# Digital Design Management Guidance Note

Version 1

## Document Control

### Version History

| Version Number | Version Date | Summary of Changes | Author |
|---|---|---|---|
| 1.0 | 04/02/2022 | Initial document | D Jannings / E Griffin-King<br>Industry Contributors:<br>A Field<br>S Cave<br>N Grgec |
| | | | |
| | | | |
| | | | |

### Reviewers' Name

| Reviewers / Contributors Name | Date | Signature | Comments |
|---|---|---|---|
| A Lyon | 17/6/2022 | | |

### Signed off by Approvers

| Approver Name | Date | Signature | Comments |
|---|---|---|---|
| A Lyon | 17/6/2022 | | |

### Final Distribution

| Name | Position |
|---|---|
| File | - |

# Contents

# 1 Overview

## 1.1 PURPOSE

The purpose of this document is to provide guidance as to how the Digital Engineering (DE) tools and processes outlined in KiwiRail's DE Framework can be embed within the design phase of a capital project to support and enable design management fundamentals.

This document is not designed to replace any design management documentation but rather support the use of DE to enable design management best practice in specific areas where applicable.

The key areas this document will cover are:

- Digital way of working in the design phase
- Information delivery planning
- Information gathering (including existing conditions)
- The collaborative production of information
- Design coordination
- Design reviews
- Information handover for construction

## 1.2 WHY DIGITAL DESIGN MANAGEMENT

The concepts outlined in this guidance note might be obvious for some, for others this will be a different way of thinking about the production, coordination, and management of information during the design phase of a project. Wherever your knowledge sits, this document looks to outline consistent approaches that can be scaled across KiwiRail capital projects.

The design phase is typically when the Digital Engineering framework is implemented on a KiwiRail capital project and presents the biggest opportunity to set up the digital engineering tools and processes to successfully support the project outcomes. Design coordination is at the core of the value digital engineering brings to a project and presents the significant opportunity to develop information efficiently and reduce time and cost risks downstream during construction.

Traditionally this has not been the case in the construction industry. Simply put, uncoordinated design information, results in unwanted time and cost implications for KiwiRail. By adopting a consistent approach across the KiwiRail capital portfolio, risk can be reduced, and innovation can be focused in the right places.

Building Information Modelling (BIM) is not a new concept, however it's integration with design management has not always been seamless in the construction industry. This guidance note looks to focus on keys areas that will lead to better outcomes on KiwiRail projects. Itis not intended as an exhaustive list of areas where there are synergies between digital engineering and design management.

## 2 Framework Documents

Version 4 of the DE Framework is segmented into a suite of documents. This enables specific technical information to be covered in a specific document, for the right audience.

The following diagram and table convey the suite of the framework documentation.

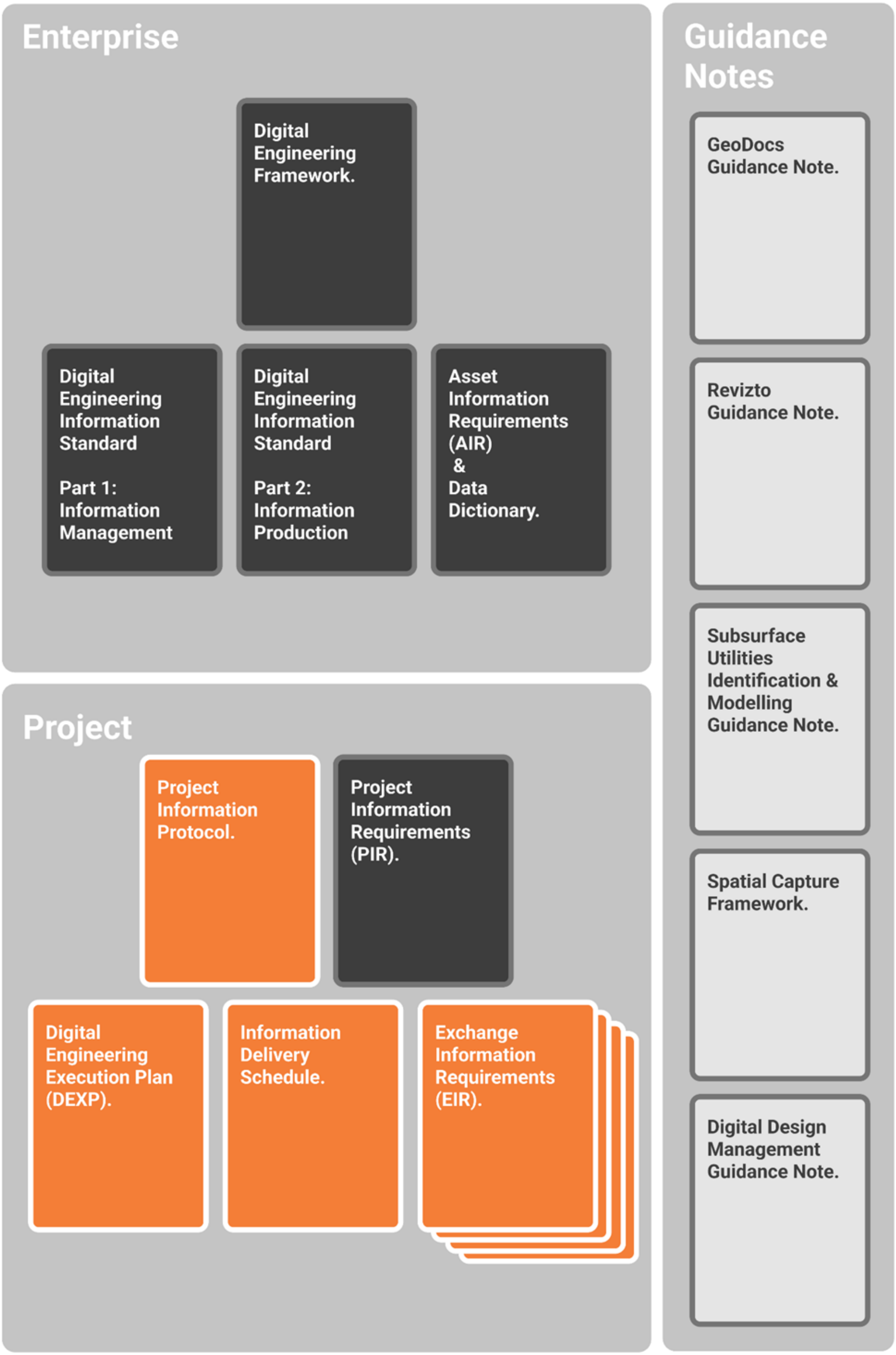



*Figure 1: Digital Engineering Document Structure*

| Document | Purpose |
|---|---|
| **Enterprise** | |
| Digital Engineering Framework | To outline KiwiRail's DE vision and overarching objectives<br>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 |
| Subsurface Utilities Identification and Modelling Guidance Note | How to identify, model and transmit subsurface utility information to KiwiRail within a project. |
| 3d Spatial Data Capture Framework | Outlines how spatial information is to be captured, created, reference, and controlled. |
| Asset Data Dictionary | Outlines all the possible asset types, and their associated attribution requirements. |
| GeoDocs Guidance Note | Supplementary document which covers off the correct usage of the CDE, including details of the background processes for those wanting additional detail. |
| Revizto Guidance Note | How KiwiRail standardise the use of Revizto across the KiwiRail projects portfolio |
| Digital Design Management Guidance Note | Provides guidance as how to implement and delivery digital engineering to support design management activities |
| **Project** | |
| Digital Engineering Execution Plan (DEXP) | Outlines how Digital Engineering will be completed throughout the scope of the engagement, responding to the requirements outlined in the EIR.<br>Outlines the roles and responsibilities within the supplier's organisation and can be used as a form of assessment for the tender submission process.<br>Pre-contract is to be prepared by the supplier, and the post-contract is collaboratively developed between KiwiRail, its partners and the supplier. |
| Project Information Protocol | Provides additional clauses which enable the scope of Digital Engineering to be amended to the contract. |
| Information Delivery Schedule | Details the level of information need, required against asset data dictionary classifications, throughout the project lifecycle.<br>Specifies the types of asset classifications expected throughout the scope of the project. |
| Project Information Requirements (PIR) | Includes general project information, including scope, stakeholders and high-level delivery milestones<br>Outline the overarching project specific digital initiatives for implementation on the project.<br>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) |
| Exchange Information Requirements (EIR) | Breaks down the overarching project objectives in the Project Information Requirements into the requirements of each engagement within a project at a detailed level.<br>Details the expectations of information delivery against the project milestones.<br>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) |

# 3 Digital way of working

The implementation of digital engineering is changing the way we work at KiwiRail. This change requires a collaborative approach to the production and exchange of information from both KiwiRail and its supply chain.

The design phase is a critical time for us to produce the right information necessary to build our new assets. The design phase is where we create and coordinate our assets once in the digital world before then build them in the physical world. KiwiRail's DE Framework outlines 4 key objectives which are:

- **Provide a place where people can access and consume data**

  This is known as the common data environment (or CDE). The CDE enables the project teams to have access to what information they need when they need it. The KiwiRail CDE is GeoDocs and aligns with ISO19650. It is to be implemented and utilised during the design phase.

- **Reduce risks during the construction phase**

  When design information is not properly coordinated it creates the opportunity for risk during construction and therefore cost for KiwiRail in rework and alternative designs. KiwiRail's collaborative environment enables all project team members to come together during the design phase to coordinate design information without licencing or software being a barrier.

- **Create a rich and accurate as-built record of the asset**

  While typically as-built information is generated during the construction / handover phase of a project the creation of an asset starts during the design phase. All asset information needs to be generated in alignment with KiwiRail's Asset Information Requirements. For a portion of asset information (typically asset meta data) the most efficient place to produce this information is during the design phase.

- **Increase efficiency in the way we work**

  All information produced must have a clearly defined need. If this is not defined during the information delivery planning part of the design phase, effort should not be put into its production. Information produced during the design should be created and exchanged in a way that enables it to be used and reused by downstream task teams.

# 4 Information Delivery Planning and Production

The construction sectors traditional challenges with productivity have meant that it typically costs more and takes longer than it should to build new assets. The production and management of information during the design phase can have a significant impact on the outcomes of a project such as time and cost.

Information management improves the quality, availability, and timeliness of reliable information, it facilitates more efficient and effective decisions and investments across the asset lifecycle and is a key enabler of digital transformation. Every £1 invested in information management could generate a labour time savings of £5.10-£6.00 and a total cost savings of £6.90-£7.40 over time[1].

[1] https://www.cdbb.cam.ac.uk/files/cdbb_econ_value_of_im_report.pdf

At the beginning of a design phase effort must be put into planning the production of information. All information to be produced must a have a purpose and an identified information receiver.

Typical examples of information receivers include:


- **Contractors** – who require information to construct new assets
- **Consenting –** who require information in order to confirm the design meets regulatory requirements
- **KiwiRail asset owners** –Such as asset management, operational and engineering teams who will maintain the asset beyond the life of the capital project

4.1 **Stakeholders** – such as iwi, landowners and public who must be consulted and require information to understand how their interests may be impacted by a project. Typically, these stakeholders are from non-technical backgrounds and benefit from 3d information which can provide context which is often lost in a 2d information. Alignment with ISO19650

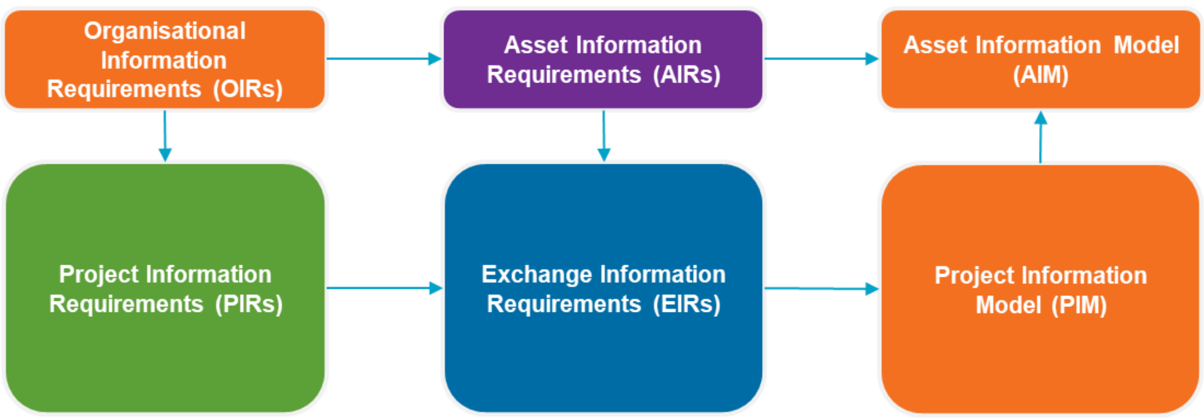
The ISO 19650 standard is an international standard for managing information over the whole life cycle of a built asset using building information modelling (BIM). All works conducted within a design phase should be completed in alignment with the DE Framework and ISO19650.

All projects should have a designated information manager who holds ISO19650 accreditation, or if the scale of the project does not justify a designated resource, support should be sought by a suitably accredited ISO19650 professional within the KiwiRail digital engineering team. The projects information manager will work in close alignment with the design manager to ensure that BIM and design management workstreams do not become silos.

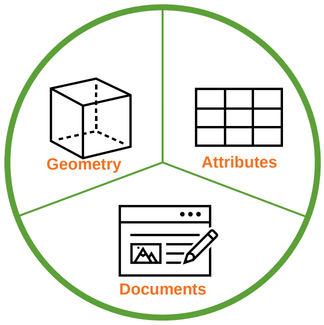
This document should be read in conjunction with the DE Framework, notably the **Digital Engineering Information Standards part 1 and 2**, and support the planning and delivery of information production.

Information uses are to be outlined in **Project Information Requirements** and how it is to be exchanged should be outlined in the **Exchange Information Requirements**. The detail of how this all comes together on the project will sit in both the projects Design Management Plan (DMP) and Digital Engineering Execution Plan (DEXP).

The following diagram conveys how the requirements come together to produce information:



## 4.2 PROJECT INFORMATION MODEL

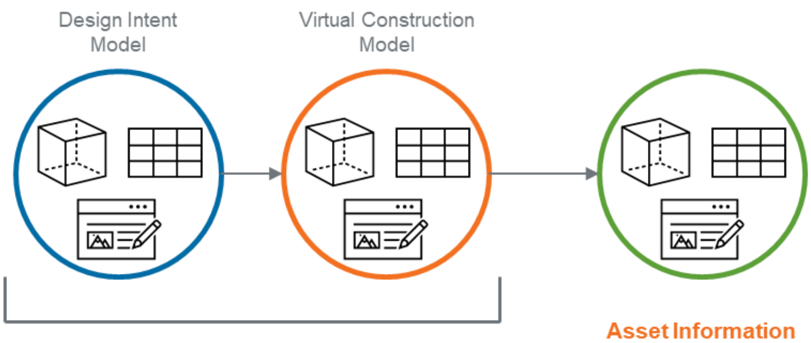



Project Information Model

Two different types of information models are created during the asset delivery phase, being Project and Asset information models. The term model in this case is holistic and refers to 3d geometric representations, as well as attributes, and documentation.

The design phase is where the initial project information model (PIM) is created. This is often named the design intent model during the design phase and will morph into the virtual construction model and then into the asset information model (AIM) upon completion and handover of the project information.

The below image conveys this flow of information.




## 4.3 LEVEL OF INFORMATION NEED

The correct level of information needed on a project must be defined to avoid too much or too little information being produced. Overproduction of information can be considered waste, while under production of information can lead problems for information receivers.

As outlined in section 3.1.5 of the **Digital Engineering Information Standards part 1** and in alignment with ISO19650, KiwiRail has elected to split level of information need into its elementary components of level of detail and level of information. This is outlined further in the below table.

| # | Term | Initialism | Scale | Description |
|---|---|---|---|---|
| 1 | Level of Detail | LoD | 1-5 | Level of Detail is the amount of geometrical (graphical) information contained in a 3D model. |
| 2 | Level of Information | LoI | 1-6 | Level of Information is the amount of non-geometrical (non-graphical) data embedded within an Information Model or 3D model. |
| 3 | Level of Development* | LOD | 100-500 | Level of Development refers to both the Level of Detail and Level of Information contained within a model element. |

### 4.3.1 Asset Definition Method

In order to confirm level of information needed the assets and their hierarchy that are going to be developed both first in the digital world and then in the physical world need to be defined. Just like design coordination, the asset definition process is iterative during the design phase and becomes more granular throughout the process. KiwiRail is moving towards an asset definition method approach whereby high-level assets that will be built on a project are clearly defined early in the design process within our asset management system. This enables the production of information (both graphical and non-graphical) to align with the asset hierarchy.

### 4.3.2 Use of Information

All information produced must have a purpose. This may seem obvious, however it often this is not thought of during the planning of information production in the design phase. This can result in information not being suitable for downstream use.

An example of this would be a project identifying that 4D construction sequencing would be of value on the project, however the 3D models have not been developed during design in a way that enables this activity. This results in the project being unable to conduct 4D activities without modifying or reproducing information, losing any efficiencies gained from strategic planning of information production in the design phase. BIM uses agreed to be implemented and outlined within the **Project Information Requirements** need to be developed in consideration as to how they will support information uses for information receivers.

Some examples of information and BIM uses are show below:

**Information use examples:**

- Design reviews
- Consenting
- Stakeholder engagement
- To build the asset

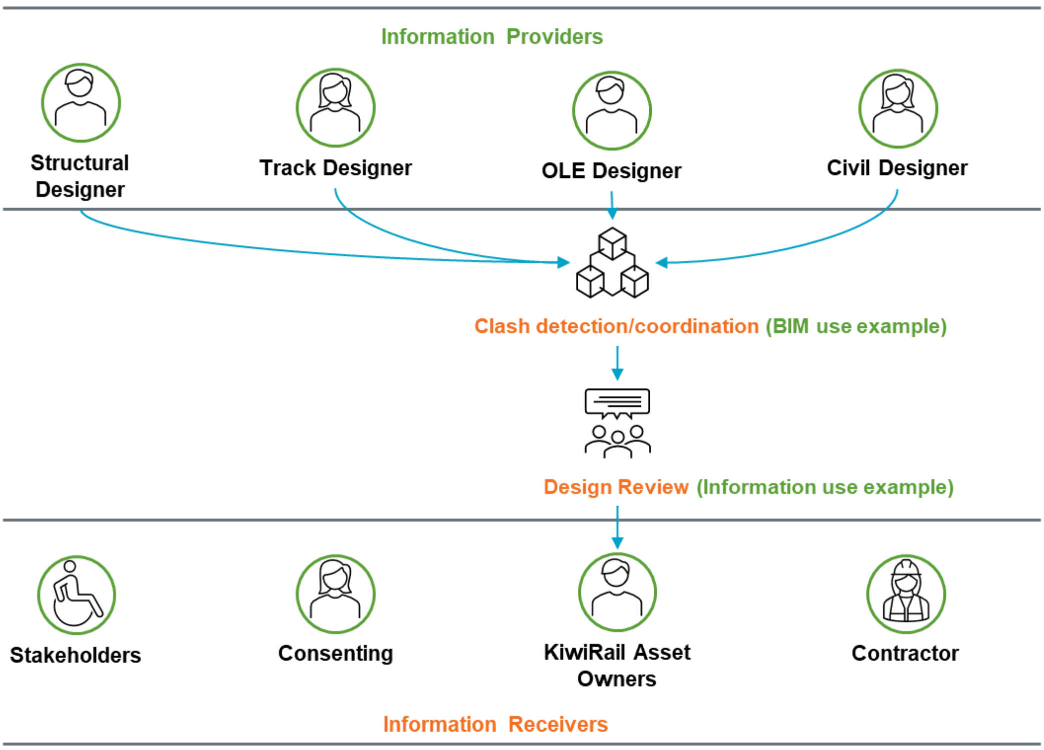
**BIM use examples:**

- Clash detection
- 4D construction sequencing
- Model based quantity take offs
- Model base carbon measurements

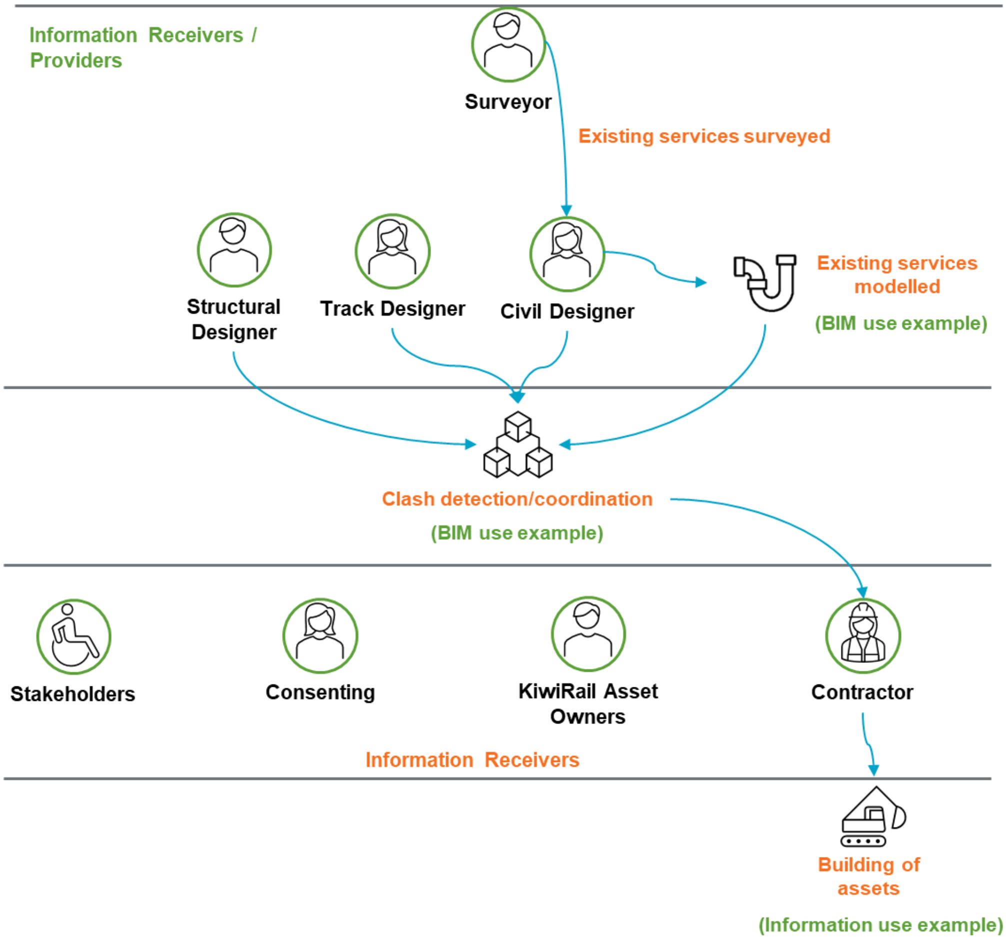
### 4.3.3 Bringing it all Together (Examples)

BIM uses should always be associated to information needs, otherwise effort may put into areas that do not add value to the project. The below diagrams graphically convey some examples of how BIM uses, and information uses need to be symbiotic for digital engineering to provide value.

Example 1: Design Review Information



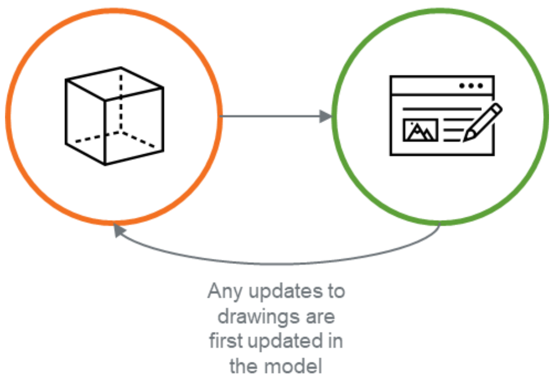
Example 2: Underground service mapping




## 4.4 INFORMATION PRODUCTION

All information produced during design should take a model and data first approach, whereby drawings are always derived from 3D models. Drawings that are produced must have a clear use and information receiver. When updates are required to drawings the model should always be first updated and then this change cascades into the drawings, ensuring that 3D and 2D information are aligned. This process can often become convoluted with a number of design authoring software's typically being used to develop information. Because of this, the development of processes is fundamental. These should be documented in the project DEXP, and the Task Information Delivery Plan (TIDP). The projects Master Information Delivery Plan (MIDP) should clearly document what information is being produced as outlined in the **Exchange Information Requirements**.

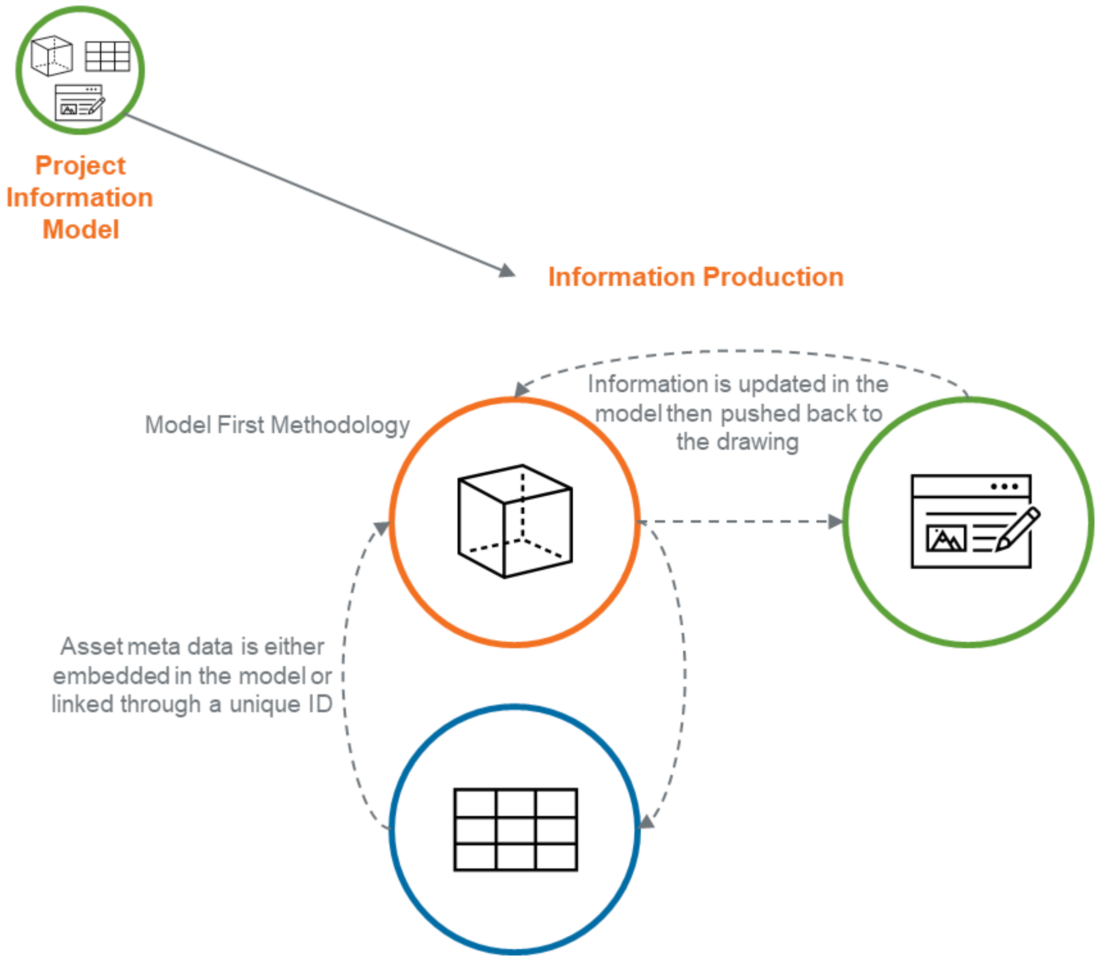
**Model First Methodology**



#### 4.4.1 Data Driven Approach

When developing design deliverables information produced should be thought of as data rather than documentation. Often information is developed into documentation (for example 2D drawings) because this is only way information receivers are used to receiving information, or able to view it without software limitations.

This results in information being reproduced several times and creates risk that information receivers do not have the latest version of design information. It is also an inefficient way to develop information. Where possible information should either be developed in a 3D (graphical information) or in a data base (non-graphical) and linked through unique identifiers. KiwiRail has invested in technologies such as the Common Data Environment and the Collaborative Environment that alleviate software limitations for information receivers making all types of information available for all information receivers.




#### 4.4.2 Information Ontology (Structure)

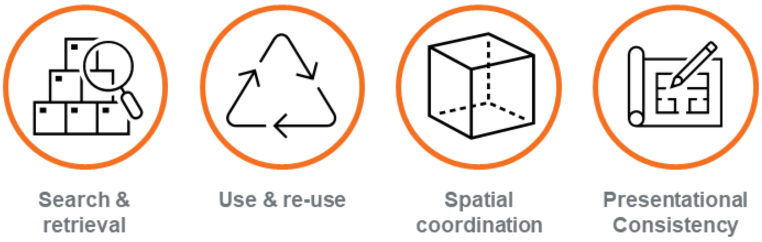
Construction projects are complex and so the interfaces between the assets that are created, therefore a system's thinking[2] approach can be applied to support the reliable production of information. Otherwise, the process will be highly inefficient and overly complex. Just like the physical infrastructure that is created the production of information needs to be connected. This is what the holistic view of a Project Information Model aims to achieve, however the reality of executing this on a project requires detailed planning of the processes required to produce project specific information.

[2] The Evolution of Systems Engineering | The MITRE Corporation

How information needs to connect should be mapped out in the information production planning phase to ensure these connections are identified and done in an efficient way.

#### 4.4.3 Information production – ISO19650 fundamentals

Information produced should be done so in alignment with ISO19650. The following four key areas need to be well defined and implemented during the design phase:

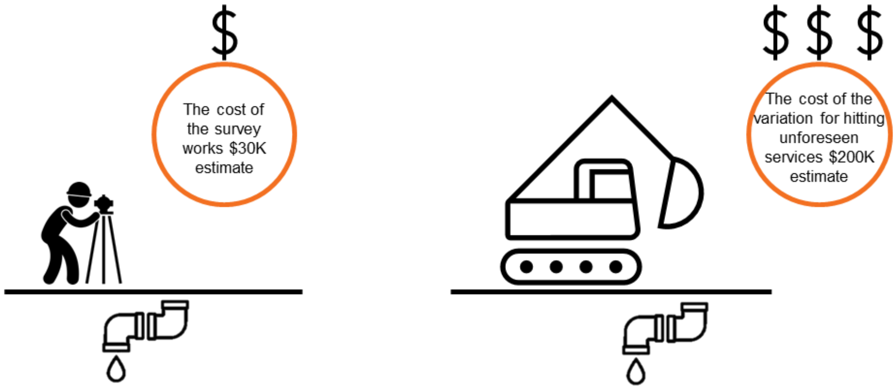



- **Search and Retrieval** – Finding information when you need it, this is one of the key functions of the common data environment. Metadata attributed to each information type needs to be agreed within the project team, so it is easy for people to search for information within the CDE.
- **Use & Re-use** – The structure and format of how information is developed in will largely define how it can be used downstream. This needs to be defined at the beginning of the design phase, if information is not able to be used for its intended purpose or reused for other purposes, then it is of no value to KiwiRail and is a waste of time and cost.
- **Spatial Coordination** – All graphical information produced needs to be spatially coordinated, otherwise this can present significant risks to the project, notably around decision making and when assets are constructed onsite. All graphical models must include a real world origin point and use a coordinate system in alignment with the **KiwiRail Spatial Capture Framework.**
- **Presentational Consistency** – This is extremely important to information receivers' ability to understand and interpret information. This is also particularly important for KiwiRail as construction is typically carried out in live rail environments, for example underground services need to be clearly interpreted on design information.

# 5 Information Gathering

## 5.1 EXISITING CONDITIONS

Typically, infrastructure projects do not prioritise the upfront investment in having reliable information on existing conditions. This results in risks being passed to the construction team where they are vastly more expensive to rectify if things go wrong. KiwiRail is changing its approach to this and prioritising the surveying, data collection and modelling of existing conditions. This requires a relocation of where money is spent on a project however will result in a reduction of overall costs. An example of this is outlined below:




There are two key areas that should be considered:

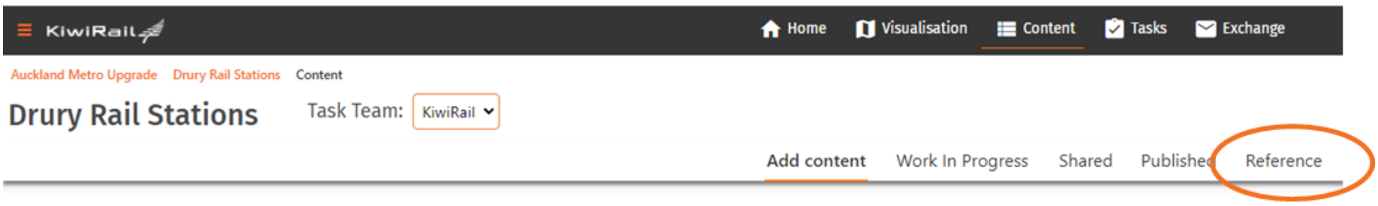
- **Point Cloud Surveys** – All spatial information should be produced in alignment with the **KiwiRail Spatial Capture Framework**. Spatial information enables coordination with existing conditions for example existing structures onsite and should be captured as early as possible for the design teams use.
- **Underground Services** – Existing underground services should be surveyed and modelled in alignment with the **KiwiRail Subsurface Utility Identification and Modelling Guidance Note**. This will enable the design team to coordinate with existing underground services to a greater level of accuracy. It will also provide greater reliability **on the information** being passed over to the construction team therefore reducing risks during construction.

Traditional surveying methods such as topographic should also be conducted as required. Non-spatial surveys and investigations that impact design such as condition surveys (e.g. cctv of pipes) and geotechnical and soil testing, and electrical load monitoring should all be conducted as required. This will enable information providers to make informed design decisions with regards to existing conditions.

### 5.2 REFERENCE INFORMATION

Any information in relation to the site that has been previously produced and could be of use to the design team and wider project team should be collated and uploaded to the Reference container within the projects CDE (GeoDocs) environment. An example of this would be existing drawings from a previous project at the project location.

The below image shows where to find the reference container within GeoDocs.

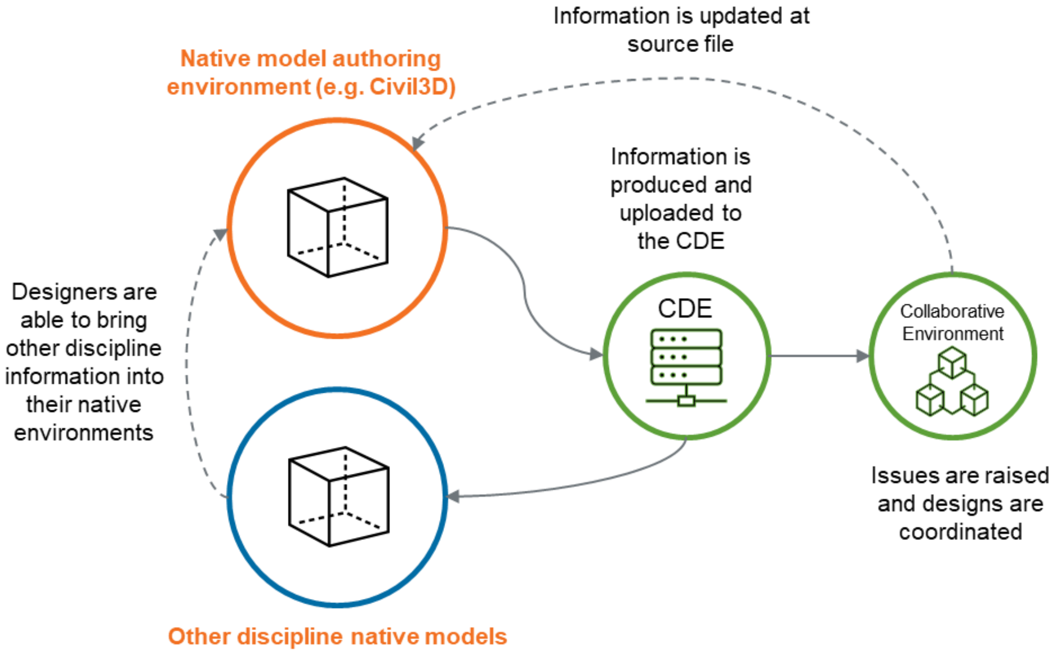



## 6 Collaborative Production of Information

Information developed during the design phase will ultimately involve a level of collaboration between different task teams. Due to the complexity of KiwiRail projects any information developed in isolation presents risks that are often not uncovered until the construction phase and result in time and cost implications.

A collaborative approach needs to be at the forefront of the production of information. The following keys areas must be developed for a project to enable coordination and a collaborative approach.

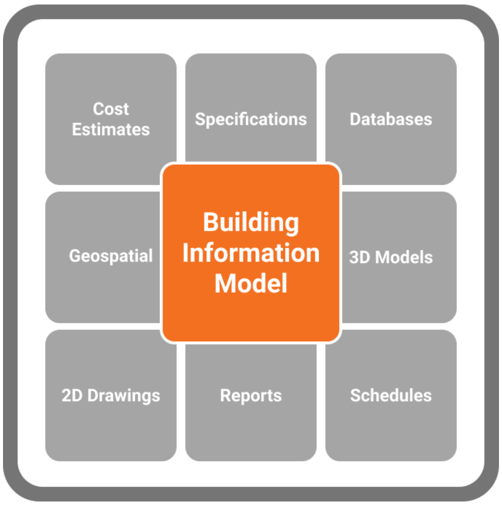
- **Model Authoring Environment** - Each task teams information must be available to all task teams via the CDE. The Exchange Information Requirements developed for the project should ensure that design task teams are able to take other disciplines native 3D models into their model authoring software without interoperability complications. This enables context when information is being produced in its native environment.
- **Collaborative Environment** – When assets are developed first in the digital world presents the best opportunity to iteratively get things right before we are on site. All coordination of 2D and 3D information must be conducted in the KiwiRail Collaborative Environment, this is outlined in more detail in Section 7.1.




## 6.1 FEDERATION STRATEGY

Traditionally a federation strategy is only considered in relation to the federation of 3D BIM models. When we are delivering a Project Information Model during the design phase, a federation strategy needs to be developed which defines the proposed approach to breaking down all parts that make up the information model into manageable units. A clear breakdown structure will support but is not limited to, the following key areas:

- **Simultaneous working** – This will enable task teams to work simultaneously on different aspects of the design. For example, spatial boundaries will support task teams in knowing exactly where they can locate assets within the design.
- **Scope allocation** – The breakdown structure should support clearly defining who is designing what and how this how the information will be developed for an information receiver.
- **Information exchange** – When the breakdown of the PIM has clearly been defined, it enables clear delineation for information transfer between task teams.



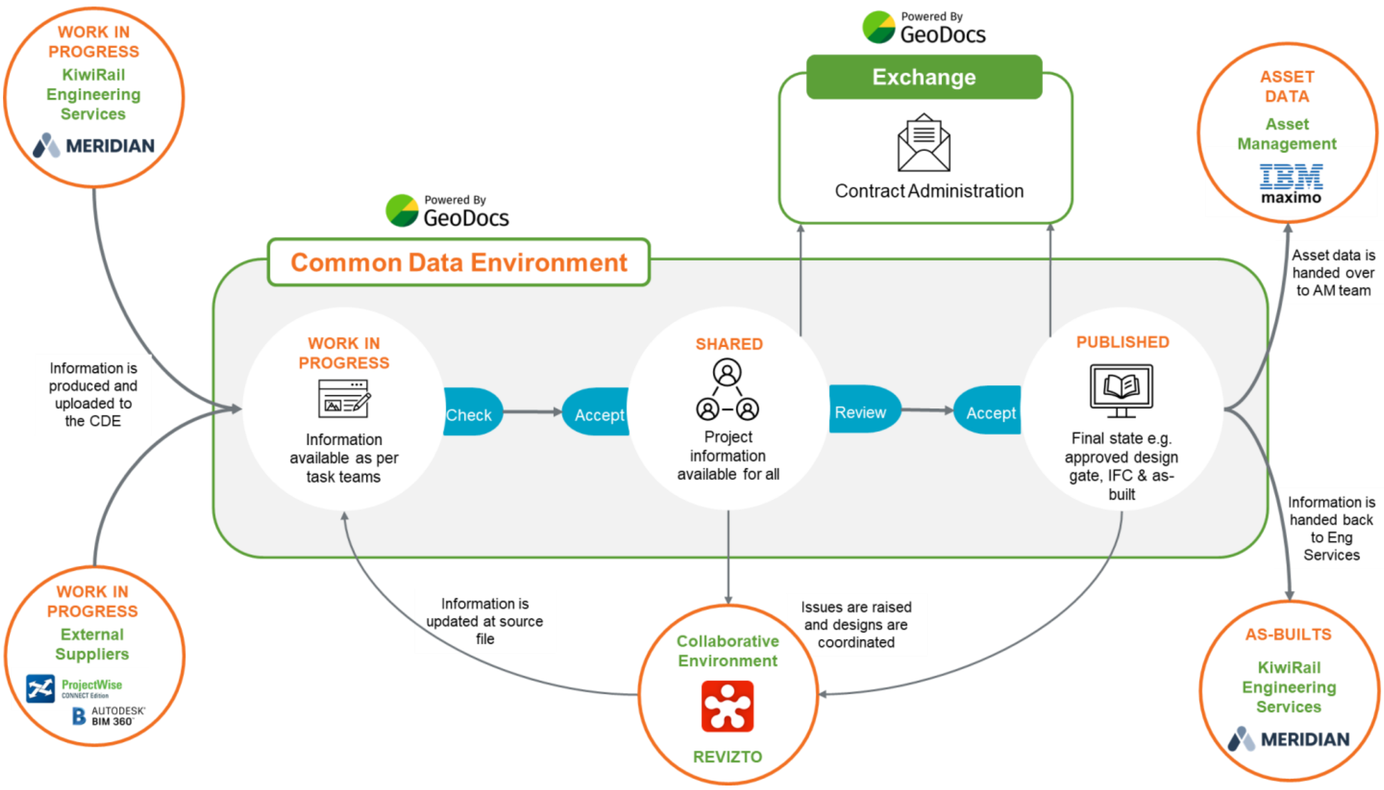

Project Information Model Example

## 6.2 COMMON DATA ENVIRONMENT

The KiwiRail Common Data Environment (CDE) is covered in detail in the **Digital Engineering Framework** and in the **GeoDocs Guidance Note** and should be referred to alongside this document. This document will not cover the detail of the CDE.

In relation to digital design management the CDE is a fundamental component for delivering the design. All information should be stored in the CDE in alignment with ISO19650. Following ISO19650 requires a change in the way have worked traditionally on construction projects, with the key fundamental of information moving from **Work in Progress (WIP)**, to **Shared**, to **Published** needing to be understood and adhered too.

The diagram below simplifies how information flows through the CDE during the project.



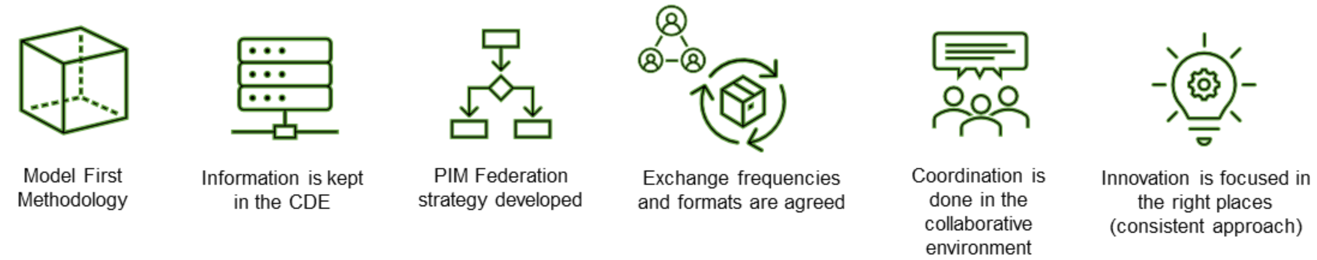

# 7 Design Coordination

The implementation of digital engineering tools and processes across the KiwiRail capital works portfolio has been developed to enable a consistent approach to design coordination. These tools and process drive the coordination process and should not sit in isolation to traditional design management techniques.

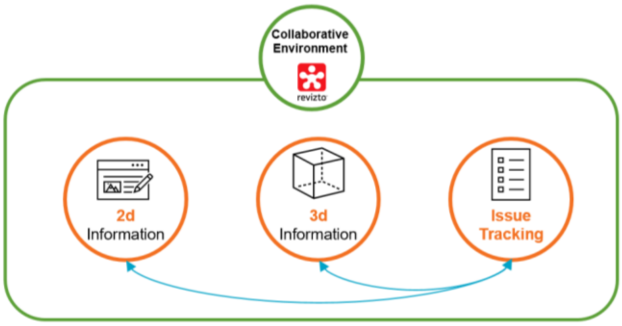
Traditionally DE tools and process have often not been implemented until the later design phases (developed and detailed) as information is not considered detailed enough the warrant the implementation. This results in traditional processes being set up at the beginning of a project and it being really challenging for DE tools and process to implemented without sitting in isolation. For digital engineering to really add value it must be integrated and available to all practitioners from the beginning of the design process.

When a model first methodology is taken early in concept design, information can be developed in a way that ensures it is iterative and becomes more granular over time rather than being produced and re-produced in different formats, ultimately wasting time and effort.

The following digital design coordination fundamentals should be implemented:




## 7.1 COLLABORATIVE ENVIRONMENT

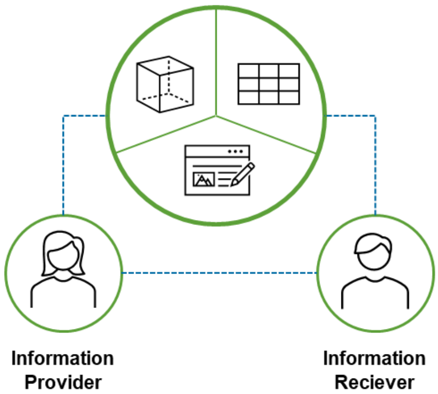



A collaborative way of working during design and construction is integral to BIM and it is important to have an accessible environment to support this. The collaborative environment is a place where all parties can access the latest federated 2D and 3D design information for coordination, review, and collaboration. Kiwirail uses Revizto as the platform for this across capital projects. More detailed information regarding Revizto can be found in the **Kiwirail Digital Engineering Revizto Guidance Note**.

Revizto is updated on a regular basis with the latest 2D drawings and 3D models meaning the platform can be used to view the federated design during design meetings, for model reviews, and to communicate issues and clashes between task teams with an auditable record of communications.

This democratises access to up-to-date issues, clashes and design information with it all unified in one accessible platform.

## 7.2 EXCHANGE FORMATS AND FREQUENCIES




The exchange of information between task teams is fundamental to a projects ability to coordinate a design. This might sound logical, however typically with multiple design authoring software's used by different task teams the exchange of information can become a roadblock and waste time.

Exchange formats (for example file types) and frequencies should be agreed upfront within the **Exchange Information Requirements**. While the collaborative environment will be the source of truth from a coordination perspective, information exchange frequencies need to be frequent and automated where possible to enable iterative design within authoring software's.

All exchanges of information need to be done via the CDE. 3D models and 2D drawings can then be pushed to the collaborative environment for inter task team coordination. Where possible information pushes should be automated from the native design authoring software (for example Revit) to the collaborative environment (Revizto), however all information should first be in the CDE as per ISO19650.

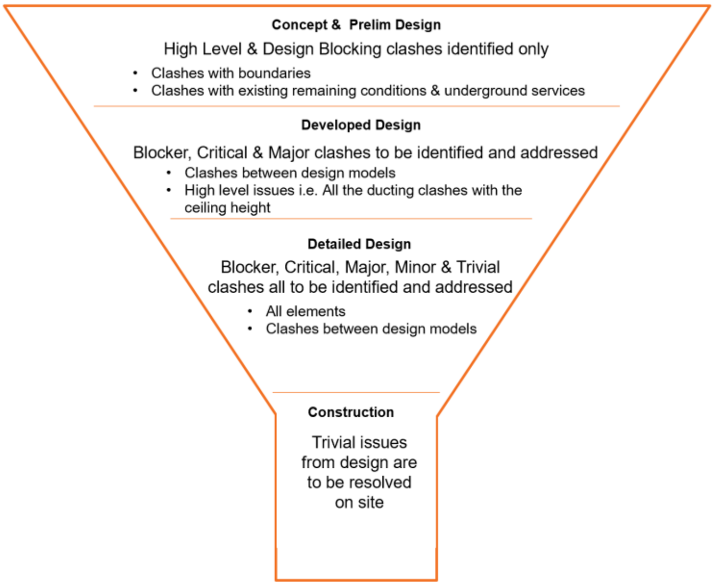
This will enable a cyclic approach to information exchanges between task teams as information providers and receivers.  Traditionally information exchanges become more frequent as the design progresses. This is because information is not seen as ready to share with other task teams. When a model first methodology is taken, information exchanges can more frequently earlier in the design process

### 7.3 CLASH DETECTION

Clash detection ensures that models are coordinated so that when the project information model is issued for construction, we have confidence that the design is constructable and that the onsite rework required has been minimised.

Clash detection should be carried out at varying levels across all the design phases:

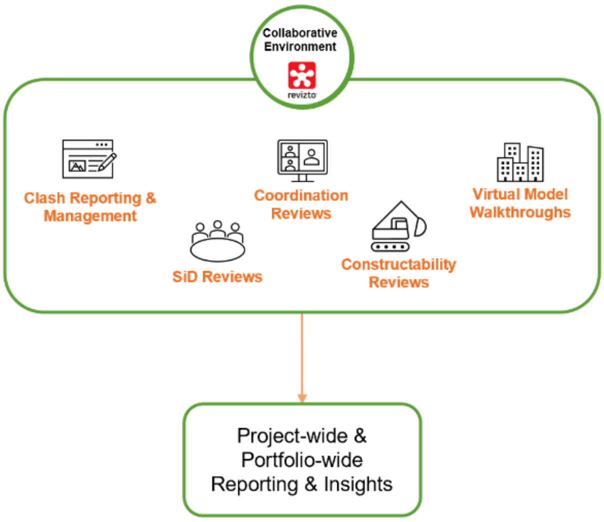
- informal checks done within the individual design models by the model element authors ensuring there are not clashing elements within their models
- formal clash tests run in the federated model environment by the BIM manager/coordinator to identify individual geometrical clashes between elements in different discipline models
- virtual model walkthroughs where any constructability issues and clashes that are spotted can be raised, assigned, and addressed in the coordination environment.




This should be done at a high level in the early design stages and progress to a more thorough and detailed approach the further through design the model gets. These clashes are recorded in the collaborative environment where they can be monitored, updated, and marked as resolved and are visible to the design team. This enables progress to be tracked across the design phases and into construction and gives us the ability to report on issues across the disciplines in the project and also, up a level, across the capital portfolio.

# 8 Design Reviews

Design reviews should be conducted using the tools in the KiwiRail digital engineering suite like Revizto (the collaboration environment) and GeoDocs (the CDE). By conducting model-based reviews in tools like Revizto, you can view the 2D and 3D information and record your comments in the same place. This removes the complications of having multiple registers and spreadsheets being shared between people and means all the commentary (or as much as is feasible) is in the one place. There items can be re-assigned to the people who need to action them and closed out once agreed. Having this all this in the one place also means there is a history kept of all issues raised, the commentary surrounding them and what was done to close them out that can be referred to throughout the project life cycle.



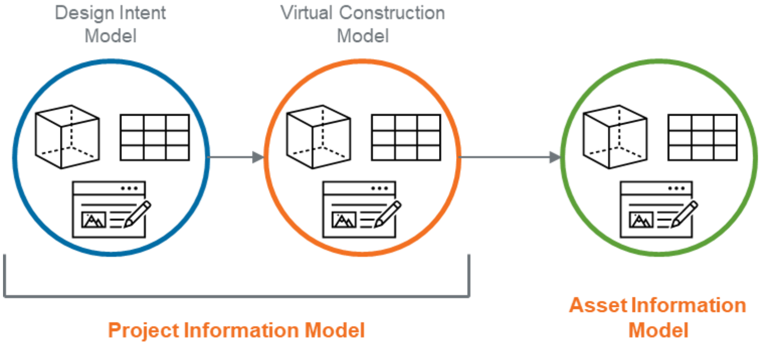
The collaborative environment support a model-based approach to conducting Safety in Design workshops, inter-disciplinary coordination reviews and constructability reviews within the platform. Issues can be raised in the same platform that you are navigating and viewing all the 2D and 3D design information in. Custom metadata can be created to use with a data-driven approach of labelling issues and their relevant review type (SiD, constructability issues, clashes etc.) giving us the power to create dashboard outputs and get visibility and insight into issues across the project and across the portfolio.

Our CDE has a task-team review feature that can be used for getting approval of documents hosted in GeoDocs that need review or sign-off from other members in the task team. This simplifies the process of sharing documents and receiving comments as by enabling it to all be done in the same place.

# 9 Information Handover for Construction

The exchange of information from the designers as information providers to contractors as information receivers is a crucial part of project success. Contractors need the right information in the right format types to build physical assets. Traditionally information would be handed over as static drawings, which often resulted in contractor task teams re-creating information (notably 3D models) that has already been created for use during the construction phase. The earlier Construction Information Requirements (CIRs) are set the better as this can be considered during the design. The earlier also contractors can be consulted in the design phase the more meaningful their input can be and recommendations incorporated into the design.

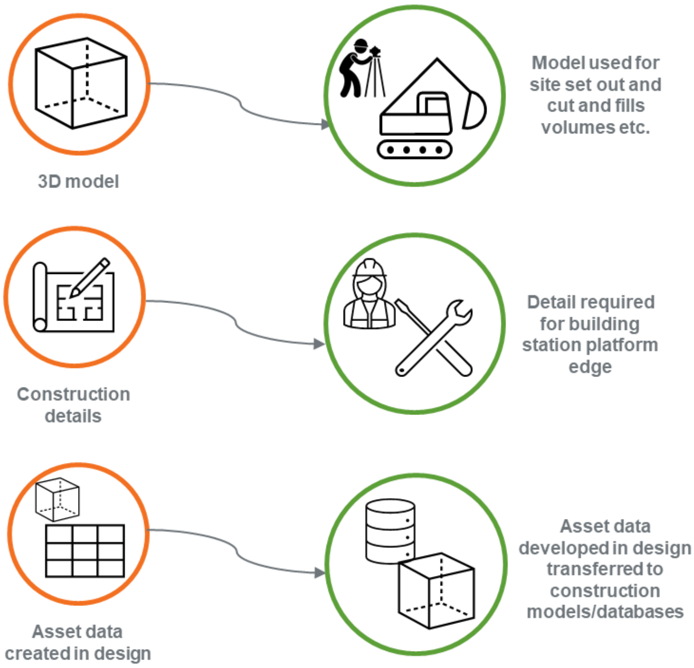
Given the scale and complexity this is often not a simple transition from design to construction as projects are delivered using many different procurement strategies and contract types. As information is handed over, the Project Information Model will transition from a holistic design intent model to a virtual construction model. It is important that the format and method for exchanging information from the design to construction environments is defined in the construction contract and that the project management and commercial teams agree the process.




## 9.1 INFORMATION EXCHANGE

Information must be handed over to the construction task teams via the CDE. As it will have been through a review process and have approved by the relevant parties and subject matter experts the information will be pushed from the **Shared** container to the **Published** container in the CDE. Information for Construction (IFC) should only ever be available in the **Published** container, so it is really clear which is the right information for construction.

The design task teams will need to work collaboratively with the construction task teams to understand how information will be used on site, as this will define the best formats to provide information in. Some examples are shown below.




## 9.2 COLLABORATIVE ENVIRONMENT IN CONSTRUCTION

The collaborative environment will continue to be used during the construction phase to coordinate, communicate, and collaborate. In relation to designers when it is appropriate for the construction task teams to have access and use the collaborative environment, they will provide all input/feedback to design task teams on 3D models and 2D drawings via the platform. Stamps and tags as outlined in the **Kiwirail Digital Engineering Revizto Guidance Note** will be used to filter feedback provided back to design task teams.

KiwiRail