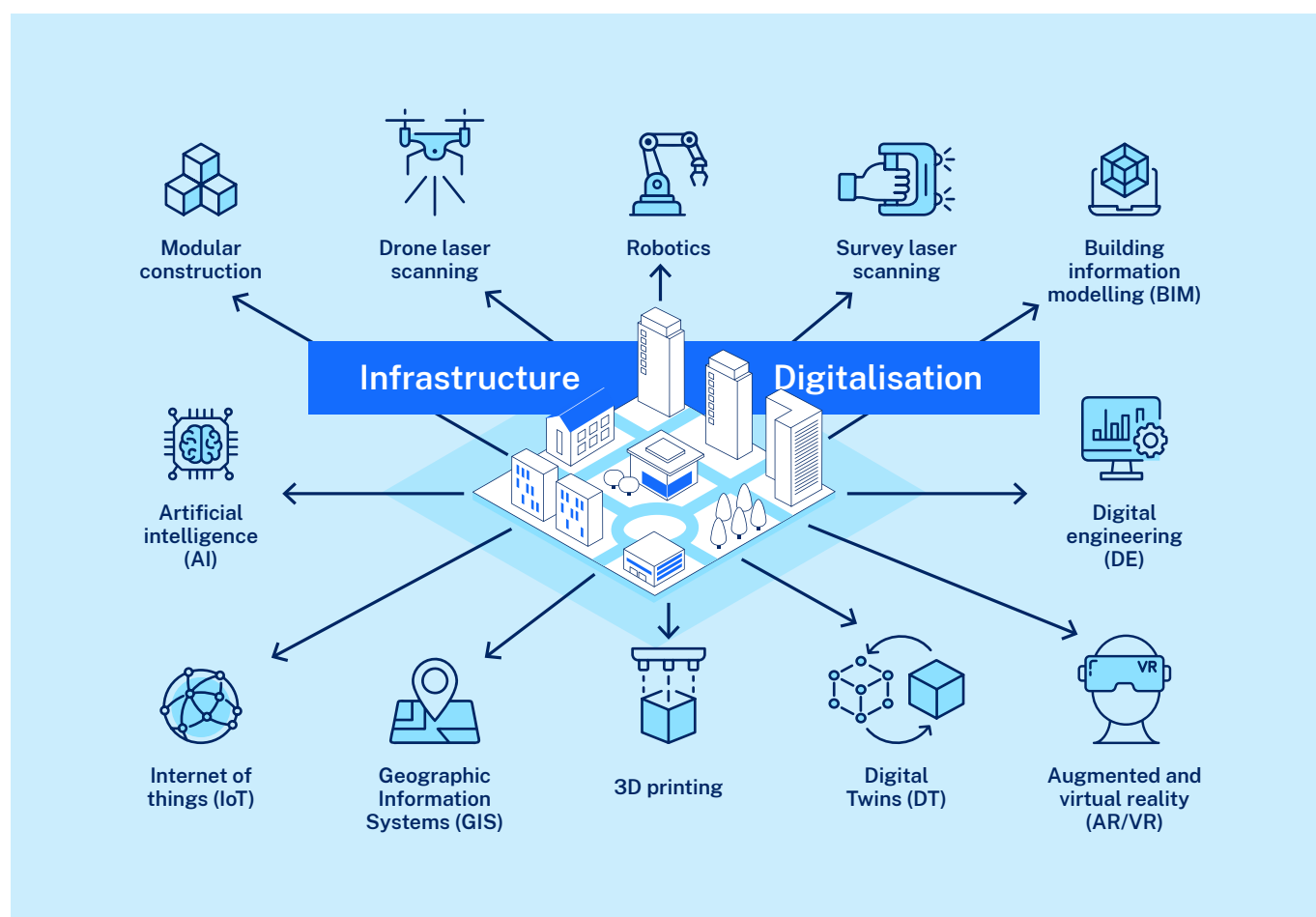
1.2 Context

Infrastructure digitalisation refers to the use and integration of digital practices, processes, technologies and the associated data to optimise the planning, design, construction, maintenance and operation, and disposal of infrastructure.

These digital practices and technologies include, for example, modular construction, robotics, building information modelling (BIM), digital engineering (DE), digital twins (DT), artificial intelligence (AI), Internet of Things (IoT), 3D printing, and augmented and virtual reality (AR/VR), Geographic information systems (GIS), amongst others. Their application enables improved process efficiency, optimised material and resource usage, and enhanced decision-making in the delivery and management of public infrastructure.

Effective management of data is a key component of digitalisation, involving the systematic collection, storage, processing, sharing, and governance of data generated throughout the infrastructure asset lifecycle. Effective data management ensures that information is reliable, structured, accessible, and secure while maintaining interoperability and compliance with organisational requirements. Compliance with government cyber security policies is a key requirement of the Policy.

Together, infrastructure digitalisation and robust data management practices provide benefits such as cost reduction, enhanced operational efficiency, improved risk management, and more reliable and resilient infrastructure systems.

Challenges and opportunities

The NSW Government committed an additional $118.3 billion for capital investment over 4 years to 2027-28[2]. Investment in critical infrastructure will support the state's expected population growth, deliver essential government services, drive economic opportunities, and deliver against government social and environmental objectives.

However, there are challenges ahead which require the NSW Government to adopt a different approach to how public infrastructure is planned, delivered, managed and operated.

Challenges in the infrastructure sector

1. **Fiscal pressures:** The NSW infrastructure pipeline faces delivery capacity issues and fiscal sustainability challenges. Rising infrastructure delivery costs, increased maintenance demands on an asset base now worth more than $500 billion,[3] and declining recurrent maintenance expenditure[4] highlight the need for more efficient infrastructure delivery and management. Importantly, the construction sector is grappling with rising supply and labour costs and constrained public budgets.

2. **Stagnant construction sector productivity:** The construction sector, contributing approximately 20% of Australia's GDP,[5] has seen a 17.6% drop in productivity since 2014, contrasting with a 4.3% rise in the broader market.[6] Issues such as structural labour shortages, rising material costs, and reliance on traditional construction methods exacerbate these challenges. Additionally, the sector's dependence on outdated data management practices leads to inefficiencies and reduced productivity across the asset lifecycle.

2   NSW Government, 2024-25 Budget Paper No.03 Infrastructure Statement, 2024
3   NSW Government, 2024-25 Budget Paper No.03 Infrastructure Statement, 2024
4   Infrastructure NSW, op. cit.
5   Infrastructure Australia, Infrastructure Market Capacity Report, 2021
6   Oxford Economics, The Opportunity Cost of Long-Term Poor Productivity Performance In The Australian Construction Industry, 2023

Opportunities from digital and technology

1. **Adoption of advanced technologies:**
   Digitalisation opens the door for greater adoption of productivity-enhancing tools, processes and technologies such as modern methods of construction (MMC), prefabrication and modular construction, automation, robotics, IoT, augmented and virtual reality, building information modelling (BIM), and digital twins. These technologies can increase productivity, efficiency, flexibility, and safety of physical infrastructure and networks, ultimately leading to more cost-efficient and effective infrastructure investments. The role of digital technology on infrastructure productivity highlights significant benefits to the economy.[7]

2. **Mature infrastructure data management:**
   Mature data management practices can optimise asset data use, enhance infrastructure planning, coordination, design, procurement and delivery, and support decision-making for broader considerations. High-quality, data-driven insights enable improved efficiency and better long-term outcomes for the NSW Government's existing and future investments. Strong data capabilities are essential for accurately measuring embodied carbon and reporting carbon costs, both critical for achieving NSW's decarbonisation goals.

1.3 Scope and application

This Policy applies to all NSW Government agencies that **meet the following 2 criteria:**

1. Budget Material agencies (as listed in NSW Budget Paper No.1), except for state-owned corporations, public financial corporations and public non-financial corporations.

2. Agencies that lead or are involved in the planning, design, construction, operation and maintenance of government-owned built infrastructure. This includes activities associated with technology and data management related to the built infrastructure.[8]

1.4 Related policies and international standards

This Policy sits alongside other NSW Government policies that aim to embed robust agency practices in project delivery, asset management, effective data management, and cyber security.

In meeting compliance with this Policy, agencies should also have regard to existing NSW Government policies. This includes NSW Government policies, strategies and frameworks regarding, but not limited to:

- asset management
- surveying and geospatial information management
- cyber security and data security
- artificial intelligence
- information and data management
- internet of things
- smart places and smart infrastructure
- procurement and contracting
- capital and recurrent expenditure, and costing
- Gateway Review and Investor Assurance
- sustainability and climate change.

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7   For example, the use of BIM to develop public housing dwellings was estimated to save 6.92% of project costs, based on the reduction on cost overruns amounting to $76.5 million saved per annum – Infrastructure Victoria, Digital technology and infrastructure productivity, 2024

8   This includes, roads, bridges, hospitals, schools, railways and metros, justice infrastructure, TAFE and other NSW Government owned built infrastructure assets.

Relationship with relevant international standards

The Policy seeks to align agency practices with internationally recognised standards, practices and frameworks. This includes ISO 19650 – Organisation and digitisation of information about buildings and civil engineering works, including building information modelling (BIM).

ISO 19650 sets out recommended concepts and principles for an organisation's processes across the built environment sector in support of the management and production of information throughout the asset lifecycle. The series provides specific guidance for both the delivery and operational phase of the asset lifecycle, while outlining best practices to ensure effective information exchange, and data and cyber security between relevant parties.

Agencies should consider aligning their practices with the principles of ISO 19650.

1.5 Implementation timeframe

Initial transition period

The Policy allows for an **initial 18-month transition period** between its release date and effective date. During this period, agencies are expected to complete all actions under **Principle 1** as a minimum, including:

1. **Action 1.1** Agencies shall establish and maintain an Infrastructure Digitalisation and Data (IDD) Governance Structure.

2. **Action 1.2** Agencies shall establish and maintain an Agency IDD Policy.

3. **Action 1.3** Agencies shall establish and maintain an IDD Strategy, which identifies clear strategic objectives and outcomes, 5-year maturity targets, and an Implementation Plan.

4. **Action 1.4** Agencies shall conduct IDD Maturity Assessments to inform the IDD Strategy and Implementation Plan.

The initial transition period allows time for agencies to determine their own priorities and pace to digitalising their portfolio infrastructure programs and assets over a 5-year horizon.

During the transition period, Infrastructure NSW will establish an exemptions process for agencies who have small annual capital expenditure and/or a small asset base.

Ongoing Policy implementation and integration into existing agency frameworks

To minimise administrative impact in implementing this Policy, agencies are encouraged to leverage existing processes, such as those found in project management and asset management, rather than creating new, separate processes.

Policy implementation should be scalable and tailored to the specific operating context and needs of each agency. This includes various factors such as the agency's size, the volume and complexity of its capital projects, its technological, digital and data maturity, and the desired target maturity level based on return-on-investment (ROI) analysis.

Achieving the Policy's objectives requires effective change management, capability building, and sustained commitment, leadership, and collaboration across the following **7 key enablers of infrastructure digitalisation:**

- Governance and frameworks
- Information requirements
- Data standards
- Common data environment
- Technology
- Procurement and contracting
- Capability.

The mandatory actions and requirements detailed in *Part 3* of this Policy are aligned with the key enablers above. Infrastructure NSW is committed to supporting agencies in their efforts to elevate their maturity levels across these crucial dimensions. Change management support will be provided through the release of comprehensive guidelines that highlight best practice aligned with the enablers and Policy requirements. Infrastructure NSW will initiate capability uplift and change management initiatives aimed at fostering continuous improvement within agencies across these key enablers.

Following Policy release, any new additional resources sought by agencies to achieve their 5-year Strategy and Implementation Plan will be subject to the annual Budget process.

1.6 Monitoring, reporting and assurance

Infrastructure NSW will develop and manage a fit-for-purpose policy evaluation, monitoring and assurance process to drive the successful implementation of the Policy.

Agencies will be required to submit annual maturity-assessments, specific to the requirements of the Policy and focusing on outcomes and benefits realisation, including productivity gains and level of technological and digital adoption.

Agencies will be required to set internal maturity targets projecting 5 years, to meet the intent of the Policy. Targets and previous year performance against these will be independently reviewed by Infrastructure NSW. Infrastructure NSW will advise Cabinet on agency performance on an annual basis for endorsement. Cabinet may elect to increase expectations placed on agencies.

Policy guides

The **Infrastructure Digitalisation and Data Policy – Overview and Foundational Concepts Guide** has been prepared as part of the initial release of the Policy. This first Guide provides a high-level overview of infrastructure digitalisation, the Policy context, and describes the foundational concepts that are key to understanding the technical elements of the Policy. It serves as an entry point to the specialised, detailed guides that will be produced by Infrastructure NSW.

Other guides and resources will be made available to assist agencies with Policy implementation. These resources will offer recommended approaches, describe best practices, and provide insights to help agencies align their digitalisation and data management practices with the expectations of the Policy.

The associated resources should be read in conjunction with the Policy. This will ensure agencies work towards meeting the mandatory requirements of the Policy while tailoring their approaches to improve efficiency and data quality, while implementing fit-for-purpose solutions within their specific contexts.

Part

2

Part 2 | Principles

2.1 Infrastructure digitalisation and data management principles

This Policy is framed around 4 principles which are the foundational values and behaviours agencies are expected to adopt and apply across all aspects of the infrastructure lifecycle.

These principles apply to all infrastructure delivery and management activities within the scope of this Policy. The 4 principles and their intended outcomes are outlined below.

Figure 2: Policy principles and intended outcomes

Principle 1 Commit to digitalisation to improve infrastructure delivery and asset management outcomes	The primary goal of infrastructure digitalisation and data management is to enhance infrastructure delivery and asset management outcomes. Governance and frameworks are effective only if they direct the focus of infrastructure digitalisation and data management efforts towards achieving improved infrastructure delivery and asset management outcomes aligned to an agency's organisation and service.
Principle 2 Prioritise the adoption, application, and enablement of digital practices, processes, and technology	Data-driven digital practices, along with supporting technologies enhance infrastructure delivery and asset management outcomes. Data and digitalisation initiatives deliver tangible value throughout the infrastructure lifecycle by ensuring resources are allocated efficiently, stakeholders work collaboratively, and by fostering innovation. A strong focus on infrastructure data management aligned with international best practices is fundamental for enabling and embedding digital processes and technology throughout the infrastructure asset lifecycle.
Principle 3 Manage technology and data as an asset throughout the infrastructure lifecycle	Infrastructure technology and data are treated as valuable assets and managed with the appropriate level of rigour. Data governance is embedded into core agency functions, ensuring data quality, security (including cyber), and accessibility is effectively managed. This includes embedding data-related requirements in procurement tenders to ensure the agency's data-related objectives are maintained. Managing infrastructure technology and data as assets enhances transparency, accountability, and interoperability and collaboration both within and across agencies.
Principle 4 Invest in capability to advance infrastructure digitalisation	Investment is made to uplift skills, capability and resources to harness the full potential of infrastructure digitalisation opportunities. Training programs, recruitment strategies, and partnerships with industry and academia are used to upskill the workforce. Agencies increase their digital and data capabilities and can adapt to emerging technologies, ultimately enabling them to leverage the full benefits of infrastructure digitalisation and data management.

Part

3

Part 3 | Actions and requirements

To demonstrate compliance with the Policy and its principles, agencies are required to complete **13 mandatory Actions**. The mandatory actions are the outputs or artefacts that agencies must produce to demonstrate compliance with the Policy.

Each of these actions must address a set of associated **minimum Requirements**. These outline minimum expectations for how agencies should implement an action.

Principle 1: Commit to digitalisation to improve infrastructure delivery and asset management outcomes

Action 1.1 Agencies shall establish and maintain an Infrastructure Digitalisation and Data (IDD) Governance Structure

Requirement 1.1 The IDD Governance Structure shall oversee the development and implementation of the agency IDD Policy, Strategy and Implementation Plan. The governance structure shall include representatives from relevant functions of the organisation including those responsible for managing each phase of the infrastructure asset lifecycle.

Action 1.2 Agencies shall establish and maintain an IDD Policy

Requirement 1.2 The Agency IDD Policy shall articulate the agency's commitment to infrastructure digitalisation and data management principles, practices, and outcomes in line with the Policy.

Action 1.3 Agencies shall establish and maintain an IDD Strategy and Implementation Plan which identifies clear strategic objectives, outcomes, 5-year maturity targets and planned initiatives to achieve them

Requirement 1.3a The IDD Strategy and Implementation Plan shall outline the strategic direction, initiatives, and timeline for the agency to achieve the outcomes and mandatory actions outlined within the Policy over a 5-year time horizon.

Requirement 1.3b The IDD Strategy and Implementation Plan shall be endorsed by the agency executives, and its initiatives and activities approved via internal prioritisation processes.

Action 1.4 Agencies shall conduct IDD Maturity Assessments to inform the IDD Strategy and Implementation Plan

Requirement 1.4a Agencies shall use the IDD Maturity Assessment Tool (to be developed by Infrastructure NSW) to assess the current level of infrastructure digitalisation and data management maturity levels across the organisation.

Requirement 1.4b Agencies are to define a target maturity level in the Agency IDD Strategy, and develop their Implementation Plans accordingly to address the gap between the current and target maturity levels over the 5-year IDD Strategy time horizon.

Example of process or system outcomes

- The IDD Governance structure is representative of the entire organisation, enabling the integration of the functions of relevant key disciplines. This includes project management, asset management, procurement, ICT, strategy, planning, project delivery, engineering, construction, operation and maintenance through the whole asset lifecycle, and digital engineering.

- The IDD Maturity Assessment process serves as a critical gap analysis tool, providing insights to shape the IDD Strategy and Implementation Plan. The assessment results establish a baseline for infrastructure digitalisation maturity. Ongoing assessments track changes in maturity levels and an indicator of effectiveness of the agency's IDD Strategy and Implementation Plan.

- The IDD Strategy and Implementation Plan, authorised through the governance structure, provides direction and organisational objectives to achieve the desired maturity target.

Benefits

- Progressive implementation and ongoing operation of agency IDD practices are achieved as a result of having appropriate agency-level governance structures and a fit-for-purpose framework.

- An agency's assessment of infrastructure digitalisation and data management maturity enables identification and prioritisation of initiatives and actions. This results in effective and progressive adoption of appropriate practices, processes, and technologies for infrastructure digitalisation and data management.

Principle 2: Prioritise the adoption, application, and enablement of digital practices, processes, and technology

Action 2.1 Agencies shall develop, document, and maintain data and information requirements to enable infrastructure digitalisation outcomes

Requirement 2.1 Data and information requirements shall be established and documented in accordance with ISO 19650. These information requirements are to be clearly communicated to relevant parties and reflected in procurement to ensure there is clear understanding of information requirements and deliverables at different stages of the infrastructure lifecycle.

Example of process or system outcomes

- Information requirements, including agency Organisational Information Requirements (OIR), Asset Information Requirements (AIR), Project Information Requirements (PIR) and Exchange Information Requirements (EIR) are documented, up to date, and available for use.
- Information requirements are disseminated at the earliest feasible stage of the infrastructure lifecycle.
- EIRs are used for engagement of project delivery partners and during operations and maintenance phase.

Benefits

- As a result of having well-defined information requirements, relevant data is collected with greater accuracy and reliability for all stakeholders across the infrastructure asset lifecycle.
- Projects can better leverage effective collaboration across various infrastructure disciplines and adopt technologies and tools more efficiently to enhance data interoperability.

Action 2.2 Agencies shall establish an Infrastructure Common Data Model to inform the development and operation of an Agency Common Data Environment

Requirement 2.2 The Common Data Model (CDM) shall support the establishment of a Common Data Environment (CDE), which enables the creation of infrastructure data and flow of information, enabling sharing across the asset lifecycle.

This includes establishing and maintaining interconnected technology platforms and environments to support different phases of the infrastructure lifecycle, supporting the management of the agreed single source of information for all infrastructure assets and associated activities under the agency's remit.

Example of process or system outcomes

- Agreed agency Infrastructure Common Data Model (CDM) are aligned with the agency's Enterprise Data Model (EDM).
- Projects and maintainers adopt the agency Infrastructure CDM across the infrastructure lifecycle.
- Agreed CDE uses infrastructure CDM for infrastructure data and information management.

Benefits

- An agency-wide CDE leads to improved communication, greater reuse and sharing of infrastructure data and information across all project and asset management participants, enabling agencies to realise broader value from pursuing robust data and information management practices.
- Delivery, operation and performance of infrastructure assets becomes more efficient and effective.

Action 2.3 Agencies shall establish Data Standards to ensure a unified approach to information and data management across the infrastructure asset lifecycle and for all relevant disciplines

Requirement 2.3a Data standards shall be based on an appropriate classification system for master data, reference data and metadata to ensure a unified approach to infrastructure data management across the infrastructure lifecycle.

Requirement 2.3b Agencies shall, as a matter of principle, adopt and use international best practice open data formats when developing their internal data standards. This applies to internal data standards relating to cost, schedule, survey, sustainability, geospatial, geotechnical, design, construction, and maintenance management. Data standards shall specify classification requirements, including for assets and locations, geospatial coordinates, naming conventions, file formats, and other relevant items.

Requirement 2.3c Agencies are to ensure appropriate data security and cyber security measures are undertaken to safeguard infrastructure data across all phases of the infrastructure lifecycle. These measures must align with data and cyber security requirements outlined in relevant legislation, policy, standards and guidelines.

Example of process or system outcomes

- Asset management and infrastructure projects adopt agency-wide data standards, including semantics, naming conventions, formats, classifications and any other relevant items.

- Infrastructure data standards are available and adopted for all key disciplines (indirect and direct cost related) across the infrastructure lifecycle.

Benefits

- Agency infrastructure data is collected, stored, accessed, and secured in accordance with NSW Government expectations and requirements, enabled and supported by data standards established through effective governance. Agencies are equipped to effectively and securely create, federate, verify, analyse, and reuse infrastructure data across the infrastructure lifecycle and enable it to be shared for whole-of-government use.

Artist impression of Blackwattle Bay

Principle 3: Manage technology and data as an asset throughout the infrastructure lifecycle

Action 3.1 Agencies shall establish and maintain a Common Data Environment (CDE)

<u>Requirement 3.1</u> The CDE and data workflows shall be consistent with ISO 19650 requirements and shall be used for managing infrastructure data and information of the agency's infrastructure portfolio. The CDE shall be informed by the agency's Common Data Model. The agency may either adopt a single platform or a combination of local and cloud-based applications, with the ability to seamlessly collaborate, and share data and information between these applications. The agency CDE shall have the functionality to enable sharing of infrastructure data and information with internal and external stakeholders, including external delivery partners and other government agencies, where appropriate.

Example of process or system outcomes

- An agreed agency CDE for infrastructure data is available and used to support data and information across the infrastructure lifecycle.

Benefits

- All infrastructure stakeholders access the right information at the right time as facilitated by a CDE with supporting workflows.
- Timely and reliable data sharing results in improved value creation and capture.

Action 3.2 Agencies shall develop and implement an IDD Technology Plan to support the IDD Strategy and Implementation Plan

<u>Requirement 3.2a</u> The IDD Technology Plan shall identify technologies, tools and platforms to be used to support the agency IDD Strategy and Implementation Plan and the digital delivery of infrastructure assets and support ongoing operations and maintenance. These digital technologies, tools and platforms include AI, machine learning, MMC, and augmented and virtual reality (AR/VR), automation, robotics, and more.

<u>Requirement 3.2b</u> Each solution within the IDD Technology Plan shall be appropriately assessed for cost, benefits, risks and impacts, including interoperability with the CDE, data and cyber security, and scalability. Technologies should be managed as an asset and integrated into agency asset management practices.

Example of process or system outcomes

- Technology solutions are considered holistically and integrated into an ecosystem of interconnected tools and platforms.
- An agreed IDD Technology Plan informs the procurement of technology solutions relevant for the phase(s) of the asset lifecycle.

Benefits

- Agencies and project teams can improve productivity, make better decisions, increase stakeholder engagement, enhance operational efficiency, and improve infrastructure delivery and management performance and safety by adopting digital technologies, tools and platforms.

Action 3.3 Agencies shall reflect their information requirements and data standards in procurement processes and contracts to enable data sharing and information reliance

Requirement 3.3a Procurement processes shall be enabled by appropriate procurement frameworks, procedures, standards, and contracting templates that support the procurement of infrastructure data and information. These documents shall support procurement across all types of activities including planning, design, construction, operations and maintenance by addressing challenges such as data reliance.

Requirement 3.3b Procurement processes and resulting contracts across the infrastructure lifecycle shall promote collaborative working arrangements, shared understanding of infrastructure data standards and governance, effective management of a CDE, and the adoption of suitable enabling technologies.

Requirement 3.3c Tender evaluation criteria for infrastructure contracts shall adequately reflect the agency's data and information requirements.

Requirement 3.3d Information requirements shall be provided to key stakeholders such as suppliers or delivery partners when they develop infrastructure data and information for the agency.

Example of process or system outcomes

- Agreed EIRs are used in infrastructure contracts.
- Agency infrastructure tender evaluation criteria reflect digital delivery approaches, and infrastructure data and information deliverables.
- Agency EIR adopted for infrastructure data and information development and delivery.

Benefits

- Infrastructure data and information deliverables procured through contracts are appropriate, represent the best value for money, and support current and future stages of the infrastructure lifecycle.
- By making infrastructure data and information requirements clear to external suppliers, industry is better able to respond to tendered requirements and agencies can more accurately assess value for money.
- Agency's project and asset information needs are clearly captured and communicated via infrastructure contracts with industry partners, increasing transparency and reducing risks.

Action 3.4 Agencies shall document and formally agree an IDD Operating Framework that outlines the organisation's approach to day-to-day activities, processes and decisions from an operational perspective

Requirement 3.4a The IDD Operating Framework shall outline and document the day-to-day activities, processes, decisions and requirements from an operational perspective to realise the agency's IDD Strategy and Implementation Plan.

Requirement 3.4b The IDD Operating Framework shall have regard to existing policies, processes and functions of the organisation and integrate infrastructure digitalisation and data management practices where possible.

Example of process or system outcomes

- The IDD Operating Framework is well defined, consensus driven, and applicable to the entire organisation, ensuring integration across disciplines and all phases of the infrastructure lifecycle.

Benefits

- The IDD Operating Framework provides clarity and consistency across all parties involved throughout the infrastructure lifecycle.

Principle 4: Invest in capability to advance infrastructure digitalisation

Action 4.1 Agencies shall identify critical roles and responsibilities to execute the IDD Strategy and Implementation Plan, and ensure these roles are filled

<u>Requirement 4.1</u> Role descriptions for existing and new positions critical to supporting an agency's IDD Strategy and Implementation Plan shall be defined and maintained.

Action 4.2 Agencies shall develop and execute an IDD Capability Uplift Plan

<u>Requirement 4.2a</u> The IDD Capability Uplift Plan shall identify, agree, and commit to opportunities to improve the skills and capabilities of the workforce in line with the agency's IDD Policy and Strategy. Consideration should be given to new and existing internal skills and capabilities as well as options to leverage the expertise and resources across industry.

<u>Requirement 4.2b</u> The IDD Capability Uplift Plan shall establish internal training or an awareness program to promote cross-functional alignment and understanding of the Agency's IDD Policy and Strategy. This program shall clearly define the roles and responsibilities of various functional areas to foster effective collaboration to support infrastructure digitalisation and data management practices. Key functions to include are the executive team, asset management, project delivery, maintenance, engineering, project controls, strategy, procurement, commercial, ICT, Operational Technology (OT), safety and any other relevant team.

Example of process or system outcomes

- Alignment of workforce planning with IDD Strategy.
- Role and responsibility descriptions for positions critical to supporting an agency's IDD Strategy are maintained to align with the IDD Implementation Plan.
- RASCI matrix for roles and responsibilities in agency standards and procedures to be updated to reflect new IDD accountabilities.
- Agencies' training and development plans are maintained to support an agency's IDD Strategy.
- Appropriate training matched to IDD Capability Uplift Plan is available for all relevant roles to support IDD outcomes.
- IDD training and awareness program(s) developed and delivered across the agency.

Benefits

- Advanced digital capabilities drive effective decision-making, better management of risks, improved efficiency, elevated service delivery and wider-scale dissemination of benefits resulting from digitalisation efforts.
- Cross-functional collaboration and clear roles and responsibilities in infrastructure data management and technology will enable more effective project delivery and asset management outcomes, and in turn realise greater value from public infrastructure investments.

Powerhouse Parramatta artist impression, designed by Moreau Kusunoki (Lead Designer) and Genton (Local Architect)