



Exchange Information Requirements (EIR)

Project Name

Version 1

Document Control

Version History

Version Number	Version Date	Summary of Changes	Author
1.0	XX/YY/ZZZZ	Initial publish for project use	

Reviewers' Name

Reviewer Name	Date	Signature	Position
	XX/YY/ZZZZ		

Signed off by Approvers

Approver Name	Date	Signature	Position
	XX/YY/ZZZZ		

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1. Introduction

The ability for organisations, made up of many stakeholders, to exchange information through structured means is a critical element of digital engineering. Standardised approaches to information management and, importantly, the exchange information requirements (EIR) aligned with asset lifecycle stages, ensure that information is developed to suit all parties, and can be leveraged for longer-term asset management.

The EIR articulates the level of information need aligned with key decision points throughout the project lifecycle.

1.1 PURPOSE

The purpose of the EIR is to explain the information that KiwiRail require to inform our decision making throughout the project lifecycle, in relation to a built asset.

The EIR is a distillation of both the objectives of the project management process, along with the asset management process. The EIR should answer the questions of:

- What information is needed at each of these project milestones to better inform decision making?
- Who is required to produce the information throughout the project lifecycle?
- When in the project is this information needed?
- What is the minimum level of information required to fulfil these objectives?
- What information, if any, is sensitive?
- What deviations, if any, are there from the DE Framework?

Multiple EIR may exist on a given project and should be tailored from appointment to appointment (this extends to any sub-appointments on the project). It should be noted that the collection of all EIR which exist within a project should result in the overarching Project Information Requirements (PIR).

The EIR is considered a component of the overall contract, focused on the digital delivery, and should be treated as such.

1.2 AUDIENCE & CONTEXT

The audience for this document is:

- Asset Owners, such as KiwiRail, and those representing or collaborating with KiwiRail;
- Project Delivery Professionals, such as engineers and constructors; and
- Facilities and Asset Management Professionals.

1.3 REFERENCES

Note this document should be read in conjunction with the other digital engineering procurement documents and relies heavily upon the DE Framework and DEIS:

- Digital Engineering Framework;
- Digital Engineering Information Standard (DEIS);
- Project Information Requirements; and
- Project Information Protocol.

Figure 1 below covers the DE document structure and the relationships between each of the documents, with **Error! Reference source not found.** outlining the content of each document.

Table 1: Digital Engineering Documentation

Document	Purpose
Enterprise	
Digital Engineering Framework	To outline KiwiRail's DE vision and overarching objectives. To provide guidance as to where specific detail can be found in other documentation.
Digital Engineering Information Standard – Part 1 (Management)	Outlines the process of how information is managed and consumed within the context of a project.
Digital Engineering Information Standard – Part 2 (Technical)	Outlines the details of how information should be produced by an author to meet KiwiRail's information requirements.
Asset Information Requirements	Outlines all the possible asset types, and their associated attribution requirements.
Project	
Project Information Protocol	Provides additional clauses which enable the scope of Digital Engineering to be amended to the contract.
Project Information Requirements (PIR)	<p>Includes general project information, including scope, stakeholders, and high-level delivery milestones.</p> <p>Outline the overarching project specific digital initiatives for implementation on the project.</p> <p>PIR explain the information needed to answer or inform high-level strategic objectives within the appointing party in relation to a particular built asset project. PIR are identified from both the project management process and the asset management process. (extract from ISO)</p>
Exchange Information Requirements (EIR)	<p>Breaks down the overarching project objectives in the Project Information Requirements into the requirements of each engagement within a project at a detailed level.</p> <p>Details the expectations of information delivery against the project milestones.</p> <p>EIR set out managerial, commercial, and technical aspects of producing project information. The managerial and commercial aspects should include the information standard and the production methods and procedures to be implemented by the delivery team. (extract from ISO)</p>
Information Delivery Plan (IDP)	Details the level of information need, required against asset data dictionary classifications, throughout the project lifecycle. Specifies the types of asset classifications expected throughout the scope of the project. Outlines an exhaustive list of digital artifacts required for project close out.
Guidance Notes	
Digital Design Management Guidance Note	Outlines how the DE tools & processes of KiwiRail's DE Framework can be embedded within the design phase of a capital project to support & enable design management fundamentals.
Revizto Guidance Note	How KiwiRail standardise the use of Revizto across the KiwiRail projects portfolio.
Tucana Guidance Note	Supplementary document which covers off the correct usage of the CDE, including details of the background processes for those wanting additional detail.
Subsurface Utilities Identification and Modelling Guidance Note	How to identify, model and transmit subsurface utility information to KiwiRail within a project.
Spatial Capture Framework	Outlines how spatial information is to be captured, created, referenced, and controlled.
Resources	
Construction Delivery Matrix (CDM)	Helps to facilitate a discussion between the designers and contractors around which piece of information can be used for pricing and construction setout.

Minimum Data Requirements	Helps to facilitate specifying the minimum asset data requirements for capture during the project's lifecycle, and who's responsibility it is to provide this information.
Asset Information Exchange Template	Helps to facilitate the Asset Information Exchange process between suppliers and DE team.
Scan Register	Scan register template to provide KiwiRail with details around the captured scan / survey data.

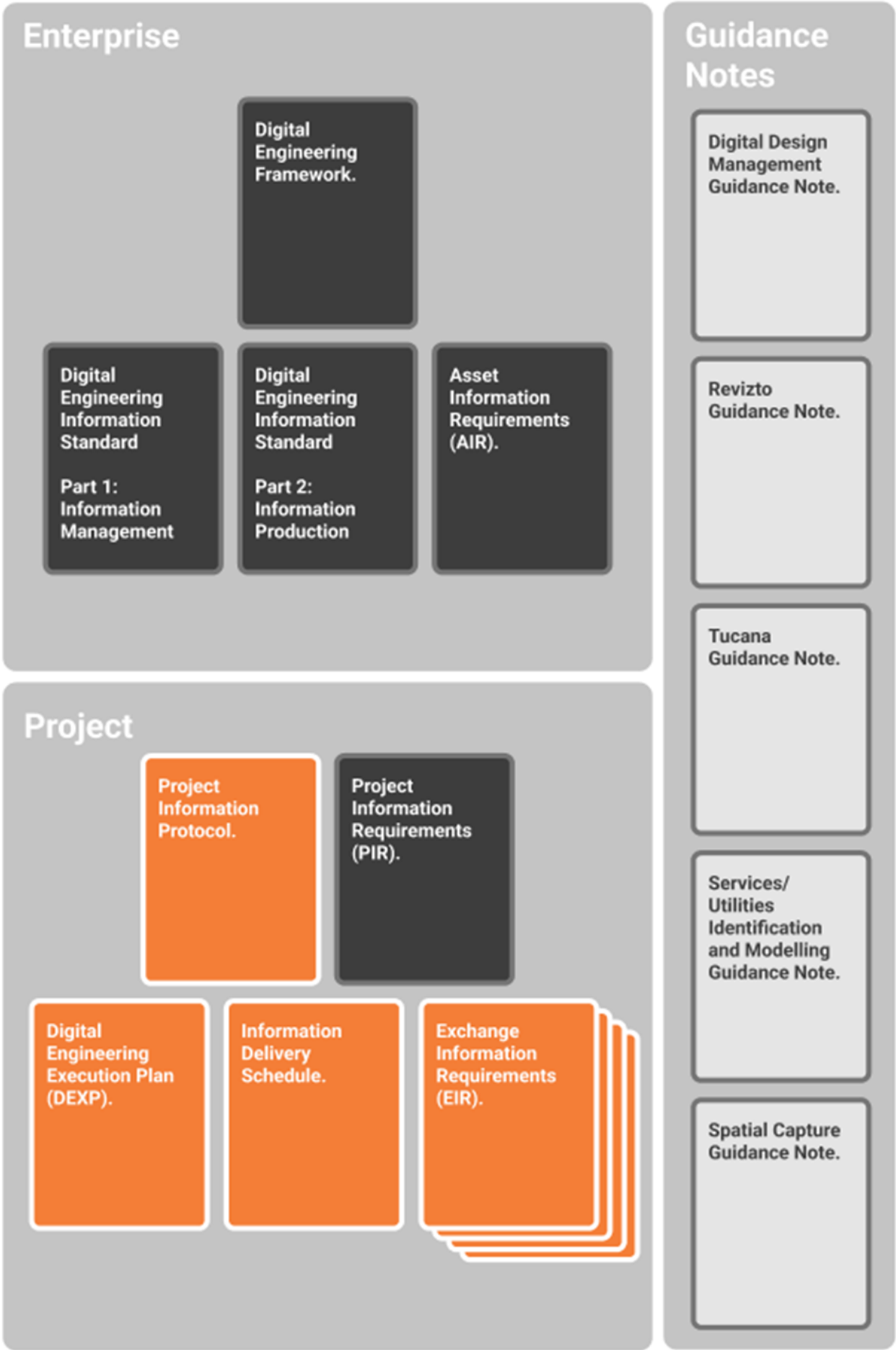


Figure 1: Digital Engineering Document Structure

2 Basis of Document

The EIR is comprised of five sections:

- Project Information;
- Information Management;
- Commercial;
- Technical; and
- Digital Engineering Execution Plan (DEXP).

2.1 TERMINOLOGY

This section articulates the 'language' of compliance. The following terms have defined meanings.

- must – describes a legal requirement;
- shall – describes mandatory requirements of the standard;
- should – describes non-mandatory, best practice recommendations; and
- may – describes possible options that are neither mandatory nor best practice.

2.2 REQUIREMENTS

Unless specified otherwise within the following EIR, the supplier shall ensure that all digital delivery within the scope of the engagement aligned with the requirements outlined within the DEIS.

2.3 TERMS AND DEFINITIONS

For any Digital Engineering Terms and Definitions, please refer to Appendix 2. Higher level concepts are outlined in the DE Framework.

3 Project Information

General project information, across the whole lifecycle of the project, is articulated within the Project Information Requirements (PIR), which may be found as part of the issued document suite. The Project Information Requirements cover:

- Project Scope
- Identified Project Stakeholders and their contact information, including KiwiRail, its partners and the suppliers, both designers and constructors.
- Specific initiatives regarding the use of Digital Engineering within the scope of the project.
- The proposed procurement route and associated overarching delivery milestones.
- High level coverage of the information requirements aligned to the delivery milestones.

As such, it is recommended that the PIR are read prior to the EIR, so that the overall project objectives can be understood before consuming the detail-oriented information conveyed within the EIR.

4 Information Management

This section deals with the management aspects of the project’s digital engineering process. It discusses key roles and who is accountable.

Note: *this section should be read in conjunction with DEIS Part 1.*

4.1 ROLES AND RESPONSIBILITIES

The table below details the high-level responsibilities for DE on this engagement, defined according to ISO 19650-2:2018.

Definitions:

- R = Responsible for undertaking the activity;
- A = Accountable for activity completion;
- C = Consulted during activity; and
- I = Informed after activity completion.

Table 2: Roles and Responsibilities

ISO 19650 Section	Project Task	Appointing Party (Client)	Supplier (Design Team)	Third Party (Engineer to the contract)
5.1.1	Appoint Individuals to undertake the information management function	R	I	<TBC>
5.1.2	Establish the information requirements	R	A	<TBC>
5.1.3	Establish the information delivery milestones	R	A	<TBC>
5.1.4	Establish the Information Standard	R	I	<TBC>
5.1.5	Establish the Project’s information production methods and procedures	R	A	<TBC>
5.1.6	Establish the Project’s reference information and shared resources	R	C	<TBC>
5.1.7	Establish the Project’s common data environment	R	C	<TBC>
5.1.8	Establish the Project’s information protocol	R	A	<TBC>
5.2.1	Establish the appointing party’s exchange information requirements	R	A	<TBC>
5.2.2	Assemble reference information and shared resources	R	R	<TBC>
5.2.3	Establish tender response requirements and evaluation criteria	R	C	<TBC>
5.3.1	Nominate individuals to undertake the information management function	R	R	<TBC>
5.3.2	Establish the delivery team’s DEXP	C	R	<TBC>
5.3.4	Establish the delivery team’s capability and capacity	C	R	<TBC>
5.3.5	Establish the delivery team’s Mobilisation Plan	C	R	<TBC>
5.3.6	Establish the delivery team’s risk register	I	R	<TBC>
5.3.7	Compile the tender team’s response	C	R	<TBC>
5.4.1	Confirm the delivery team’s DEXP	R	R	<TBC>
5.4.2	Establish the delivery team’s detailed responsibilities matrix	C	R	<TBC>
5.4.3	Establish supplier’s exchange information requirements	C	R	<TBC>
5.4.4	Establish the Task Information Delivery Plan(s)	C	R	<TBC>
5.4.5	Establish the Master Information Delivery Plan	C	R	<TBC>

ISO 19650 Section	Project Task	Appointing Party (Client)	Supplier (Design Team)	Third Party (Engineer to the contract)
5.4.6	Complete supplier's appointment documents	C	I	<TBC>
5.5.1	Mobilise resources	R	R	<TBC>
5.5.2	Mobilise information technology	R	R	<TBC>
5.5.3	Test the Project's information production methods and procedures	C	R	<TBC>
5.6.1	Check availability of reference information and shared resources	C	R	<TBC>
5.6.2	Generate information	R	R	<TBC>
5.6.3	Undertake quality assurance check	C	R	<TBC>
5.6.4	Review information and approve for sharing	C	R	<TBC>
5.6.5	Information model review	C	R	<TBC>
5.7.1	Submit model for supplier authorisation	C	R	<TBC>
5.7.2	Review and authorise the information model	C	R	<TBC>
5.7.3	Submit information model for appointing party acceptance	C	R	<TBC>
5.7.4	Review and accept the information model	R	I	<TBC>
5.8.1	Archive the project information model	R	-	<TBC>
5.8.2	Capture lessons learned for future projects	R	R	<TBC>
-	Establish the construction delivery matrix	C	R	<TBC>

As part of the pre-contract DEXP submission, parties shall respond to; and include additional detail beyond what has been presented in Table 2. Additional detail may include:

- the nominated individual(s) designated to filling each role, referenced against the DEIS;
- detail around the role each organisation will play, in the case of a consortium tender submission; or

additional task responsibilities not currently outlined.

4.2 PLANNING THE WORK AND DATA SEGREGATION

Model elements shall be broken down in reference to the project Work Breakdown Structure (WBS). It is expected that the WBS may see refinement throughout the design lifecycle, and with any amendment to the WBS, the supplier shall manage and ensure that models are segregated to match.

The work is to be broken down into the following hierarchy, with each item within the WBS comprised with a unique identification number:

- Zone
 - Area
 - Asset

The project CDE, Tucana, is to be established with the accepted WBS, which shall provide the ability for information to be uploaded and attributed to the relevant codes.

4.3 COLLABORATION

In alignment with the DEIS Section 2, the project shall utilise Tucana as the project CDE, alongside Revizto as the design coordination tool.

To ensure KiwiRail is prepared and has licenses available before project commencement, prospective parties shall estimate the number of team members which will require access to each of the platforms. This information shall be detailed within the pre-contract DEXP.

4.4 DATA SECURITY AND SENSITIVITY

This section covers the agreed authorisations for security and project CDE access and authority to distribute documents.

4.4.1 Platform Security

To ensure that project information is securely managed, only parties outlined in Table 3 shall have the authority specified to distribute information.

Authorities are as specified:

- Configuration - *Configuration of the project site including metadata, task teams, roles, and exchange.*
- Content Approval (shared) – *able to approve documents being pushed from WIP to Shared only.*
- Content Approval (published) - *able to approve documents being pushed from WIP to Shared only.*

Table 3: Platform and Data Security Management

Company	Authorised Person	Authorised Role	Configuration	Content Approval (Shared)	Content Approval (Published)
KiwiRail	Jasen Cronje	Digital Engineering Manager	✓	✓	
KiwiRail		Document Controller		✓	
KiwiRail	Noelene Carey	Tucana Product Owner	✓	✓	
KiwiRail		Design Manager		✓	✓
KiwiRail		Program Manager		✓	✓

4.4.2 Data Security Requirements

No additional data security is currently required for the scope of the engagement.

5 Commercial

This section deals with the commercial aspects of the Project Digital Engineering process.

Note: *this section should be read in conjunction with DEIS Part 1.*

5.1 DELIVERY AND DECISION MILESTONES

The delivery milestones from a digital engineering perspective are derived from:

- KiwiRail's information requirements at the noted project milestones to inform decision making; and
- The relative date to these milestones that information should be delivered to ensure the right information is available.

As such, the anticipated key delivery milestones from a DE perspective are as follows:

Stage	Description
Stage A	Preliminary Design (Basis of Design – 15%)
Stage B	Developed Design (Basis of Design – 40%)
Stage C	Detailed Design (Basis of Design – 90%)
Stage D	Issue for Construction (Basis of Design – 100%)

For further information on any of the delivery dates, please refer to the project programme. Note that these delivery milestones differ to the standard DE data drop frequency outlined in the DEIS.

Part of the KiwiRail Digital Engineering process requires suppliers to provide monthly as-built information throughout the construction programme. As-built information is to be supplied to KiwiRail in accordance with the Digital Engineering Information Standards, Part 1 and 2, and any other supporting documents. In circumstances where this delivery is prohibitive, the supplier is to consult with the KiwiRail Project Manager and Digital Engineering team to determine the best delivery approach.

6 Technical

This section deals with the technical aspects of the project's digital engineering process; including detail surrounding how information should be exchanged, and expectations of minimum information delivery requirements.

Note: *this section should be read in conjunction with the DEIS Part 2.*

6.1 MODEL ORGANISATION

6.1.1 Project Base Point

Each station will have a unique base point, so three will exist in total. This survey information has been captured for each of the three sites in the P2P project and this existing information will be used. Written agreement shall be sought from all parties before adoption of each base point.

It shall be noted that the project coordinate system shall align with that of the DEIS Part 2.

6.2 MODEL EXCHANGE

All 3D models shall be authored in accordance with the KiwiRail DEIS – Part 2, Section 3.

All stage gate deliverables are required to be transitioned into the Shared status within the KiwiRail CDE (Tucana) Along with a model deceleration form. The model deceleration form shall include the following:

- Model file name and revision
- File extension
- Date of issue
- The model information suitability (e.g. S2 for information, S4 for review)
- Short summary of major changes made since the last revision in a bullet point format

6.2.1 Construction Information

3D information plays a crucial role during construction; therefore, it is a requirement that the designer author their models in such a way so that the constructors can utilise the 3D information to carry out construction tasks such as: -

- Cost estimation
- Quantity take-off
- Construction planning
- Machine control
- Machine avoidance (digital shields)

The Construction Delivery Matrix will specify the use cases for each model. Refer to section 6.6

6.2.2 As-Built Information

As-built information is essential for various purposes, including maintenance, documentation, compliance, and future planning. KiwiRail requires that design intent models are updated to as-built models, with non-graphical asset information to be included by the constructor. This information will be detailed in the Information Delivery Plan.

6.2.3 Model Attribution

All model deliverables will be required to have model attribution populated in them.

For the minimum model attribution requirements refer to Table 4 below.

Further model attribution may be required depending on the model outputs, such as services and utilities model. Refer to the relevant documentation within the DE Framework for further attribution requirements.

6.3 CLASH DETECTION

6.3.1 Requirements and Responsibilities

Clash detection throughout the design shall primarily be completed in accordance with Section 4.2.1.4 outlined within the DEIS Part 2. The supplier shall be responsible for design coordination and clash detection of all design information originating from the engagement, including any sub-appointments on the project. Clashes shall be run in accordance with the minimum requirements of the DEIS. Over the lifecycle of the project, amendment to the minimum requirements of clash detection may be required, and agreement of the minimum requirements shall be sought from both the KiwiRail and supplier.

The pre-contract DEXP shall outline the proposed clash avoidance, detection, and resolution process, in alignment with the requirements of the DEIS. This DEXP shall also nominate one or more individuals to fulfil the role of clash detection management.

6.3.2 Clash Democratisation

KiwiRail has chosen Revizto + as its collaboration platform. It is preferred that suppliers conduct their automated clash detection within the Revizto + platform. If a supplier chooses to use alternative automated clash detection methods, approval from the KiwiRail DE team is necessary. However, the responsibility for design coordination shall still lie with the supplier.

6.4 ASSET INFORMATION

Asset data will be developed and handed over in accordance with the Information Delivery Plan, aligning with the end owner's Asset Information Requirements as documented in the projects Principal Requirements.

Before generating any information, Contractors must collaborate with the KiwiRail Project team to create the IDP. This involves identifying necessary KiwiRail Asset Types, required fields, and responsible parties. This collaborative process ensures consistent and standardised asset information delivery throughout the project's lifecycle.

The Digital Engineering team should review the approved plan for identifying and capturing the necessary asset information before production of information begins.

It shall remain the responsibility of the supplier/s to ensure that:

- As a minimum all native 3D models shall be populated with the minimum asset information highlighted in Table 4. The Digital Engineering team will work with the contractor to highlight the key attributes required for non Kiwirail assets.
- All tabular asset data is collected and populated as highlighted in the minimum requirements template. Supplied by KiwiRail DE team.
- All Missing attributes shall be amended and resubmitted to KiwiRail for approval prior to final handover.

Table 4 Minimum Model Asset Attribution

	Attribute Field Name	Description	Responsible for Populating	Phase Required	Example
Data Provider Identification	DataProvider_Name	Name of the Data Provider	Supplier	Design/As-Built	Downer
	DataProvider_AssetID	ID of the asset in the providers system	Supplier	As-Built	STC_01
	DataProvider_AssetName	Human readable name of the asset in the providers system	Supplier	As-Built	OLE STC Mast 01
	DataProvider_AssetType	Classification used by the data provider internally	Supplier	As-Built	ole_stc_mast

DataProvider_AssetParent	ID of the parent of this asset in the contractor's system	KiwiRail	As-Built	PLATFORM_2
DataProvider_AssetZone	Zone in the contractor's system	KiwiRail	As-Built	Drury Central
DataProvider_Project	Project / Package the contractor is working on	KiwiRail	As-Built	Drury Rail Stations
DataProvider_Package	Delivery Package	KiwiRail	As-Built	MWD01
DataProvider_Status	Asset Status	Kiwirail/Supplier	Design/As-Built	ASBUILT
DataProvider_DataSource	File name of the native model where this asset can be found	Supplier	As-Built	601601-OL-MD-0023-[P02].dwg
DataProvider_Comments	Name of the Data Provider	Supplier	As-Built	-
Project_AssetGUID	Unique ID (to track assets on a project)	KiwiRail	As-Built	4bb5b1d7-12cd-4b7d-934f
Project_AssetName	Unique name for asset that is used by the project (Can be different from the name of the asset in Maximo or SAP)	KiwiRail	As-Built	STC 01 - Mast 1X
Project_AssetType	Plain English name for the Asset Type used on the Project	KiwiRail	As-Built	Traction Support Mast
Project_AssetTypeID	Asset 'Class' or 'Type' as understood by KiwiRail	Provider	As-Built	H_Traction_OverheadSupportStructures_Mast
Project_AssetTypeVersion	Version of the classification used	Provider	As-Built	beta_0.9.7a
Project_AssetDiscriminator	Field to discriminate between assets (in absence of detailed data)	Provider	As-Built	"STC" for a 'Traction Support Structure'
Project_Action	"Intended final action for this asset.	Provider	As-Built	'SWALE' for a 'Surface Drain'
Project_Zone	Used in the Revizto appearance profiler."	Provider	Design/As-Built	New/Install
Project Area	Geographical or WBS (Aligns with Tucana)	Provider	As-Built	South Junction
Project_Line	Geographical or WBS (Aligns with Tucana)	Provider	As-Built	West Track
Project_Track	Name of line associated with asset	Provider	As-Built	NIMT
Project_StartChainage	"Name of tracks or crossover associated with asset (name used on design or colloquially on the project)	Provider	As-Built	"Up Main
Project_EndChainage	Primary track (where two tracks are impacted) is listed first, followed by other tracks in a semi-colon separated list"	Provider	As-Built	Up Main; Loop 1
Project_ChainageRefPoint	Start chainage	Provider	As-Built	Crossover 86"
Project_ChainageSource	End chainage (always greater than start chainage)	Provider	As-Built	45.078 Km

6.5 INFORMATION DELIVERY PLAN (IDP)

KiwiRail have developed an information delivery plan, drawing reference to the project phases and milestones outlined in Section 5.1. This plan outlines the critical requirements of information delivery required by KiwiRail, including but not limited to:

- Which assets are to be as-built during the construction phase
- Asset descriptions
- Capture the Asset Owners
- Data Exchange dates
- What artifacts are required to be handed back such as: -
 - 2D drawings
 - 3D models
 - Operations, Maintenance, and spare parts information
 - Health, Safety and Risk information
 - Construction, testing and commissioning information

The suppliers must work collaboratively with the KiwiRail Project team to develop the IDP

The Information Delivery Plan may be found included within the DE procurement documentation.

6.6 CONSTRUCTION DELIVERY MATRIX (CDM)

KiwiRail has developed a construction delivery matrix. This will facilitate discussions between designers and constructors regarding which pieces of information can be used for pricing and construction layout.

The construction delivery matrix may be included within the DE procurement documentation. The designers are to collaborate with KiwiRail digital engineering team throughout the design phase of the project to ensure that their outputs align with the contractors' requirements.

6.7 MODEL SPECIFICATION FOR DESIGNERS

KiwiRail has collaborated closely with its suppliers to develop a model specification. This specification serves as guidance regarding the information and outputs necessary for contractors to execute construction tasks effectively. Designers are expected to collaborate with KiwiRail's Digital Engineering team and the appointed contractor(s) to ensure that the design outputs align with the construction requirements of the contractor(s) Refer to DEIS Part 2, Section 3.2.3.3

6.8 GIS

Geometric information includes 3D models, geospatial information, 2D drawings, point clouds, and LiDAR outputs. Geometric information provides important context which, when combined with quality, structured asset data, supports KiwiRail Asset Management activities. Geospatial information is required for many KiwiRail assets, with some requiring multiple geometry types. For example, a fibre optic network has points for nodes, lines for cable, and polygons for cabinet assets.

The supplier shall make reference to the [KiwiRail Digital Engineering Asset Requirements](#), Section 5.2 which notes that all geospatial information shall contain a unique asset identifier in the layer attribution. The required attribute information for each asset class is specified in Appendix E: GIS Attribution. KiwiRail recognises the duplication by requesting asset data in layer attribution and will be extending the data dictionary to incorporate these geospatial attribute data.

6.9 COMMON DATA ENVIROMENT (CDE)

To support their digital objectives KiwiRail has adopted Tucana as their Common Data Environment (CDE). Tucana implements the ISO relationship structure by enabling both KiwiRail and the appointed parties to leverage their own internal CDE solutions to produce information.

All information produced for the project is to be handed to KiwiRail via the common data environment. The Information delivery Plan (IDP) provided by the Principal will outline the specific information required to be handed back upon completion of physical work.

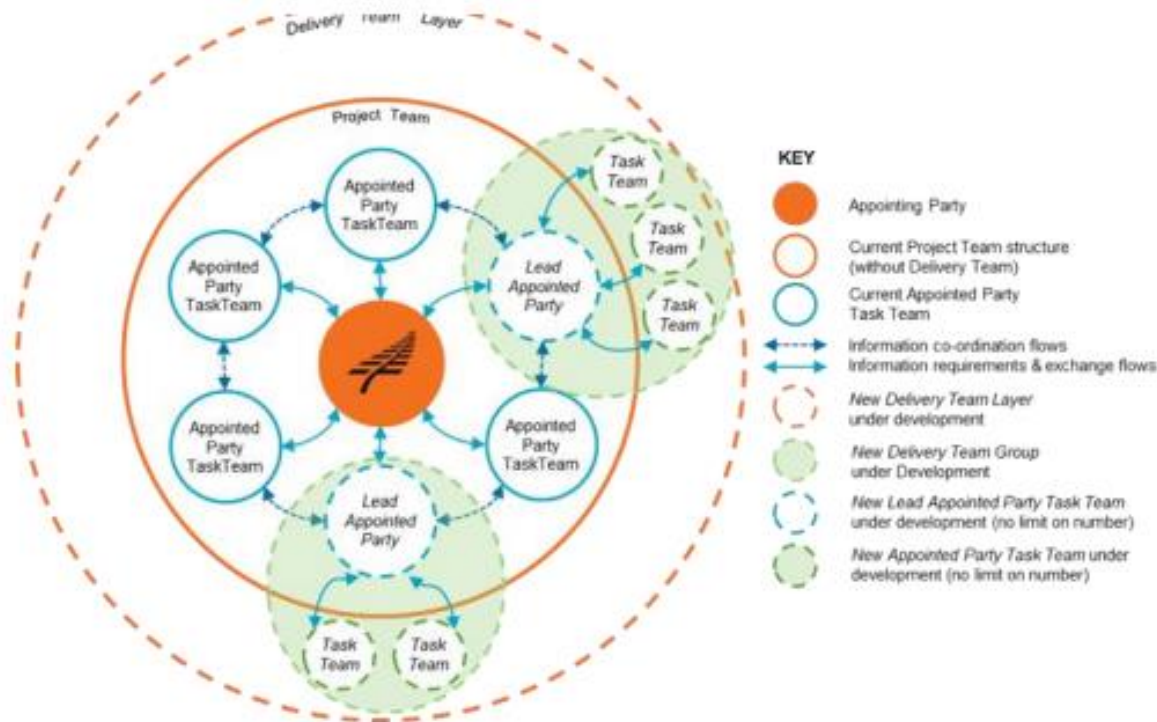


Figure 2 KiwiRail Team Structure

6.9.1 Tucana Content States

All parties are required to submit and transmit all formal project documentation and share content across the delivery and projects teams within the KiwiRail CDE.

- **WIP**
 - Where information is uploaded to and developed before sharing with the wider project team.
- **Shared**
 - Information is progressed from WIP into Shared via an approval workflow for collaboration and co-ordination with the wider project team.
- **Published**
 - Information is progressed from Shared into Published via an authorised/acceptance workflow from the Shared Content State and is accepted by KiwiRail as either a contractual deliverable or finalised project information.

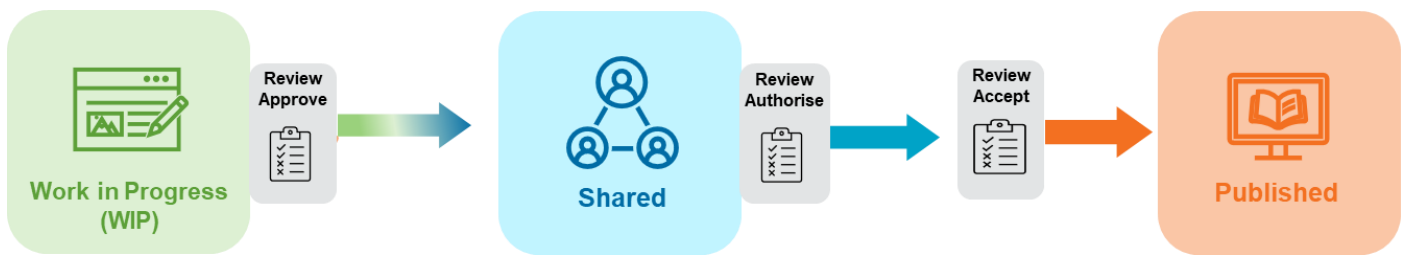


Figure 3 Content States

6.10 MODEL FEDERATION STRATEGY

During the project's design phase, the designers are required to regularly upload the design models to Revizto at the agreed frequency as highlighted in the DEXP. As the project progresses through the design lifecycle and transitions into construction, KiwiRail will request monthly as-built updates. These updates will accurately represent the physical work completed and align with payment claims during construction. The constructors DE team will formally share these models with KiwiRail through Tucana and subsequently uploaded to Revizto by the KiwiRail DE team.

Revizto will be configured with the appropriate search sets and viewpoints to effectively communicate both the design and as-built information. Kiwirail expects a fluid strategy and input from designers and constructors around viewing/overlaying of design vs. as-built information and this will be reviewed and improved through the DE coordination meetings. Further to this, Model colour coding shall be used to assist in identification of all utilities and service assets. These models shall be coloured in accordance with Appendix 5 of the Services and Utilities Identification and Modelling Guidance Note

6.11 FILE NAMING CONVENTION

The project has adopted the use of the file naming convention as presented in Table 5

Table 5 File naming convention

Field 1	Field 2	Field 3	Field 4	Field 5	Field 6
Project Number	Originator	Discipline	MA Code (KiwiRail)	Document Type	Document Number
6 numeric	3 alphanumeric	2 alphabetical	4 alphanumeric	2 alphanumeric	4 numeric

Before generating project-related information, the supplier will coordinate with the designated KiwiRail digital engineer to acquire the appropriate document coding from KiwiRail's Engineering document control.

KiwiRail acknowledges that suppliers may need to utilise their internal file naming conventions to comply with their internal Common Data Environment (CDE) requirements. In such instances, approval must be sought from KiwiRail, and this will be noted in the pre-contract DEXP.

If a supplier does has approval to use their internal naming convention, then it shall be noted that it is mandatory, as per KiwiRail's Engineering Document Management System (EDMS), also known as Meridian, that all 2D and 3D as-built information provided to KiwiRail complies with the file naming convention outlined in Table 5 above. Suppliers will work closely with the KiwiRail DE to ensure that all as-built handover information adheres to the KiwiRail's EDMS requirements.

6.12 FILE EXCHANGE FORMATS

File exchange formats shall be in accordance with the DEIS, Part 2, Section 3.2.3.2 The supplier shall include their intended file exchange formats withing their pre contract DEXP and MIDP for approval by KiwiRail DE team.

6.13 LEVEL OF INFORMATION NEED

The LOD requirements for all design intent models will align with the projects DEXP, design intent models that are required to be updated to as-built models will be outlined in the projects Information Delivery Plan. As-Built models will be developed to LOD500 and shall be populated with the minimum asset information as highted in Table 4

However, given the ambiguity associated with LOD definitions across the industry, KiwiRail will take a pragmatic approach and agree with the supplier the specific details to be modelled within the As-Built models, particular around rail assets. Guidance can be found in KiwiRail DEIS Part 2, 3.2.2, further guidance can also be found in the [BIM Forum LOD Specifications Part 1 and 2](#).

6.14 ACCEPTANCE CRITERIA

The supplier shall provide a methodology and evidence of how the projects information:

- Aligns with the DEXP
- Aligns with KiwiRail's DEIS Part 1 & 2
- How the model aligns with the KiwiRail approved methods and procedures of production
- How the model conforms to the correct level of certainty, level of detail, dimensional accuracy, and tolerance requirements by KiwiRail
- Asset database readout, demonstrating that the asset database fields have been filled in completely, and gone through the applicable technical checks
- Clash detection report including justification for non-resolved clashes
- Summary of Revizto issues unresolved or outstanding
- Submission of QA documentation for the projects deliverables that is produced by the supplier, (such as a model or drawing check sheet) and shall be specifically outlined in the pre contract DEXP
- The deliverables submitted shall match the IDP and MIDP for the project
- Methodology and documentation explaining how the As-Built models will be validated for accuracy and completeness against survey information in accordance with the suppliers and industries modelling best practice.

6.15 TRAINING

KiwiRail shall provide training to the supplier, post contract award, for the following:

- **Tucana:** Introductory online sessions with the supplier Digital Engineering Leads, Document Controllers, and others as required.
- **Revizto:** Introductory online sessions with the supplier Digital Engineering Leads, Project Managers, Discipline Leads and Design Teams.
- **Asset Information Requirements:** Introductory online sessions with the supplier Digital Engineering Leads, Project Managers, Discipline Leads and Design Teams.

Outside of the mentioned training sessions, the Digital Engineering representatives from the respective suppliers should aim to disseminate the insights gained from these sessions among their respective teams. Informal training on platform usage, led by KiwiRail representatives, will be scheduled as needed. Additionally, users can find further guidance in the [training and resources](#) section found on-line.

7 Digital Engineering Execution Plan (DEXP) Requirements

7.1 PRE-CONTRACT DEXP EXPECTATIONS AND REQUIREMENTS

Pre-contract DEXP shall, as a minimum, include the content presented in Table 6. For consistency, the structure of respondents' DEXP should be formatted in the same order as outlined. These criteria will form the basis for assessment of the pre-contract DEXP. Guidance has been provided for detail expected for the pre-contract DEXP submission. Indicative page guides have been provided for each section, and the supplier may elect to convey information in any form of their choosing, which may include tables, illustrations and diagrams or plain text.

Table 6: Pre-Contract DEXP Response - Expectations

#	Section	Reference	Description	Page Guide
1	General			3 ½ Pages
1.1	Vision Statement	N/A	<p>A brief statement outlining your journey to adoption of DE tools and technologies, and may also include:</p> <ul style="list-style-type: none"> • Where do you see the vision of DE? • Where do you see DE taking your company, or the industry as a whole? • How far on your journey to adoption of DE is your company? • What does full adoption of DE look like to you? 	½ Page
1.2	Scope	PIR	Project information including the scope of work the DEXP relates to, and any exclusions. Reasoning behind DE scope exclusions shall be detailed in this section.	½ Page
1.3	DE Project Specific Initiatives	PIR	<p>As noted in Section 2 of the Project Information Requirements, KiwiRail has outlined a set of initiatives in respect to Digital Engineering. This response may outline:</p> <ul style="list-style-type: none"> • Experience with any or all the initiatives (this may be a project reference from the capability and capacity section) • How the tools and technologies currently in use in your business could enable these initiatives to be realised. This response may include discussion on internal workflows which further support any statements made. • Offerings and initiatives beyond the proposed initiatives that have provided value in the past and may also be applicable to the project. <p>How your business is utilising DE tools internally and whether these tools may provide additional value to the project.</p>	1 ½ Pages
2	Information Management			4 Pages
2.1	Collaboration	DEIS P1	A description of collaboration and federation strategies/processes including frequency of data drops, model review workshops, and the form and process of sharing between teams and KiwiRail.	½ Page

2.2	Quality Assurance	DEIS P1	This section shall include a statement of your internal Quality Assurance (QA) workflows and their alignment with the DEIS. This may also include comparisons to practices defined under ISO 19650.	½ Page
2.3	Level of Information Need	DEIS P2	Proposed Level of Information Need to support the elements of the project the supplier is responsible for delivering, commenting where deliverables have been over or under specified, or are impractical to deliver, with alternative delivery proposals/solutions if appropriate.	½ Page
2.4	Spatial Coordination	DEIS P2	Statement of understanding and experience with the spatial coordination requirements. This may extend to a discussion on whether any difficulties are anticipated using the proposed coordinate systems on the project. Where difficulties are expected (e.g. model authoring software having difficulties geospatially locating elements correctly), this response shall outline previous experience on how these risks have been mitigated.	½ Page
2.5	WBS / Data Segregation	DEIS P1	A description of the proposed data segregation strategy against the project WBS, throughout the design lifecycle outlined within the DEIS. This could include potential areas of innovation/automation to minimise manual input towards progressed design stages.	½ Page
2.6	Information Exchange	DEIS P2	A description of the project software, version, and file formats, and exchange format requirements that will be used to deliver the project. This shall identify and compatibility issues or restrictions and how these will be addressed by the project team. The KiwiRail CDE requires source files, exchange files and a federated model.	½ Page
2.7	Deliverables	IDP	An outline of the DE deliverables for the project, including the format, and timing of each element. This information shall be used to create TIDP and MIDP drawing reference from the Information Delivery Schedule (IDP). Model information may be provided in a Model Element Author Schedule.	1 Page
3	Mobilisation Plan			3 Pages
3.1	People / Resource Mobilisation	EIR	<p>Details of involved parties and their responsibilities regarding the scope, including and aligned with the roles previously identified in this document. It is preferred but not required, that lead specialist for each discipline has experience in project delivery in DE. The responder should produce a RASCI/RACI matrix outlining the anticipated roles and responsibilities, at a high-level, based on the information available during tender, such as Table 2: Roles and Responsibilities.</p> <p>This response shall also outline the expected number of team members required at the commencement of design, so that licences of the KiwiRail supplied software can be provisioned.</p>	1 Page
3.2	Procurement	N/A	The procurement specifies the proposed plan and approach the procurement of Software, Hardware, and IT Infrastructure.	½ Page
3.3	Implementation & Configuration	N/A	The implementation section defines the program of works associated with implementation and configuration of those items defined with the procurement section.	½ Page

3.4	Testing	N/A	The testing section articulates the approach to the following activities, i) Testing of information production methods and procedures, ii) Testing information exchange between task teams iii) Testing the information delivery to the appointed party & iv) Testing of the delivery teams (distributed) CDE and its connectivity with the Project CDE.	½ Page
3.5	Training	EIR	The development and training section identifies the proposed development and training requirements for the delivery team members.	½ Page
4	Risk			1 Page
4.1	Risk Register	N/A	Preliminary register of any risks identified within the requirements set out by KiwiRail against the delivery timing or other such risks.	1 Page
5	Capability and Capacity Assessment			3 Pages
5.1	Capability and Capacity Assessment	N/A	To support the successful delivery of the project, the proposed delivery team is to complete the Capability and Capacity Assessment form, as prescribed in Appendix 1.	3 Pages

7.2 POST-CONTRACT DEXP EXPECTATIONS AND REQUIREMENTS

The final DEXP will serve as a demonstration of the supplier's commitment to quality assurance and their plan to align with the Digital Engineering requirements outlined in the Digital Engineering Framework suite of documents, while also taking into account ISO 19650. This plan's specific content will be collaboratively developed with KiwiRail and other project partners.

Once agreed upon, the DEXP will be endorsed and signed by each authorised representative of the relevant delivery teams, serving as the contractual digital engineering deliverables. It is important to note that the DEXP is a dynamic document that may require updates as the project's lifecycle advances. Any revisions to the DEXP must be documented and approved by all suppliers before implementation on the project.

8 Appendices

8.1 APPENDIX 1: CAPABILITY AND CAPACITY ASSESSMENT FORM

Company Info

Reference	Item	Details
1.1	Company Name	
1.2	Company Services	
1.3	Company Address	
1.4	Company DE Representative Name	
1.5	Company DE Representative Email Address	
1.6	Company DE Representative Telephone Number	

Awareness

Reference	Question	Answer (Yes/No/NA)	Evidence (if applicable)
2.1	Are you aware of the principals of ISO 19650?		
2.2	Have you previously delivered a project in alignment to ISO19650?		
2.3	Are you aware of different 'Level of Detail' (geometric) and 'Level of Information'?		

People

Reference	Question	Answer (Yes/No/NA)	Evidence (if applicable)
3.1	Do you have in-house capability (team or person) responsible for digital engineering or BIM in your organisation?		
3.2	Do you have people accredited in BIM delivery or Information Management in accordance with ISO19650?		
3.3	Who is responsible for driving the uptake and use of BIM/DE in your organisation and within your projects?		
3.4	Do you have internal standards for BIM/DE?		
3.5	Do you (or your supply chain) use Information Models as the primary source to produce your contractual deliverables – that is, 2D drawings, schedules, etc.?		
3.6	Do you (or your supply chain) use Information Models as part of your design and co-ordination process?		

Reference	Question	Answer (Yes/No/NA)	Evidence (if applicable)
3.7	Do you have experience in establishing and resolving clash detection processes within your organisation? If yes briefly explain how is this managed?		
3.8	Do you have experience populating asset and identifying data into Information Models for client handover?		
3.9	What education and training are available to team members responsible for managing DE information?		
3.10	What education and training are available to team members responsible for producing DE information?		
3.11	What education and training are available to team members responsible for using DE information?		
3.12	Does your organisation have a competency framework to support team members with respect to BIM/DE?		

Technology

Reference	Question	Answer (Yes/No/NA)	Evidence (if applicable)
4.1	What are your primary tools for 3D design authoring?		
4.2	What are your primary tools for 3D coordination checks?		
4.3	What are your primary tools for digital planning (4D)?		
4.4	What are your secondary tools?		
4.5	What other specialty tools do you use?		
4.6	Are you (or your supply chain) prepared to issue your Information Models in their native file formats?		
4.7	Does your PI insurance cover you for DE activities?		

Experience

Reference	Question	Answer (Yes/No/NA)	Evidence (if applicable)
5.1	How many years of project DE experience does your company have with 3D Information Models?		
5.2	How many years of project DE experience does your company have with Digital Planning (4D)?		
5.3	How many years of project DE experience does your company have with Digital Cost Planning (5D)?		
5.4	How many years of project DE experience does your company have with Digital Facility Management (6D)?		
5.5	How many years of project DE experience does your company have with spatial solutions (GIS/Reality Capture/Survey)?		
5.6	How many DE specific staff do you anticipate contributing to the project's information production / deliverables?		
5.7	What is the relevant experience and number of team members who have managed DE information / deliverables?		

Projects

Provide details around an exemplar DE project with which you were involved.

Reference	Project details	Answer
6.1	Project Name	
6.2	Sector	
6.3	Your scope of DE services	
6.4	DE benefits to you	
6.5	DE benefits to the project team	
6.6	DE benefits to the client/employer	

Additional Information

Reference	Question	Comments
7.1	Provide any additional information you believe relevant to this capability assessment	

8.2 APPENDIX 2: TERMS AND DEFINITIONS

Term(s)	Definitions	ISO 19650 term
Appointed party	<i>Other consultants, sub-consultants to the lead appointed party, who is the provider of information pertaining to works, goods, or services.</i>	✓
Appointing party	<i>End client, Asset owner or similar. Receiver of information from appointed party pertaining to works, goods or services.</i>	✓
Asset	<i>Item, thing, or entity that has potential or actual value to an organisation.</i>	✓
Asset information model (AIM)	An Asset Information Model (AIM) is a model that compiles the data and information necessary to support asset management, that is, it provides all the data and information related to, or required for the operation of an asset. – <i>Source NBS</i>	✓
Asset Life cycle	Life of the asset from the definition of its requirements to the termination of its use, covering its conception, development, operation, maintenance support and disposal.	✓
Author/Owner	The person responsible for the content in the information container.	
Building information modelling (BIM)	Use of a shared digital representation of a built asset to facilitate design, construction, and operation to form a reliable basis for decisions Note: BIM is a process for sharing structured information	✓
Classification	Information classifications allow information objects to be grouped for the purpose of common, agreed controls. Examples of controls may include object permissions, workflows, naming etc.	
Common data environment (CDE)	A system that manages the collaborative production, control and exchange of information based on a common standard and agreed access.	✓
Content engine	A content engine is a system designed to manage the production, control, and exchange of project information. Content engines are chosen based on the content they will manage	
Deliverable	Information container contractually agreed to be supplied to the client. The product of engineering and design efforts to be delivered to the client as digital files and / or printed.	
Delivery team	Lead appointed party and their appointed parties. Multi-organizational team working on a part of the project under a lead appointed party	✓
Design Intent Model	A stage of the project information model which demonstrates the early co-ordination of multidisciplinary design elements, including outline specifications and requirements.	✓
Digital Engineering Execution Plan (DEXP)	An agreed set of information to define the projects digital way of working during the delivery phase. The digital engineering execution plan may also be referred to as a BIM Execution Plan, Digital Work Plan, this may be dependent on industry or clients.	
Document	Information (meaningful data) and the medium on which it is contained. Container for persistent information that can be managed and interchanged as a unit. This can represent snap shots from the information model for a specific purpose. This is a synonym to information container	
Document code	A unique code attached to an information container for management purposes. The document code may also be referred to as the Information container code when applied to an information object.	
Information	For the purpose of this standard information is defined as geometric and non-geometric objects or set of objects that forms part of the project information model and ultimately the asset information model.	
Information breakdown structure	A means of grouping information objects by a common purpose. For example, by Work breakdown structure or plant area or facility.	
Information container	A named persistent set of information retrievable from within a file, system, or application storage hierarchy. An information container can refer to a specific information object or a set.	✓

Term(s)	Definitions	ISO 19650 term
Information life cycle	Information on a project goes through several stages starting with the requirements for information to the final archiving of the information after project closure.	
Information object	A specific information container such as a document, geometrical model or piece of data which is produced, received, or referenced during the delivery of the project. This is a synonym to information container	
Information set	A set of information objects grouped for the purpose of information control. This control may include reporting, quality assurance or workflow state change activities. Information sets will be typically applied to define groups of information objects delivered as part of the transmittal process. For example, an engineering work pack containing a number of information objects.	
Issued	An information object, or information package, that is distributed either internally or externally formally via a transmittal. The act of issuing may be carried out for many reasons and is defined by status coding. Typically, information is issued at defined workflow state changes such as Shared and Published.	
Lead appointed party	“Lead consultant”, EPC (Engineering, Procurement and Construction) or similar	✓
Master Information Delivery Plan (MIDP)	The MIDP (Master Integrated Deliverable Register) serves as a comprehensive record generated by the supplier It meticulously documents all anticipated deliverables encompassing the entire contract scope and designates responsibility for each. Additional details for each deliverable are also captured, encompassing its document number, design package, and the specified due date	✓
Metadata	Data that describes the information container stored in a common data environment (For example: project number, title, life cycle state, revision, etc.).	
Native	Term used for the information objects original file format created by the authoring application. E.g. docx, dwg, dgn, or rvt	
Phase	A point in time of an asset life cycle examples include opportunity, delivery and operational.	
Project	Unique process, consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including the constraints of time, cost, and resources. For the purpose of this standard, a project is the full life cycle from initiation project hand back/closeout according to the KiwiRail CPAD Manual.	
Project Information Management	Project Information Management is the application of management techniques and computer software to collect project information, communicate it within and outside the organization, process it to enable managers to make quicker and better decisions and ultimate disposition through archiving or destruction.	
Project information model (PIM)	A Project Information Model (PIM) is a model that compiles the data and information necessary to support design and construction phase of an asset, that is, it provides all the data and information related to, or required for the build of an asset.	✓
Project team	Appointing party and all the delivery teams	✓
Published	An information container is identified as ready for use outside the delivery organization, its actual use is typically defined by status coding clearly defines its allowed use and may enable it to be used to support different life cycle phases. Typically, it will be formally issued to the employer or contractor at this life cycle phase and in a suitable format.	
Rendition	A non-editable version of a native information container, typically a PDF or 3D review format such as Autodesk’s Navisworks or Bentley’s iModel.	

Term(s)	Definitions	ISO 19650 term
Retention period	<p>A time period applied to records to ensure retention of information to meet legal obligations and support business continuity.</p> <p>Retention periods are governed by the KiwiRail Information Management Policy, KRG-IS008-POL0.</p>	
Revision	<p>A formal label stored on an information container to formally identify it from previous copies of the information container. Typically, revisions are incremented to reflect changes in life cycle states. Revisions may be alpha or numeric characters or a combination of both.</p> <p>Note: Revision numbers within the KiwiRail CDE are alphanumeric (e.g. P01) and are automatically assigned based on review/approval workflows.</p>	
Shared	<p>Once development of a deliverable has reached a suitable point and has been suitably checked, reviewed, verified, and approved, it may be shared outside of the immediate task team.</p> <p>Typically, this is the point at which the design may be translated and made available for cross discipline coordination. The information container may also be issued for external quality assurance review and/or verification processes.</p>	
State	<p>A state represents the different areas of the Common data environment workflow through which information objects transition.</p> <p>The only defined states applied by this standard are Work in Progress, Shared, Published and Archived.</p>	
Status code	<p>A formal label stored on an information container to formally identify the allowed use of the information container in a specific state in the workflow. (This term is contained in ISO 19650 and is also known as a suitability code).</p>	✓
Supplier	<p>Supplier is used as an all-encompassing term for any party contracted to KiwiRail to undertake any form of work, which could include design (by a design consultancy) or construction (undertaken by a contractor).</p>	
Task Information Management	<p>The management of information sets defined by individual activities or tasks. Each activity has a task information delivery plan (TIDP) which described its information container, format, schedule etc.</p> <p>Task information delivery plans are combined to form a master information delivery plan (MIDP).</p>	
Task team	<p>Individuals assembled to perform a specific task.</p> <p>One or more task teams are appointed by the delivery team.</p> <p>Small projects may define a single task team.</p>	✓
Version	<p>Versioning is a system-controlled copy of the information object to define an auditable history of change.</p>	
Virtual Construction Model	<p>The virtual construction model provides information describing the detailed design, and should be relied upon for construction sequencing, methodologies, and other construction planning, before commencing construction on site.</p>	✓
Work breakdown structure (WBS)	<p>A means of breaking up the delivery of a project scope into packages, typically defined by a hierarchical coding system.</p> <p><i>“deliverable oriented hierarchical decomposition of the work to be executed by the project team.” – PMBOK definition.</i></p>	
Work in progress (WIP)	<p>The first state in a workflow at which effort is applied, ongoing development of a task or deliverable prior to review and approval for share outside the originating task team.</p> <p>Typically work in progress is the only state where an information container can be edited.</p>	✓
Workflow	<p>The automation of a business process, in whole or part, during which information or tasks are passed from one participant to another for action, according to a set of procedural rules, a series of states.</p>	

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