



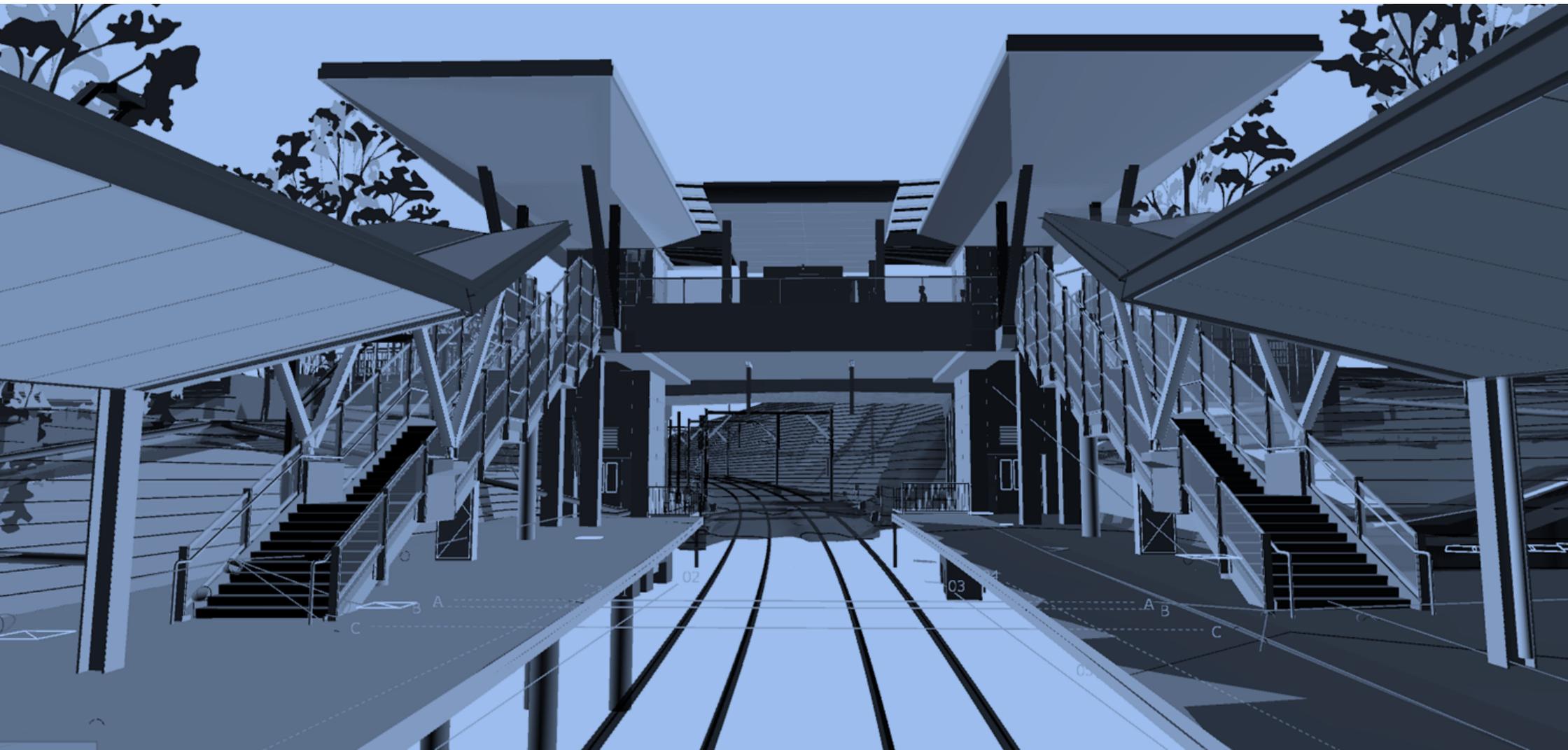
# DIGITAL ENGINEERING FRAMEWORK

Interim Approach

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Getting started

By 'building our assets twice' first virtually and then physically, DE has the power to provide valuable insights, create efficiencies and deliver cost savings to every decision we make, across the asset lifecycle.



# Digital Engineering

## What is it?

Digital Engineering (DE) connects emerging technologies with reliable structured data. It enables more collaborative and productive methods of project delivery and management of assets through the lifecycle compared to those traditionally used.

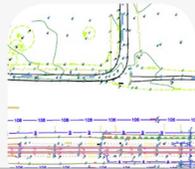
### Current state



3D 'BIM' Model  
BIM ID: BLD456



CAD Layers  
String Code: BLD\_ST



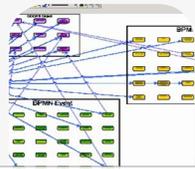
Survey Strings  
String: BLD\_CNR\_789



Time  
Activity ID: ST\_1000



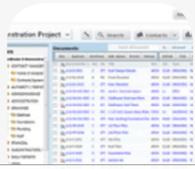
2D/3D GIS  
GIS layer ID: CV\_BLD



Systems Engineering  
SRS Code: BLD 1.2.3



Cost  
Cost Code: WP1.2.3

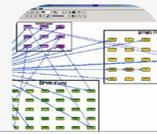


Document Mgmt  
Doc No: PLR-1000-CV-00002

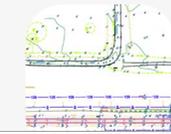


Asset Data Handover  
Asset ID: ABC123

### Future state



Systems Engineering  
DEF ID: BLD\_ST\_456



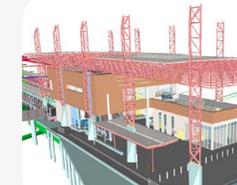
Survey Strings  
DEF ID: BLD\_ST\_456



CAD Layers  
DEF ID: BLD\_ST\_456



Asset Data Handover  
DEF ID: BLD\_ST\_456



3D 'BIM' Model  
DEF ID: BLD\_ST\_456



2D/3D GIS  
DEF ID: BLD\_ST\_456



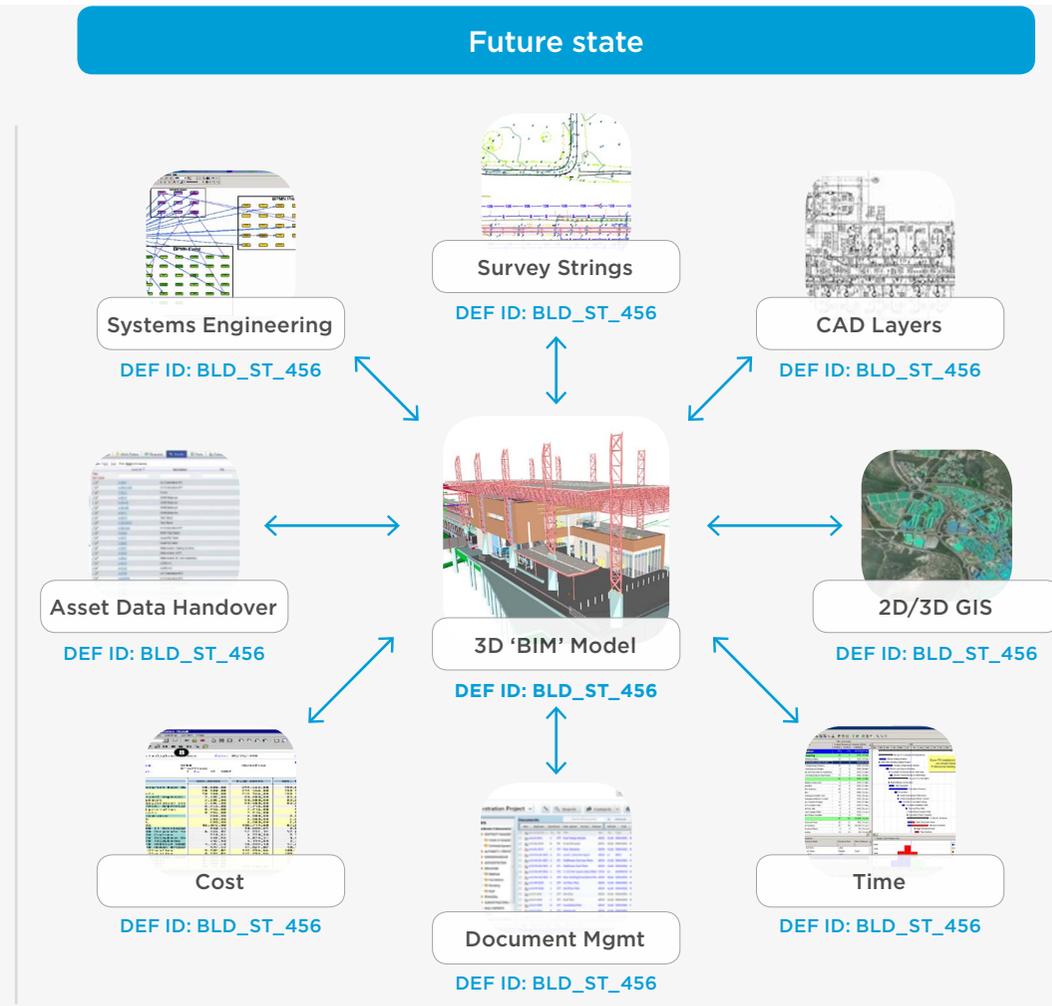
Cost  
DEF ID: BLD\_ST\_456



Document Mgmt  
DEF ID: BLD\_ST\_456



Time  
DEF ID: BLD\_ST\_456



# Who will benefit?

Everyone's experience with DE will be different, as we won't all need the same information. But the value of finding information more easily, gaining data-driven insights and making faster, more informed decisions will enhance the way we all work.

## DESIGN



Design Manager

- Improved quality
- Coordinated design
- Faster reviews/approvals



Cost Estimator

- Reliable benchmark data
- Automated quantities
- Improved estimates



Document Controller

- Improved documentation
- Less administration
- Smoother handover process

## CONSTRUCTION



Project Manager

- Faster delivery
- Reduced cost
- Reduced risk



Safety Manager

- Safety-in-design
- Safer work practices
- Improved site inductions



Scheduler

- Improved accuracy
- Rapid optioneering
- Optimised schedule

## COMMERCIAL



Commercial Manager

- Less variations
- Early warning of issues
- Traceability of decisions



Procurement Manager

- Less tender queries
- Improved tender submissions
- Faster tendering process

## OPERATIONS



Asset Manager

- Faster commissioning
- Better information
- Information mobility
- Optimised maintenance

To read more: [transport.nsw.gov.au/DigitalEngineering](https://transport.nsw.gov.au/DigitalEngineering)

**Jump ahead**  
**To get started >**

# Transport's commitment Managing data as an asset

**Transport will ensure data and information is managed as an asset.**

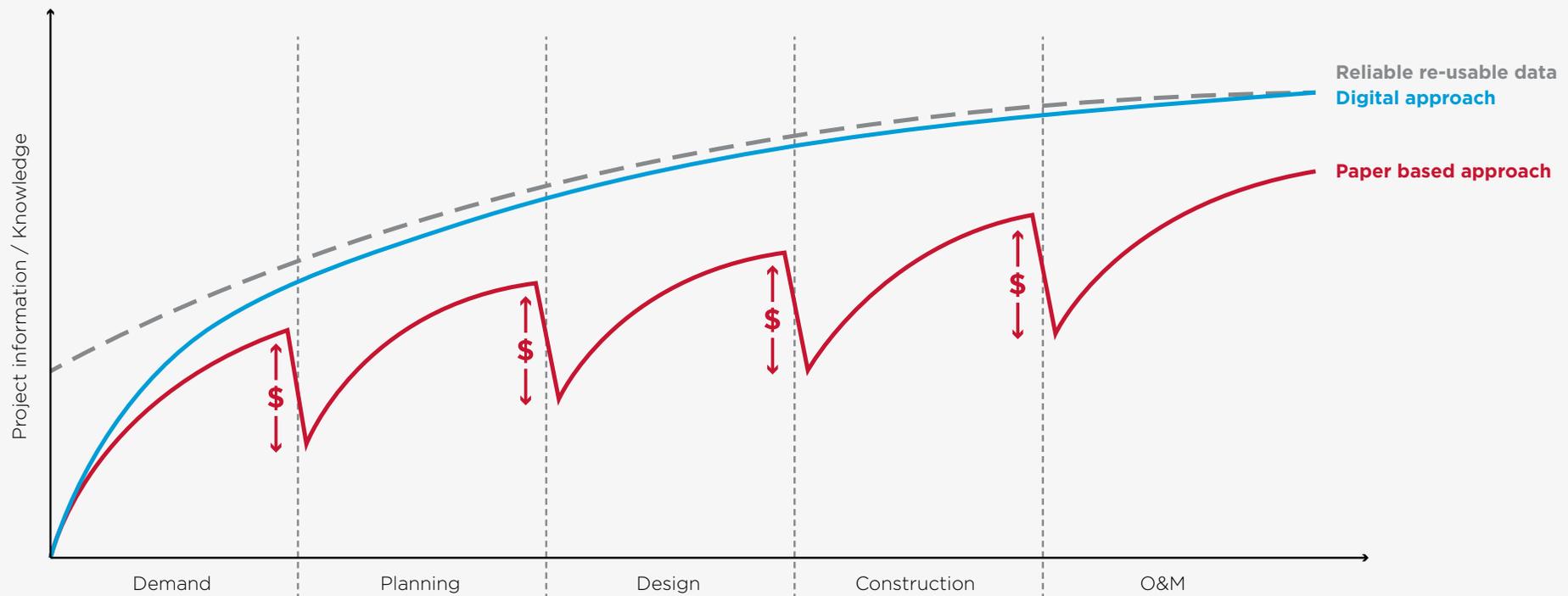
**This will enable better planning, delivery and management of a safe, sustainable and integrated transport system, by providing the right data and information, at the right time, to make more informed decisions.**

Transport is committed to empowering more informed, data-driven decisions, with the introduction of the Data and Information Asset Management Policy in 2017. Seven key principles for the management of data and information were included, to support this vision:

|                         |   |
|-------------------------|---|
| <b>Single Source</b>    | Ensuring service and asset data is accurate, current, reliable and not duplicated   |
| <b>Collaboration</b>    | Improving access and sharing, and reducing latency for improved decision making   |
| <b>Automation</b>       | Reducing or eliminating manual work associated with creating or sharing data  |
| <b>Interoperability</b> | Reducing or eliminating double handling of data between systems   |
| <b>Mobility</b>         | Enabling access to and input of data from multiple locations including the field  |
| <b>Visualisation</b>    | Incorporating methods to develop, coordinate and check service and asset data spatially                                   |
| <b>Data Governance</b>  | Comply with information management policies, including open data, data information custodianship and information security |

# Creating a digital asset

When data and information is managed effectively as a 'digital asset', this creates the ability for consistent and assured information to be re-used in all stages of project delivery, and allows for seamless handover into operations and maintenance. This will drive significant efficiencies by avoiding data-loss and minimising the need for information to be recreated and reassured at each lifecycle stage.



# The Digital Engineering Framework

To achieve the full benefits of DE, Transport has launched the Digital Engineering Framework. This will create a unified, reliable and reusable approach to DE, that will empower more data-driven decisions throughout our organisation.

The DE Framework will be delivered incrementally, through a number of key releases, commencing with the DE Framework Interim Approach. As the DE Framework continues to develop, so too will the capabilities of TfNSW to deliver DE and gain data driven insight across the organisation.

## RELEASE 1 (SEPT 18)



Contract & Template Docs



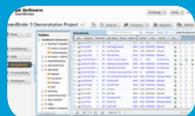
Asset Register



CAD Drawings



3D 'BIM' Model



Document Management

Business as usual

## RELEASE 2 (APR 19)



Digital Survey

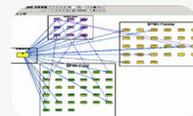


Scheduling



Project Data Building Blocks

## FUTURE RELEASES



Systems Engineering



Asset Handover



Environment & Sustainability



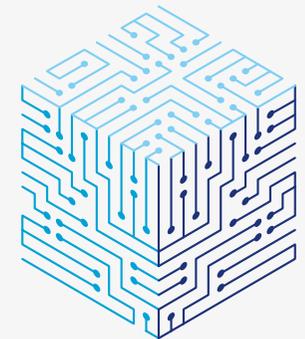
2D/3D GIS



Cost



Visualisation



API links

O&M integration

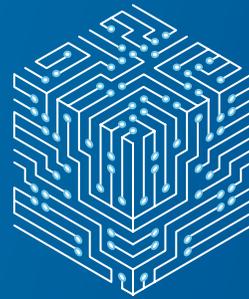
Cluster wide implementation

Smart Cities

# Five objectives

During the interim approach, the DE Framework focuses on five key objectives instigating a consistent approach to DE and allows projects to simply and rapidly adopt DE.

## Digital Engineering Framework Interim Approach



Digital Twin

Procurement

Ways of working

Technologies

Skills and resourcing

|                              | <b>DE Framework capabilities</b>                                   | <b>Benefits</b>   |
|------------------------------|--|---|
| <b>Digital Twin</b>          | Laser scanning and point clouds                                    | Better site investigation and design inputs                           |
|                              | Coding and tracking of sub-surface utilities                       | Improved modelling of underground conditions                          |
|                              | 3D modelling and design collaboration                              | Less design changes and construction variations                       |
|                              | Review design and construction methodology using 4D models         | Greater design insights and faster approvals                          |
|                              | Visualisation using AR & VR  | Improved stakeholder consultation                                     |
| <b>Procurement</b>           | Agreed commercial and legal framework for DE                       | More clarity on DE governance for projects                            |
|                              | Standardised approach with template documents                      | Faster, more consistent DE tender preparation                         |
|                              | Scalable, integrated procurement processes                         | Less complexity and improved tender responses                         |
|                              | Guidance and technical support for DE procurement                  | More informed DE tender assessment                                    |
|                              | Expertise to support project initiation                            | Smoother project start-up   |
| <b>Ways of working</b>       | DE Standard and technical guides                                   | Standardised work practices and deliverables                          |
|                              | Smarter searching capabilities                                     | Faster, more informed decisions                                       |
|                              | Deliverables specified in open data formats                        | Future-proofed data for re-use  |
|                              | High quality modelling and 3D visualisation                        | Greater insights for value engineering and improved customer outcomes |
|                              | Digital asset handover processes                                   | More efficient and effective transition to O&M                        |
| <b>Technologies</b>          | Data storage & exchange in common environment                      | Secure data access for multiple project parties                       |
|                              | IT platform pre-configured to enable DE processes                  | Faster, consistent set-up for new projects                            |
|                              | DE data accessible on mobile platform                              | Offsite access to drawings and project information                    |
|                              | Software for reviewing BIM models                                  | Faster, more informed approval  |
|                              | Bulk production drawings from 3D model                             | Less admin and more efficient data processing                         |
| <b>Skills and resourcing</b> | Consistent understanding of DE                                     | Practical knowledge of DE and the DEF                                 |
|                              | Role specific training for DEF elements                            | Improved internal capability for DE management                        |
|                              | New skills for procurement & project management                    | Improved tender assessment and project outcomes                       |
|                              | New skills and tools for design review and approval                | Improved assurance of project deliverables                            |
|                              | Pre-approved panel offering DE services and subject-matter experts | Access and rapid procurement of industry DE expertise                 |

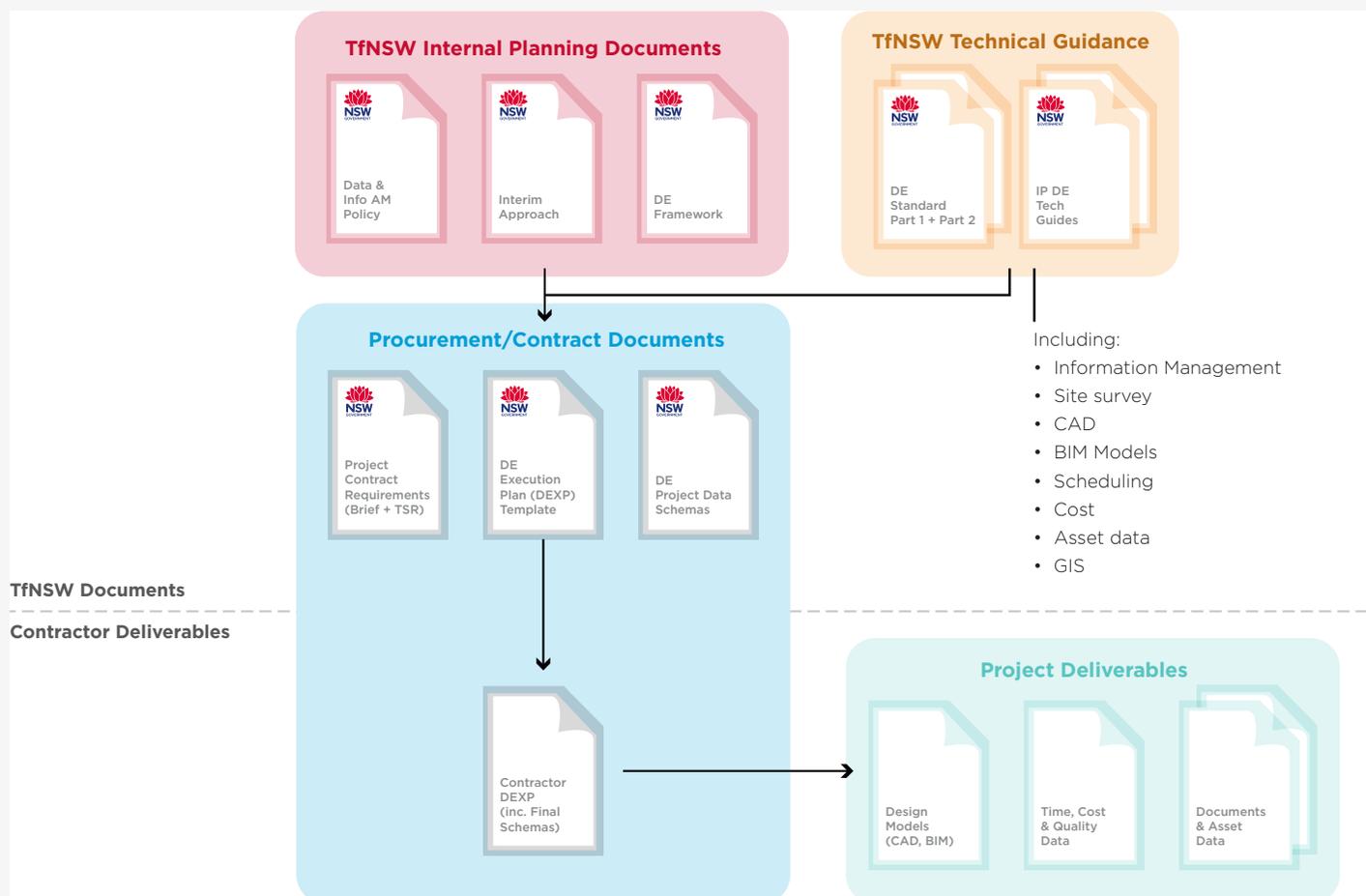
# Project support

Getting started with DE may seem overwhelming. The DE Framework aims to simplify this transition for TfNSW project stakeholders and maximise Return on Investment with the Interim Approach.

We have created a set of interim documents, that support everything from DE procurement, establishing a Common Data Environment, to completing 3D modelling:

- DE Standard  
Part 1: Principles and Concepts  
Part 2: Requirements
- TfNSW Planning Documents
- DE Technical Guides
- Procurement/Contract Documents
- Management Plan Documents

A key to realising immediate value from the DE Framework is ensuring that our supply chain has a clear understanding of the expected DE deliverables being procured on our projects. The DE and Procurements teams are working together to develop and release updated contract templates that enable project teams to include DE requirements.



# Ready to get started?



## Team training

Join a course

**A series of DE Framework training modules have been developed to upskill staff working on a project and enable them to effectively utilise the documents available.**

### Courses include:

**DE Framework Awareness** – introduction to DE, with high-level concepts and objectives

**DE Framework Fundamentals** – deeper understanding and practical demonstration of how to implement the DE Framework

**DE Framework Specialist** – delivering role specific know-how to DE implementation

Training can be delivered as an intensive course for the project, or team members can register to attend a pre-scheduled training course.



## Client-side support

Need help now?

To ensure fast and seamless integration and adoption of the DE Framework on your project, a carefully selected group of industry experts have been pre-qualified. DE Framework Panel members are now available to be engaged on any Transport cluster project.



### DE Manager

Offering client-side DE project management during both procurement and delivery phases, working closely with projects teams.



### Senior DE Manager

Advisory service for clients seeking to develop/implement DE strategies on bespoke projects/programs with complex contracting strategies and risk profiles that require customisation of the DE Framework interim approach documents.

**Contact us**