AUTODESK. UNIVERSITY

Digitizing New Zealand's Innovation Agency

Presenters

Hugh Evans, Design Lead | @callaghannz

Jason Howden, Digital Innovation Leader | @warrenandmahoney

Background to this presentation

Callaghan Innovation is New Zealand's innovation agency, activating innovation and helping businesses grow faster for a better New Zealand.

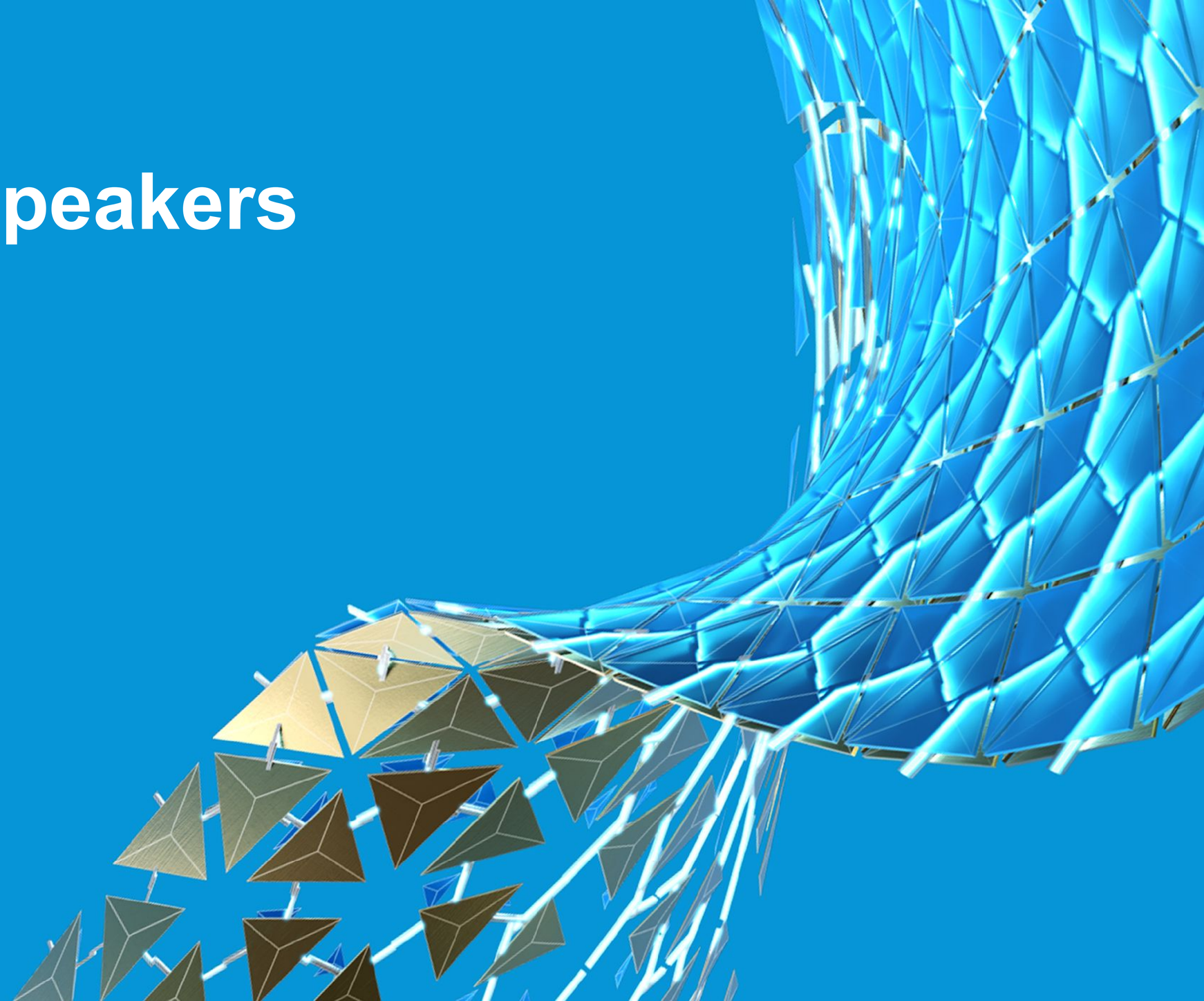
Callaghan Innovation, with Architect and BIM specialist Warren and Mahoney, present on lessons learned from implementation of an ISO 19650 aligned process for redesign of their Gracefield Innovation Quarter (GIQ) site, from Appointing Party & Lead Appointed Party perspectives, and through utilization of the Autodesk BIM 360 ecosystem for working (*and collaborating*) in the cloud.

The GIQ is set on 10-hectares that is home to over 200 leading scientists, engineers and researchers. The GIQ site is currently undergoing significant investment, as part of a $130m redevelopment investment to achieve a vibrant, supportive and connected innovation community.

CallaghanInnovation

New Zealand's Innovation Agency

About the Speakers



Hugh Evans - Callaghan Innovation

Design Lead for Callaghan Innovation, New Zealand's Innovation Agency, and responsible for a team involved with the $130m redevelopment of the Gracefield Innovation Quarter (GIQ) site.

Hugh has worked across the fields of consulting and mechanical engineering, and in other multidisciplinary roles, with a track record of delivering leadership across projects in Australia, New Zealand, Norway, Singapore, UK and USA.

In joining Callaghan Innovation Hugh sees a unique opportunity to bring the latest digital techniques to the redevelopment of a site that has a host of legacy issues, but a vision to support world-changing innovation through R&D.

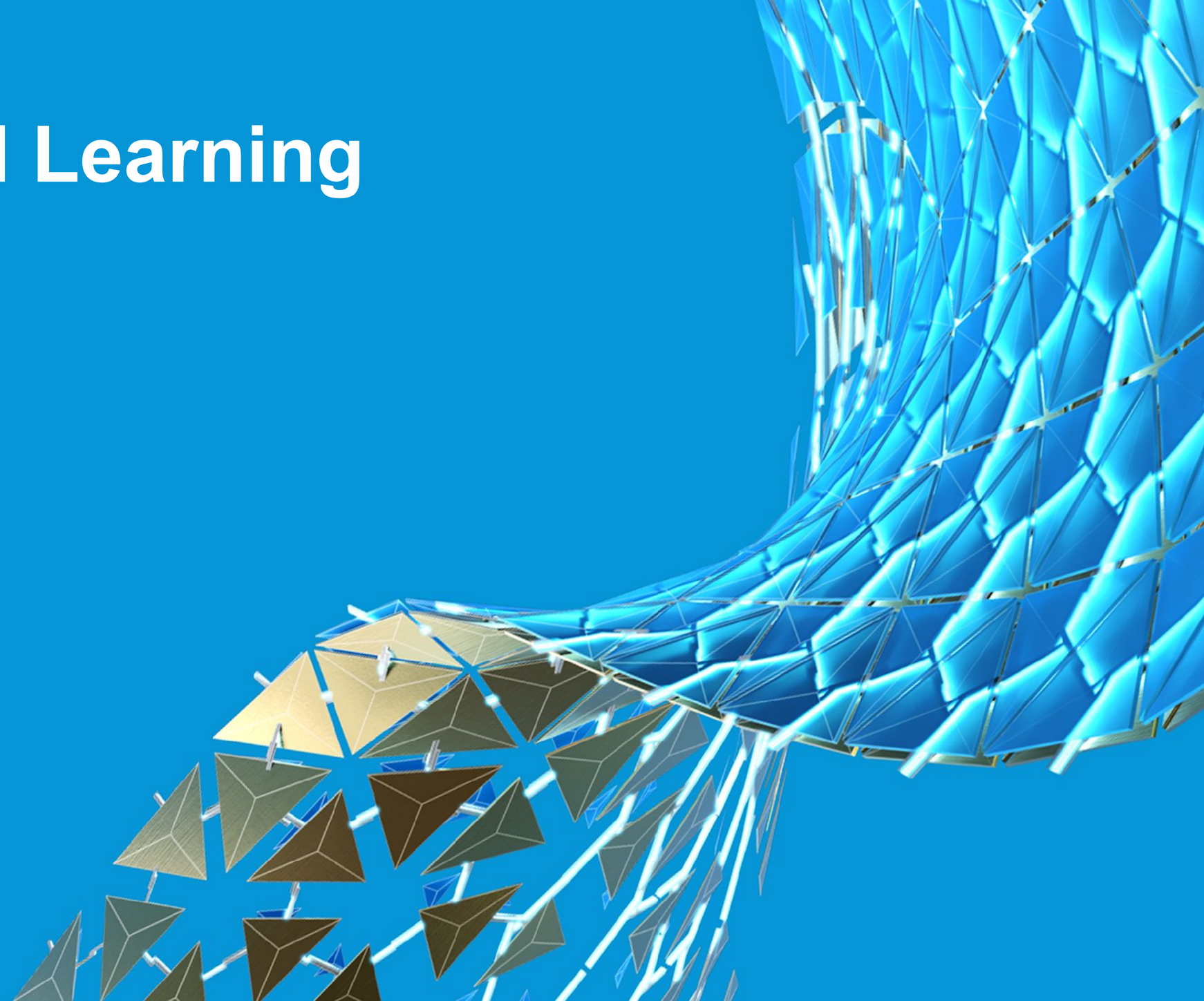
Jason Howden - Warren and Mahoney

Associate Principal and Digital Innovation Leader for Warren and Mahoney, an australiasian architecture practice with 300 staff across 7 studios throughout New Zealand and Australia. For 25 years Jason has been at the forefront of BIM, leading its development, promotion and education around the world.

Jason is a complex-project specialist who has consulted on some of the world's largest public service facilities, including hospitals, laboratories, prisons and airports, with values ranging from $100 million to over $1.5 billion.

As W+M's Digital Innovation Leader he works closely with our clients to develop bespoke technologies and processes to deliver the best possible outcomes for their projects.

Agenda and Learning Objectives



Agenda

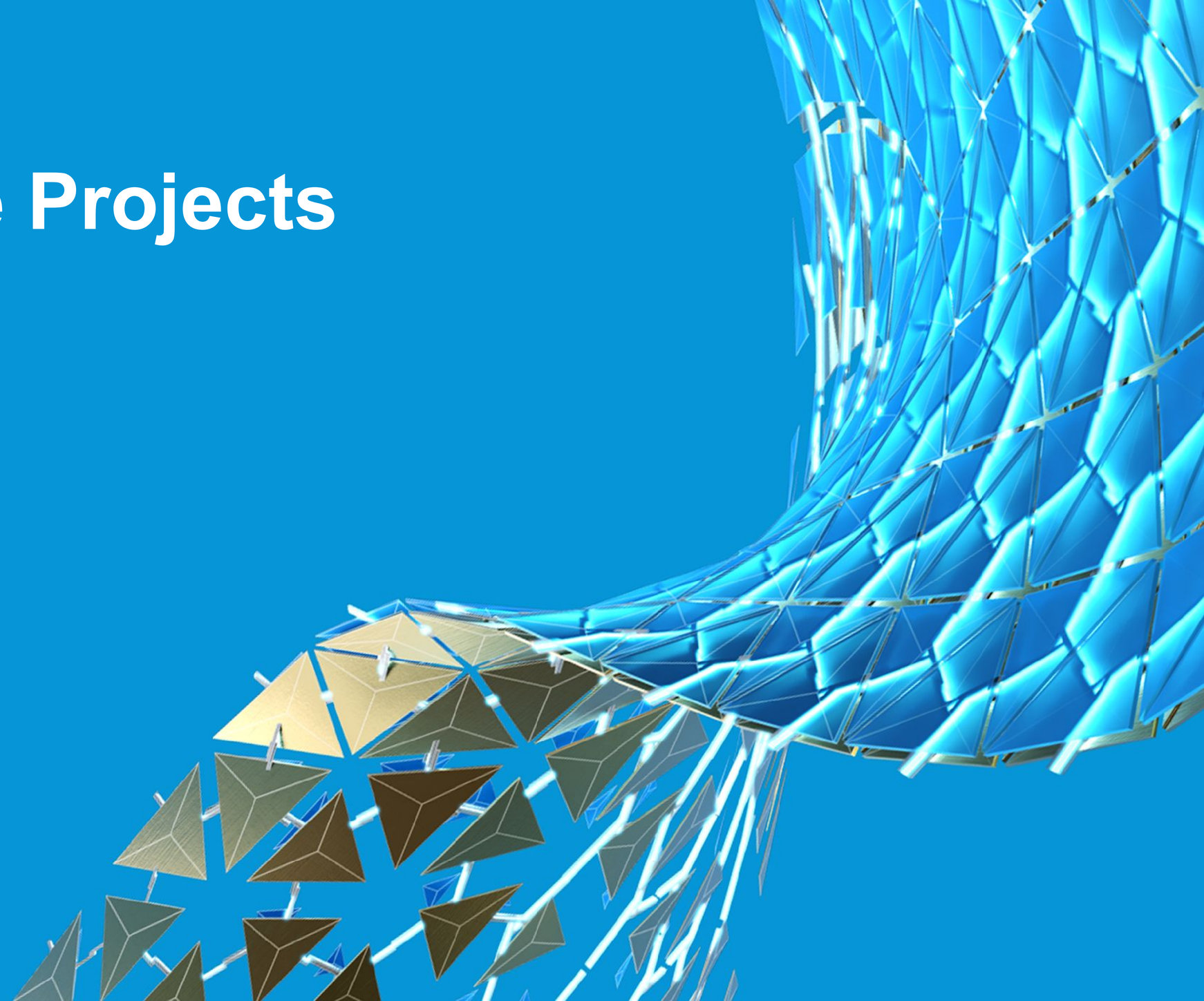
Presentation will describe the BIM and Digital approaches adopted by New Zealand's Innovation Agency, as part of the transformation of the GIQ site

- **GIQ and the projects**
- **BIM in New Zealand**
- **Procurement Methodologies**
- **Implementing ISO 19650**
- **Working in a High-Trust environment**
- **Unexpected Benefits**
- **Future Vision**

Learning Objectives

- **Objective 1**
  - Discover procurement methodologies for the successful engagement of consultants and contractors in high-trust digital environments.
- **Objective 2**
  - Discover the benefits and challenges of implementing ISO 19650 on small to medium-scale projects.
- **Objective 3**
  - Discover the benefits and challenges of working in a high-trust “live” BIM 360 environment that’s hosted by the client/building owner.
- **Objective 4**
  - Learn about unexpected client and stakeholder successes from adopting a high-trust, cloud-based, collaborative environment.

GIQ and the Projects



GIQ Site

Aerial view 2018

GIQ Facts & Numbers

10

HECTARES

The Innovation Quarter R&D facilities across workshops, pilot plants, labs and specialised equipment.

34,000m^2

LABORATORIES, OFFICES & WORKSHOPS

Includes 252 Chemistry and Physics labs (10,500m^2) and 292 office spaces (5,500m^2).

200+

SCIENTISTS & ENGINEERS

Expertise in advanced materials, biotechnologies, IoT & data solutions, advanced manufacturing.

2

UNIVERSITY DEPARTMENTS

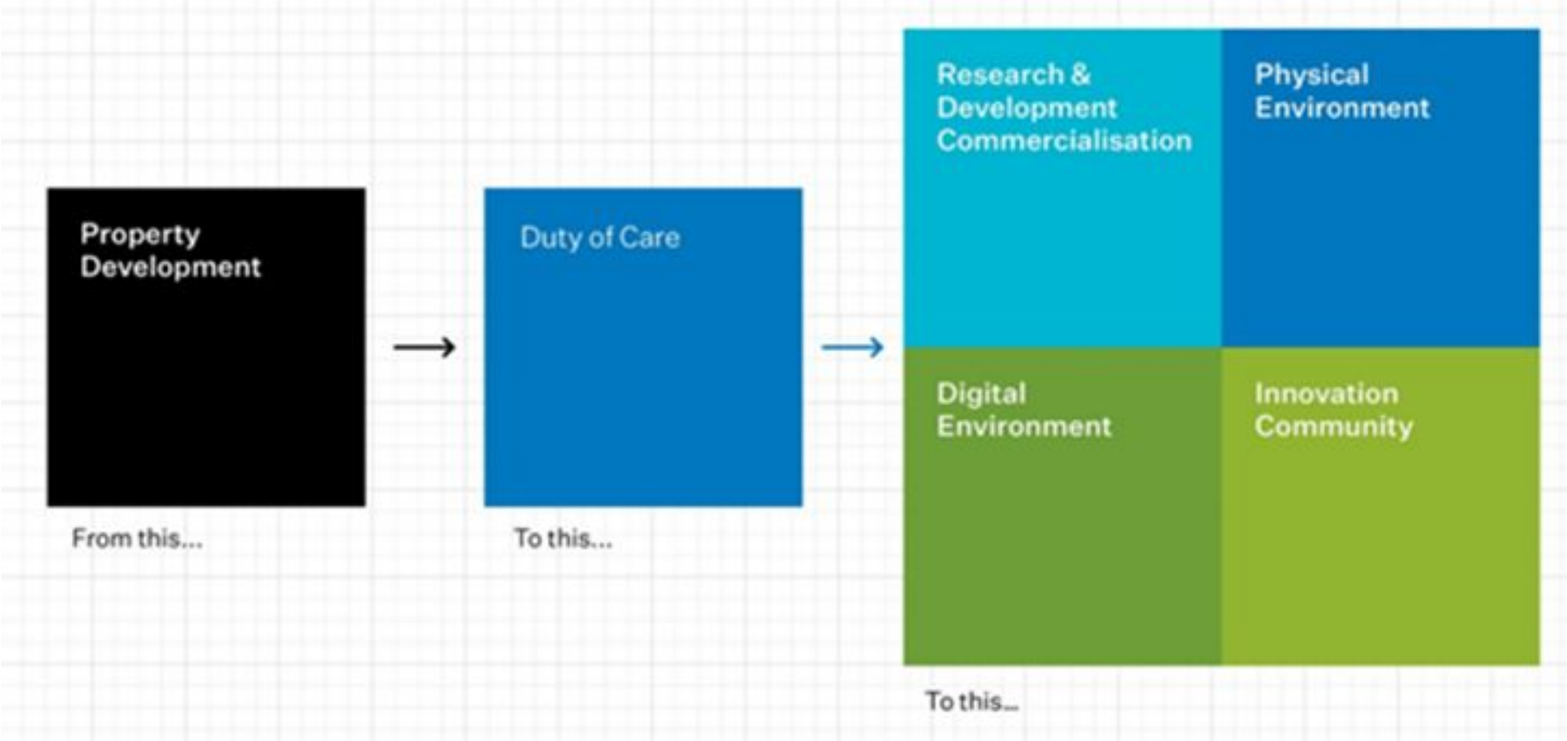
Victoria University of Wellington

(Ferrier Research Institute & Robinson Research Institute).

GIQ Legacy State

GIQ Vision

"***A vibrant, supportive and connected innovation community***", supporting Sir Paul Callaghan's vision of New Zealand being "***A place where talent wants to live***".



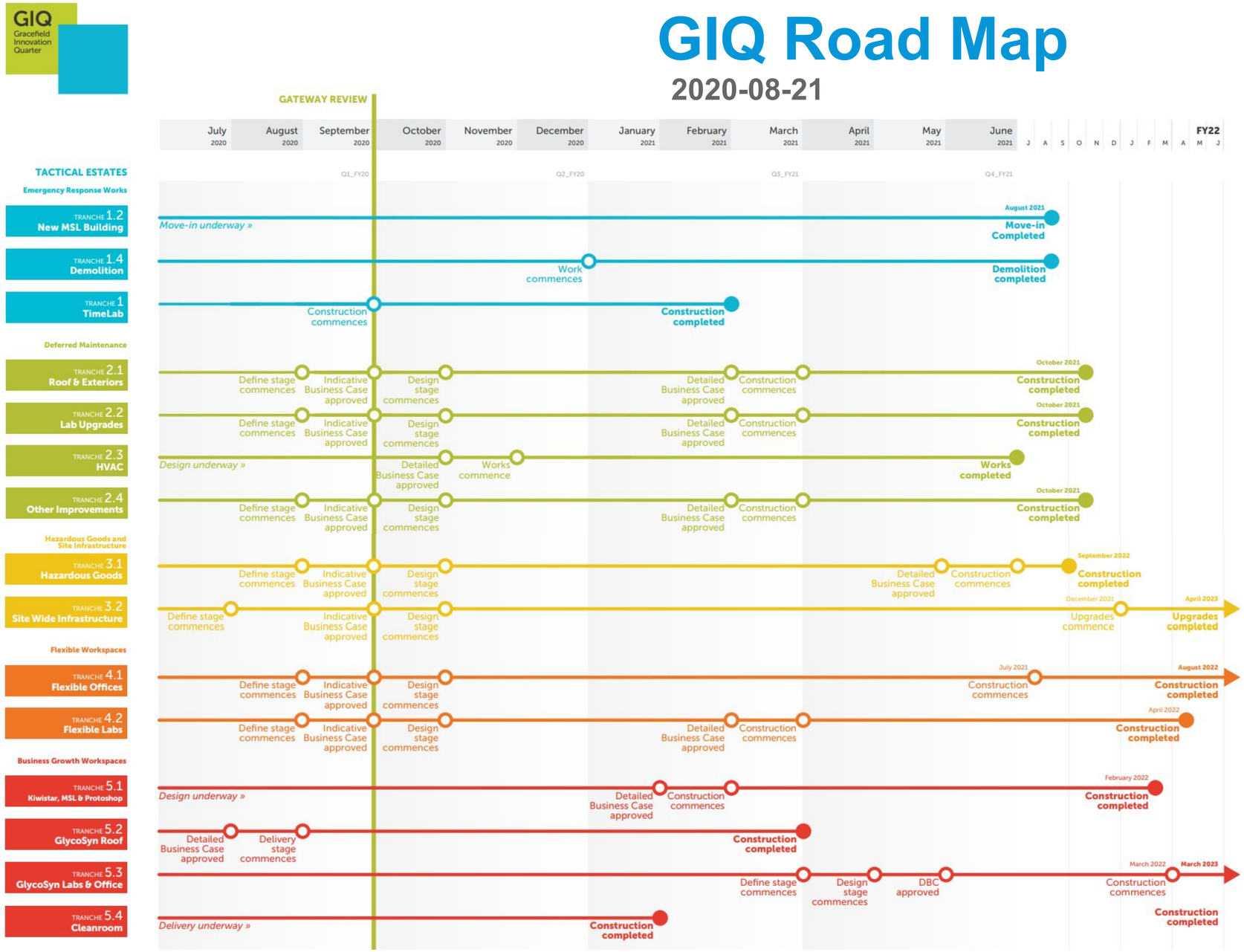
“GIQ is set to get an upgrade with the Government investing in redeveloping the site”

Hon Dr Megan Woods, Research, Science and Innovation Minister.


GIQ 3D Model

GIQ Road Map

2020-08-21



Programme Tranches

GIQ Project Framework

DISCOVER

Pre-Project

Pre-appointment stage, leads to an understanding of the project parameters and build-up of the Project Initiation.

DEFINE

Indicative Business Case

GIQ team extracts elements from the ‘Digital Twin’ federated 3D Model and builds the Scope of Works for Procurement of the Project Team.

Pre-appointment BEP is reviewed with preferred Tenderer.

DESIGN

Detailed Business Case

Project Team is appointed, with a Lead Appointed Party nominated as the BIM Lead.

GIQ ensures client hosted BIM 360 is set up for the project and correct administrative rights are enabled for BIM Lead to coordinate the design process. BIM Lead finalizes the BEP, along with MPDT.

DELIVER

Practical Completion

Main Contractor appointed and on-boarded to BIM 360.

2D drawings, 3D Model and specifications are issued via the CDE, suitable for Construction.

3D Model used as basis for shop drawing/fabrication processes and MPDT applied for site verified capture to the Model.

GIQ integrates Model data back to the ‘Digital Twin’ and Asset Information to the Asset Information Model.

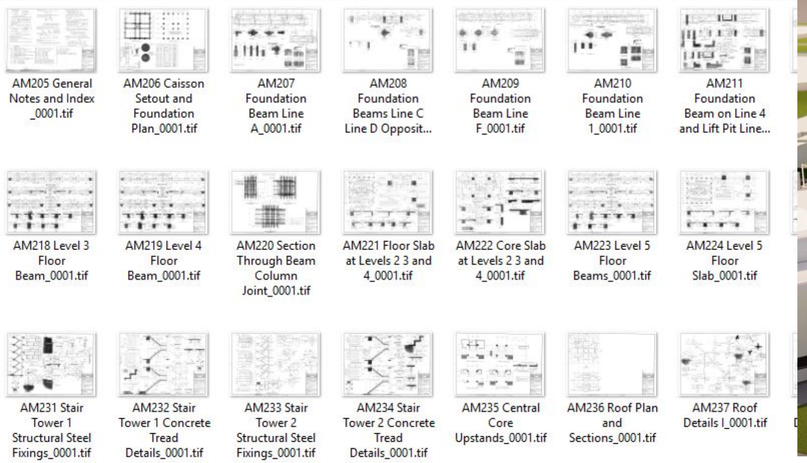
GIQ Site Digital Twin

‘Fly-thru’ of GIQ Site (BLD469202-GIQ-K-VI-001-Flythru_1080-RevA.mp4)

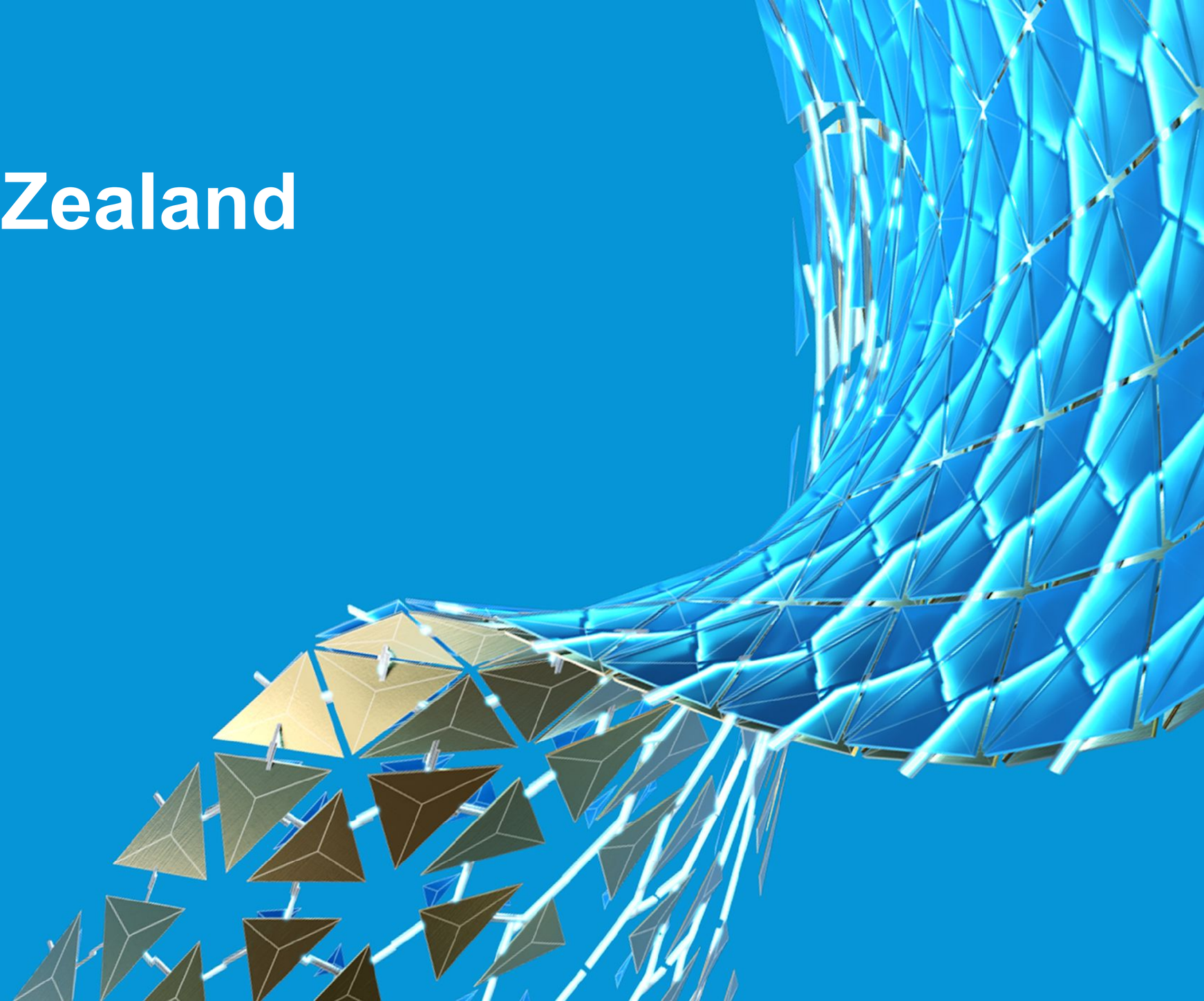
https://drive.autodesk.com/new/de2982716/shares/SH56a43QTfd62c1cd9682354508a4173665d

Password: “GIQ”

Digital Twin



BIM in New Zealand




Convention Centre
Performing Arts Precinct
Papa o Otakaro Avon River Precinct
The Square
Residential Demonstration Project
The Frame
Health Precinct
Justice and Emergency Services Precinct
Bus Interchange
Sports
Stadium


METRO

BIM uptake in New Zealand

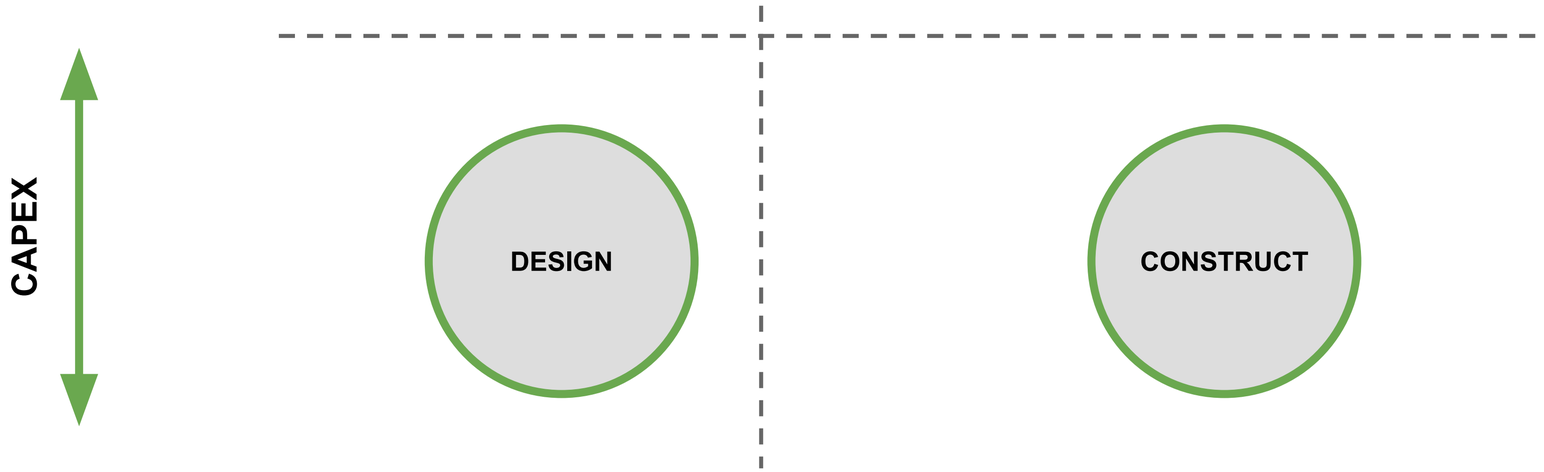
New Zealand BIM Handbook - Version 3.0

- BIM adoption is still strong in New Zealand. Formerly promoted via the BIM Acceleration Committee (BAC) throughout New Zealand.
- BIM adoption is predominantly led by design consultants but there is growing and strong support from tier 1 and 2 main contractors.
- Sub-trade contractors are starting to explore and embrace the benefits of BIM with many having been involved in the early BIM project through the Christchurch rebuild.
- With New Zealand being a small island nation lessons learned are quickly socialised across industry, with strong turnout at local and national BIM events supported by the BAC.

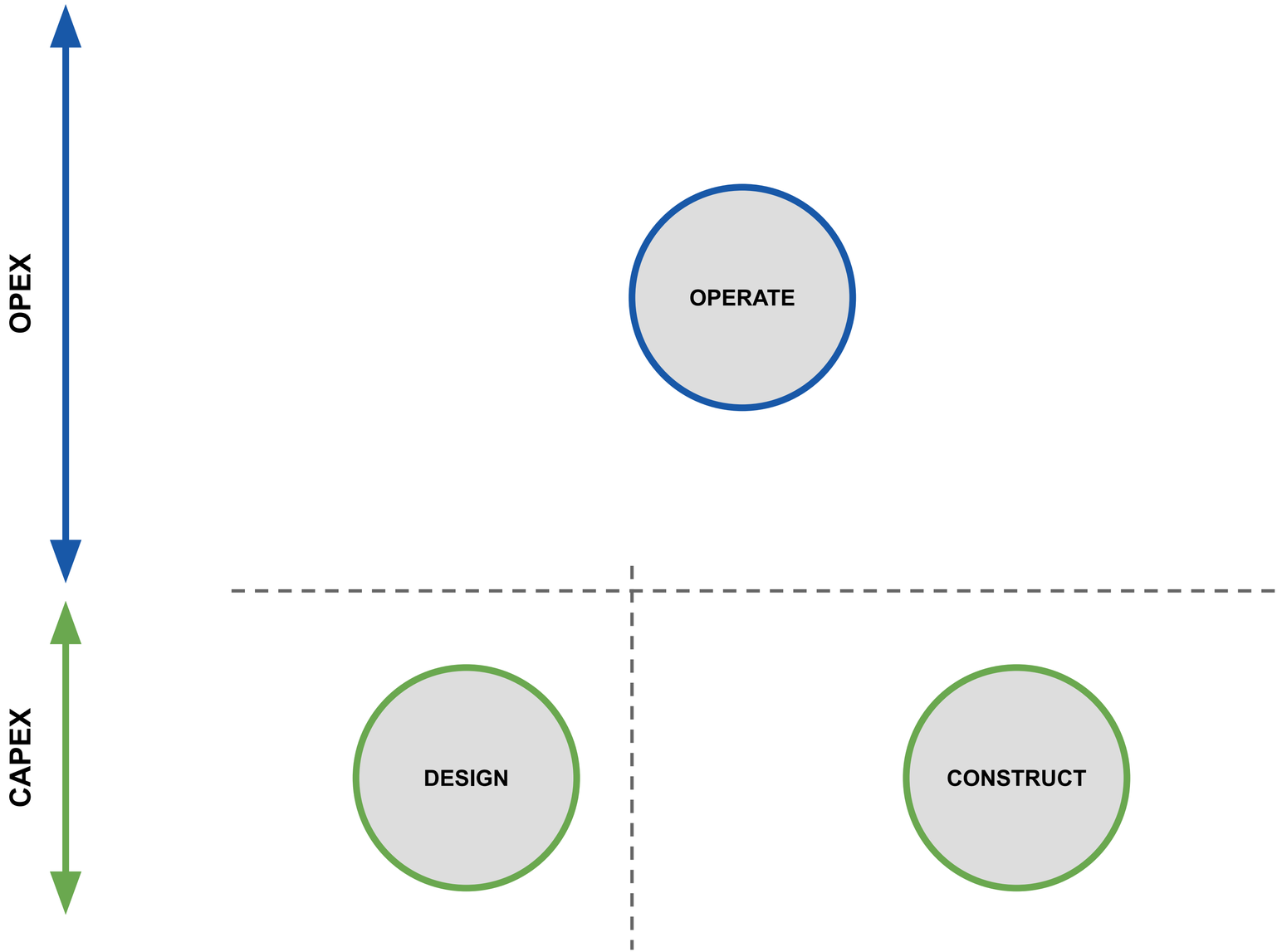
Among clients surveyed, 39% are integrating digital asset or spatial information with asset management systems, down from 47% in 2018.

Source: BAC BIM in New Zealand Survey 2019

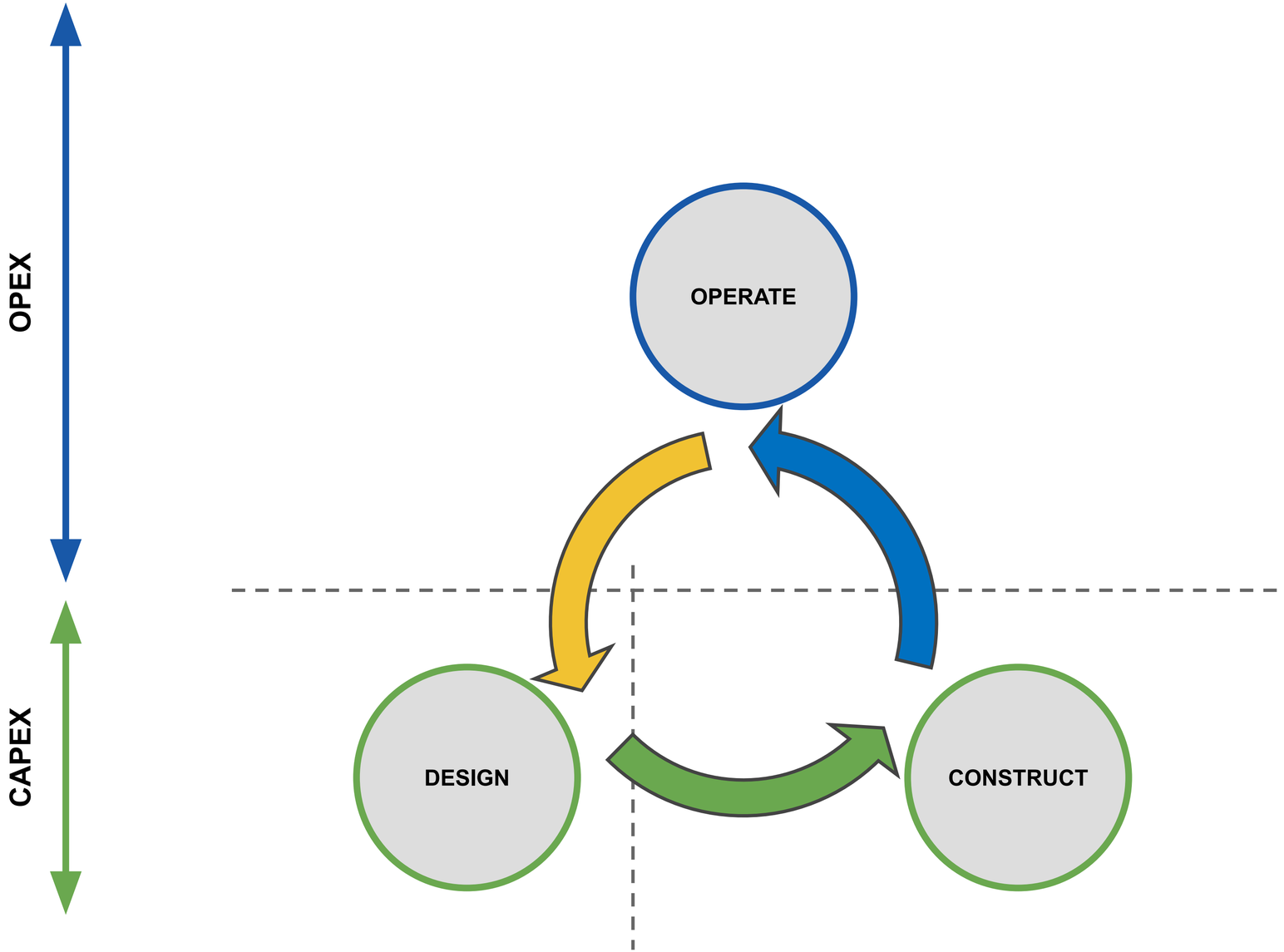
Why do BIM?



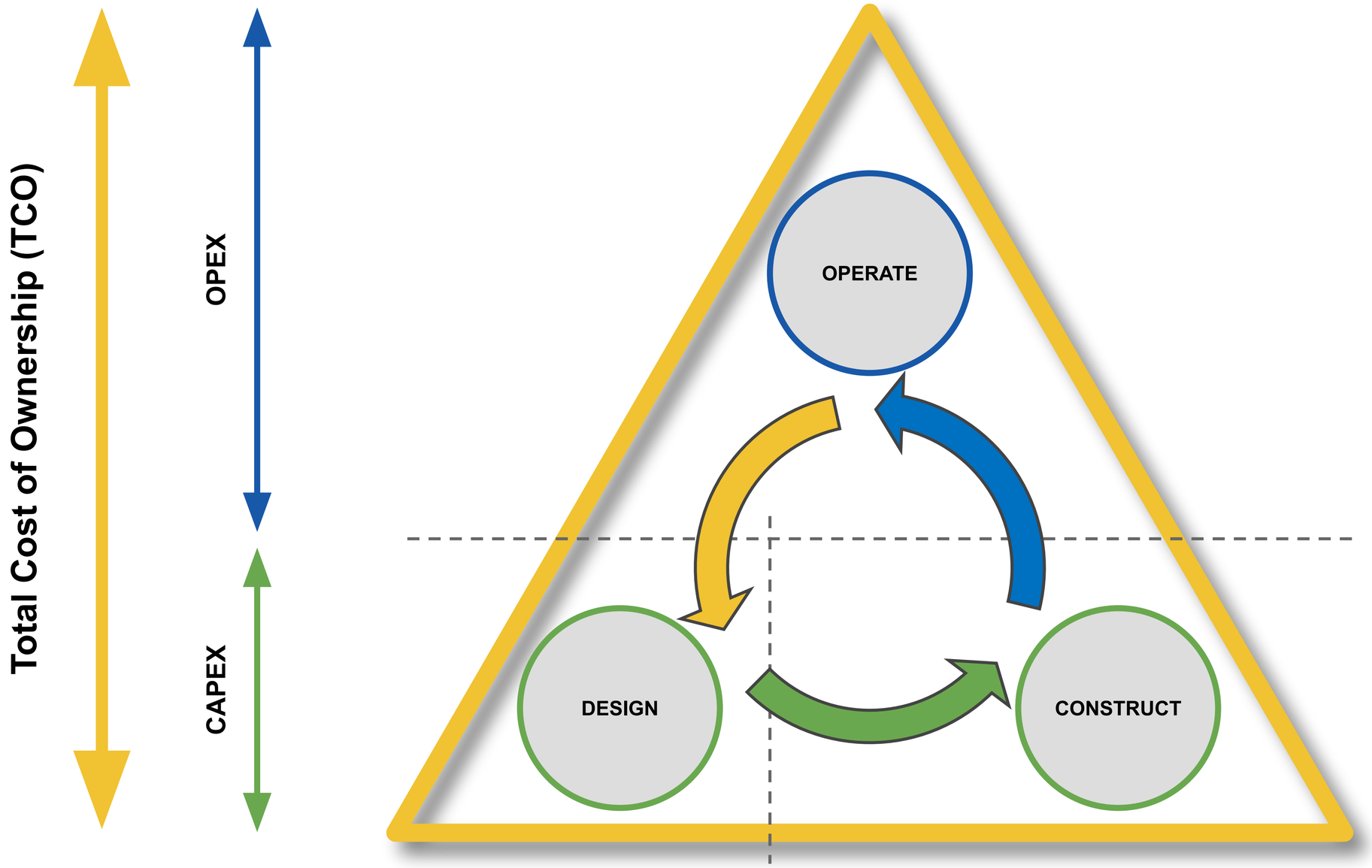
Why do BIM?



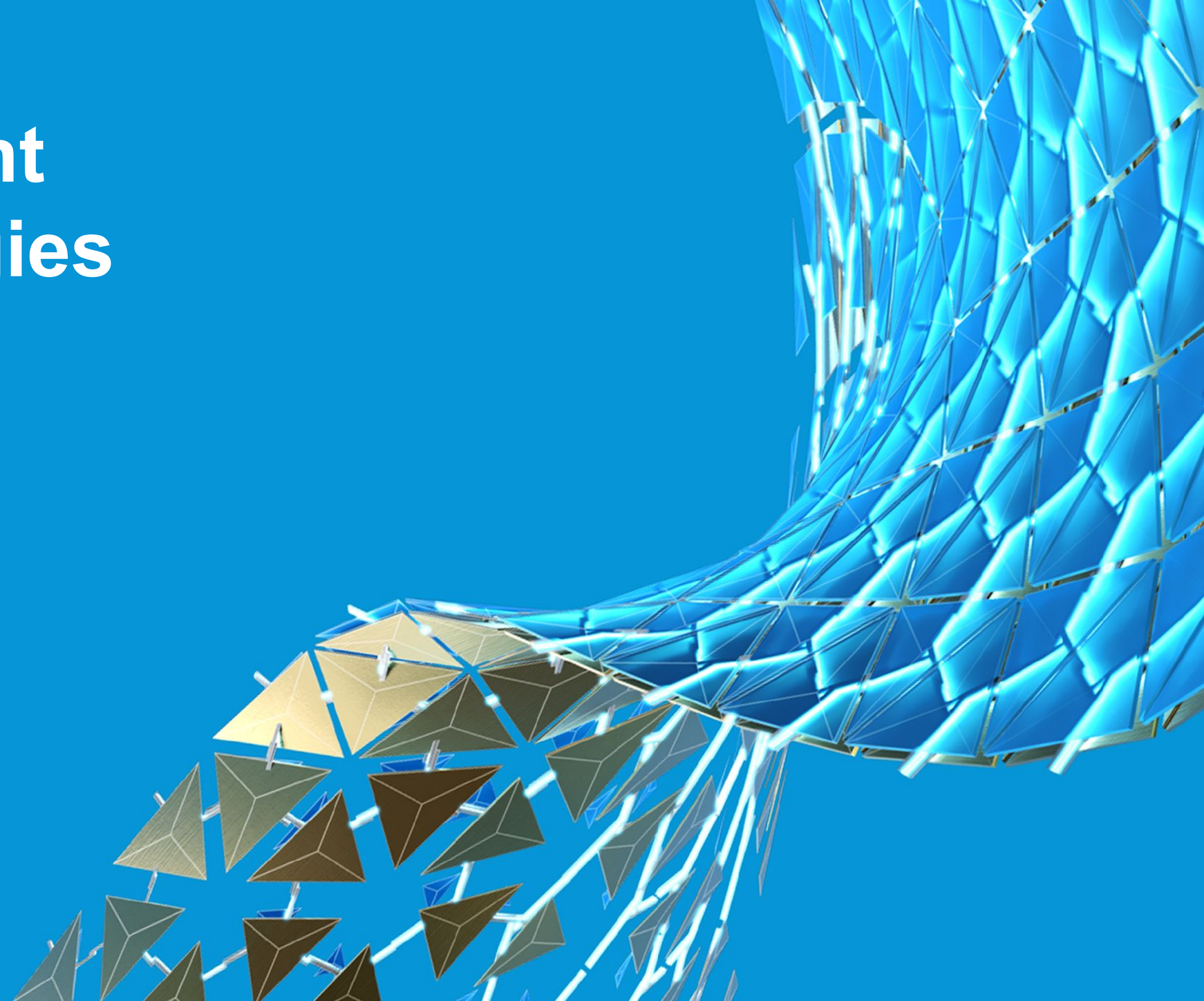
Encourage data to flow



Golden (BIM) Triangle



Procurement Methodologies



Procurement methodologies

Procurement plans and planning is in alignment with the GIQ Project Delivery Framework, this has been developed across several standard frameworks and staged gateways and include:

- **New Zealand Government's Procurement Charter**
- **Managing Successful Programmes MSP™**
- **Prince2 project stages**
- **Programme Governance Approvals**
- **Treasury Better Business Case model**
- **ISO 19650**
- **'He rangi hou kei tua' – the Callaghan Innovation Change Framework**
- **New Zealand Construction Industry Council Guidelines**

Procurement methodologies

We articulated the unique opportunity to be part of one of the first projects undertaken on the GIQ Site and the opportunity for responders to showcase their skills and capability within the construction industry.

Callaghan Innovation is developing a Digital Twin of the GIQ site to serve as an exemplar (or catalyst for) the adoption of technologies that leverage the benefits of Industry 4.0, IoT, construction sector R&D, and integration of digital asset information to enhance predictive maintenance, site performance and operational efficiency capabilities of New Zealand's infrastructure.

Procurement methodologies - ROI

For the first GIQ Project we undertook a two-stage procurement process, during which we shortlisted based on high-level capabilities.

Registration of Interest (ROI)

- **The following was issued:**
  - Project summary and very general project information requirements.
  - Define stage drawings and extracts from GIQ Digital Twin.
- **We assessed on:**
  - Project summaries - prior experience, project size and value.
  - Proposed personnel - capability & capacity to undertake the work.
  - 3D/ BIM experience, including alignment with ISO 19650 and an example BIM Execution Plan (BEP).

Procurement methodologies - RFP

For the second stage we invited shortlisted consultancies to respond to a Request for Proposal, with response in the form of a presentation

Request for Proposal (RFP)

- **The following was issued:**
  - Organisational Information Requirements (OIR) & Project Information Requirements (PIR).
  - Exchange Information Requirements (EIR) & File Naming Conventions.
  - Conceptual Drawings (Elevations and Sections), Geotechnical, Fire, Accessibility and other reports.
  - Schedule of Pricing.
  - Series of questions about:
    - Innovation, design philosophy & safety in design.
    - LOD 350 in 3D Model, BIM protocols and systems, with reference to ISO 19650.
    - Experience deploying Autodesk BIM 360 for purposes of design collaboration.

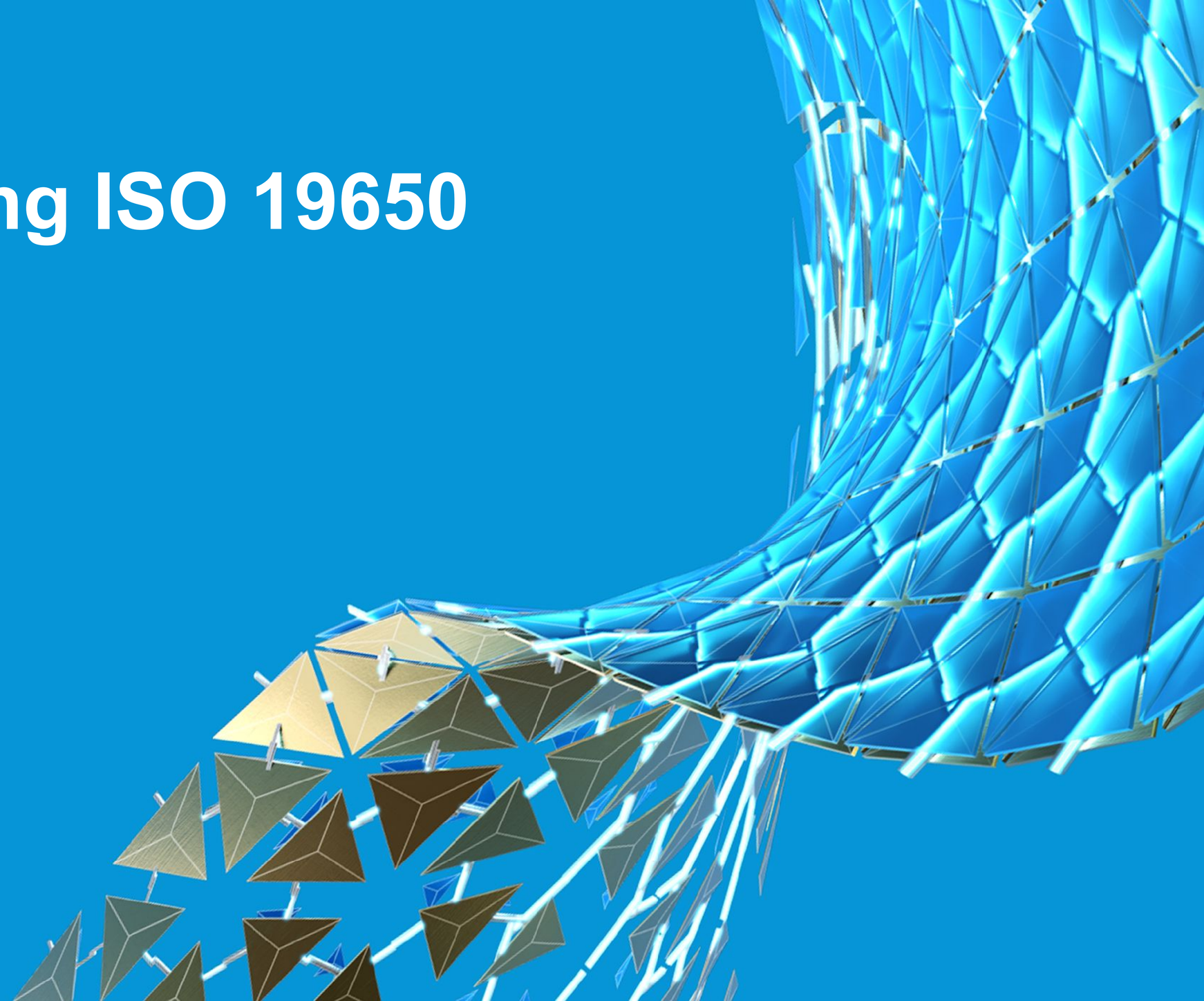
Procurement methodologies - RFP

For the second stage we invited shortlisted consultancies to respond to a Request for Proposal, with response in the form of a presentation

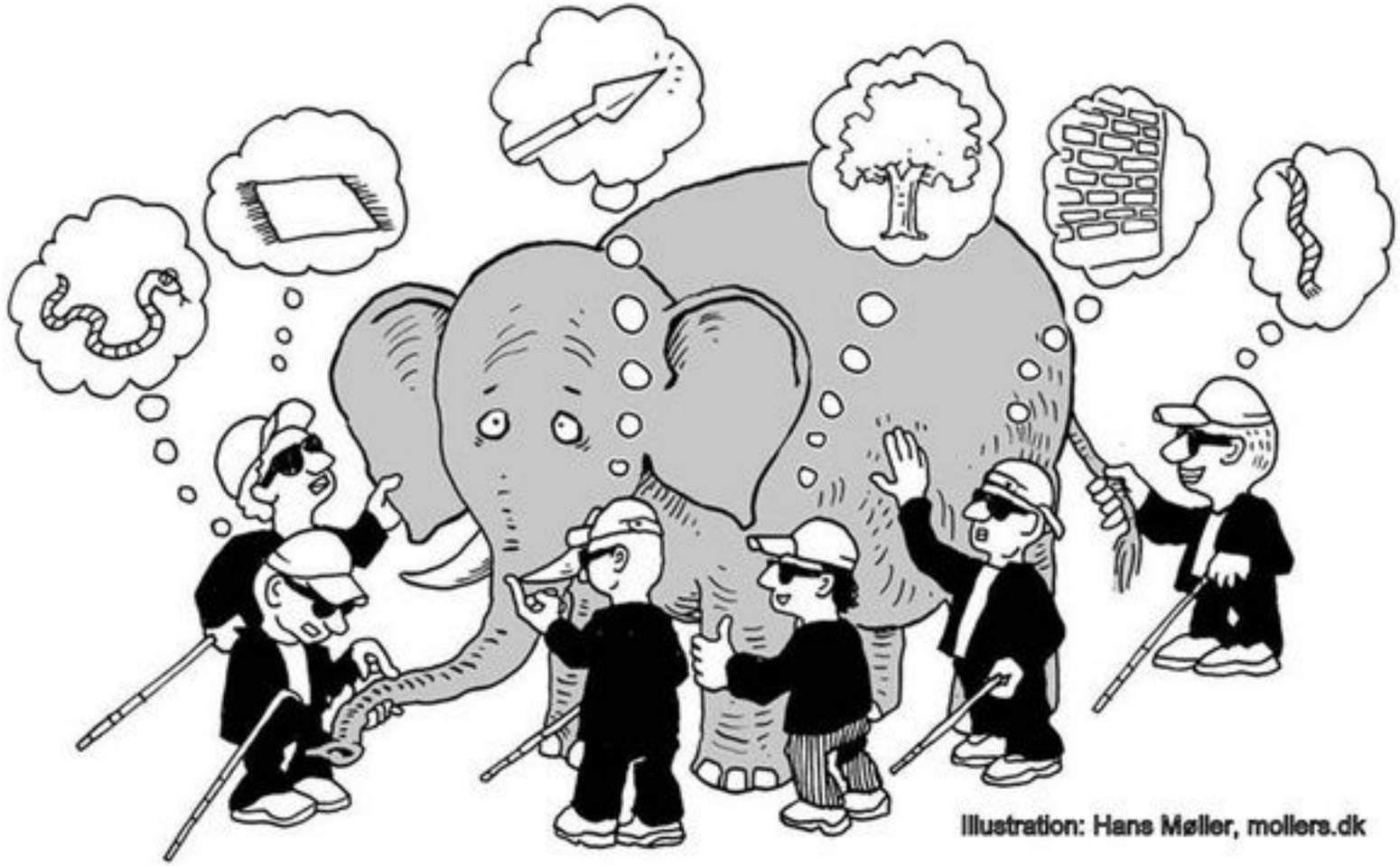
Request for Proposal (RFP)

- **We assessed on:**
  - Presentation and responses to ‘plain language questions’.
  - Named personnel.
  - Pre-appointment BEP.
  - Value.
- **Summary**
  - The two-stage approach allowed for an open market interaction, and an ability meet and discuss the project with the respondent team, providing the same Q&A and information to all parties and gaining a real understanding of who would be undertaking key roles - such as the Design Management & BIM Lead roles, Task Information Manager roles and Model Element Author (MEA); i.e. who is responsible for modeling each system and element in the Model?

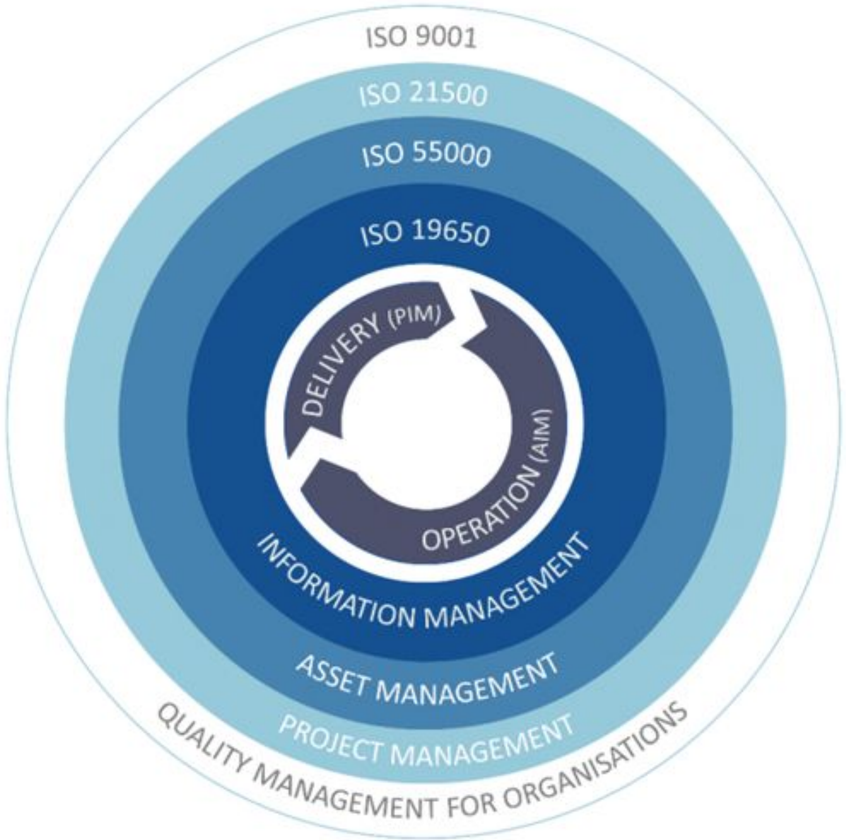
Implementing ISO 19650



Benefits of implementing ISO 19650



Context of standards



ISO 19650 within the wider context of an asset management system, such as the one described in ISO 55000 Asset Management Standard, and addresses the Delivery and Operation of built assets.

“Clarity of functions, responsibility, authority and the scope of any task”

ISO 19650-1 clause 7.2

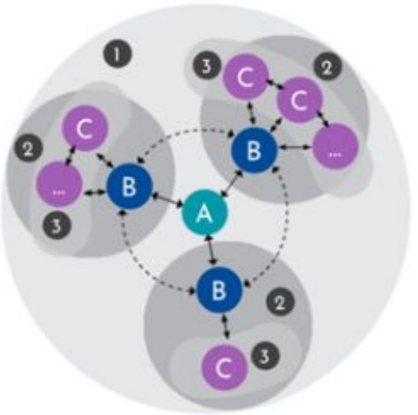
Information management function

ISO 19650 adoption for GIQ

- **Sets out the concepts and principles in support of the management & production of information during the lifecycle of built assets.**
- **Provides clarity of functions, responsibility, authority and the scope of any task to enable effective information management.**
- **Provides a framework to define the asset information requirements.**
- **Reduction of risk, and reduction of cost, through creation and use of asset/project information models by the most appropriate party, aligned to their role on the project.**
- **Enables a consistent approach, to be taken across as portfolio of programmes and projects.**

Information management function

An information management function is carried out by (or on behalf) of the appointing party, the lead appointed party and the appointed party

Parties			Teams		Interface between Parties and Teams
A	Appointing Party	The organisation leading the project (or asset management) and receiving the *information* concerning the work.	1 Project Team	Everyone involved in the project, regardless of appointment/contract arrangement.	
B	Lead Appointed Party	Party that is accountable for coordinating *information* exchange between task teams, or the delivery team and the appointing party	2 Delivery Team	Lead appointed party and associated task teams (e.g. a contractor and their subcontractor and suppliers)	
C	Appointed Party	Anyone generating *information* about the project – contractor, subcontractor, consultant.	3 Task Team	A person or group of people performing a specific task – e.g. the structural team, or mechanical subcontractor.	

Information management function (indicative)



Aspect of information management function			
Establishing project and LAP information requirements	√		
Provision and management of project CDE	√		
Tender evaluation	√		
LAP appointment	√	√	
Establishing appointed party requirements		√	√
Compiling tender response (pre-appointment BEP etc.)		√	
Summary of delivery team capability/capacity		√	
Task information delivery plans			√
Master information delivery plan	√	√	
Appointed party appointment		√	√
Mobilisation		√	
Information authorisation		√	
Information acceptance	√		

Information management function

Project setup - Master Information Delivery Plan (MIDP)

Callaghan Innovation - Gracefield Innovation Quarter
Master Information Delivery Plan (MIDP)- J01959_Tranche 5.1

Project Number	J01959
Project Title	Tranche 5.1
Author	
Date Created	17.06.2020
Date Last Updated	
Document Reference	

Notes:
Refer to Exchange Information Requirements (EIR) for document naming protocol

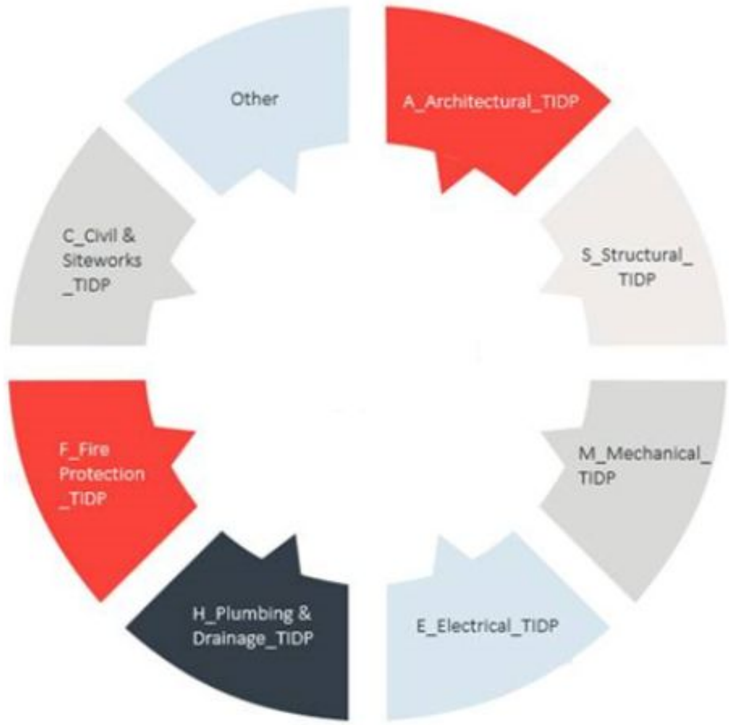
			Document Name									Data Exchange #01		Data Exchange #02		Data Exchange #03		Data Exchange #04	
												Stage:	Concept Design	Stage:	Preliminary Design	Stage:	Developed Design	Stage:	Detailed Design
												Programme	TBC	Programme	TBC	Programme	TBC	Programme	TBC
Deliverable	Description	Exchange Formats	Project Number	Originator	Volume	Level/Location	Type	Role	Document Number	Document Revision	Description	Owner	Date Required	Owner	Date Required	Owner	Date Required	Owner	Date Required
Models																			
Drawings																			
Specifications																			
Reports																			
Other																			

Information management function

Task Information Delivery Plan (TIDP)

Each task team manage is to compile their own TIDP which then assist in the development of the MIDP (to align with GIQ MIDP template).

Each task shall have a corresponding milestone that aligns to the overall design and delivery timeline.



Source: WSP New Zealand

Information management function

Project setup - Model Production Delivery Table (MPDT) - MEA & LOD

Callaghan Innovation - Gracefield Innovation Quarter
Model Production and Development Table (MPDT) - Architecture (A)

Model Element	Concept Design		Preliminary Design		Developed Design		Detailed Design		Practical Completion	
	Design Team								Construction Team	
	MEA	LoD	MEA	LoD	MEA	LoD	MEA	LoD	MEA	LoD
Enclosure										
Floors - External	A	100	A	200	A	300	A	300	CON	500
Walls - External (Generally)	A	100	A	200	A	300	A	300	CON	500
- Fire Rated External Walls	A	100	A	200	A	300	A	350	CON	500
- Acoustically Rated External Walls	A	100	A	200	A	300	A	350	CON	500
Windows - External	A	100	A	200	A	300	A	300	CON	500
Doors - External	A	100	A	200	A	300	A	300	CON	500
Roofs	A	100	A	200	A	300	A	300	CON	500
Interior										
Floors - Internal	A	100	A	200	A	300	A	300	CON	500
Walls - Internal (Generally)	A	100	A	200	A	300	A	300	CON	500
- Fire Rated Internal Wall	A	100	A	200	A	300	A	350	CON	500
- Acoustically Rated Internal Wall	A	100	A	200	A	300	A	350	CON	500
Windows - Internal	A	100	A	200	A	300	A	300	CON	500
Doors - Internal	A	100	A	200	A	300	A	300	CON	500
Ceilings (Generally)	A	N/A	A	200	A	200	A	300	CON	500
- Fire Rated Ceiling	A	N/A	A	200	A	300	A	350	CON	500
- Acoustically Rated Ceiling	A	N/A	A	200	A	300	A	350	CON	500
Railings and Balustrades	A	N/A	A	200	A	200	A	300	CON	500
Fixtures, Furniture And Equipment										
Fixed Furniture & Fittings	A	N/A	A	200	A	200	A	300	CON	500
Plumbing Fixtures	A	N/A	A	200	A	200	A	300	CON	500
Others										
Raised Floor Construction	A	N/A	A	100	A	200	A	300	CON	500
Stairs	A	100	A	200	A	200	A	300	CON	500
Lifts	A/M	N/A	A/M	200	A/M	200	A/M	300	CON	500

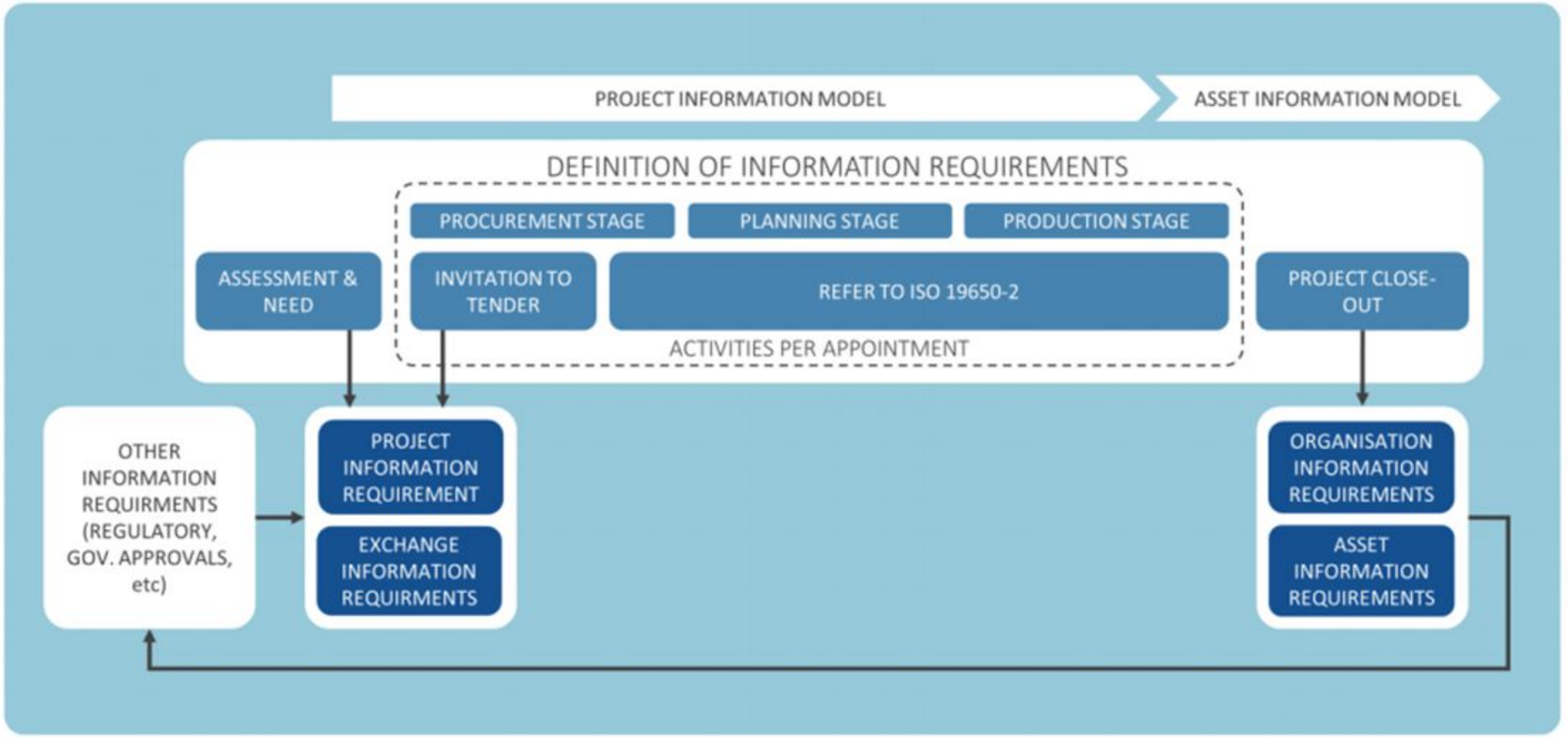
Information management function

Project setup - Model Production Delivery Table (MPDT) - UniForm & Metadata

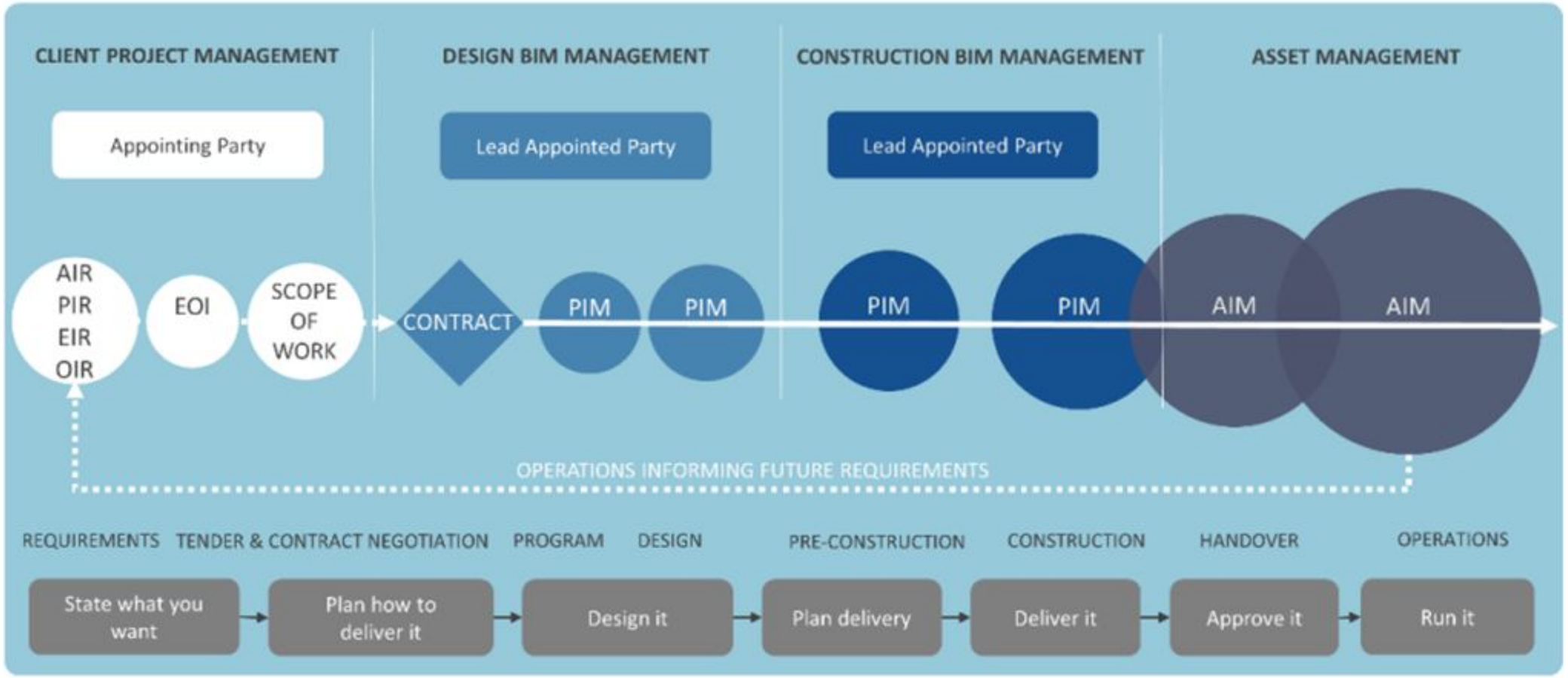
Callaghan Innovation - Gracefield Innovation Quarter
Model Production and Development Table (MPDT) - Architecture (A)

		Design Team Metadata (information) Requirements											Delivery Team Metadata (information) Requirements								
Model Element	UniFormat Code	Revit Family Type	Unit of Measure	Renewal able - Finish	Function	Fire Rating	Known H&S Issues	Specified System (BWoF)	Expected Life	Location	Critical Element (Y/N)		Supplier	Installer	Install Cost, Replacement Cost	Install Date	Installer Warranty	Manufacturer's Warranty	Make/model	Reference Code	CostX
Enclosure																					
Floors - External	B1010	Yes	m²	Yes	No	Yes	Yes	No	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	
Walls - External (Generally)	B2010	Yes	m²	Yes	No	Yes	No	Yes	Yes	Yes	Yes		No	No	No	Yes	No	No	No	No	
- Fire Rated External Walls	B2010	Yes	m²	Yes	No	Yes	No	Yes	Yes	Yes	Yes		No	No	No	Yes	No	No	No	No	
- Acoustically Rated External Walls	B2010	Yes	m²	Yes	No	Yes	No	Yes	Yes	Yes	Yes		No	No	No	Yes	No	No	No	No	
Windows - External	B2020	Yes	Qty	Yes	Yes	Yes	No	No	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	
Doors - External	B2050	Yes	Qty	Yes	No	Yes	No	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	No	No	No	
Roofs	B3010	No	m²	Yes	No	No	Yes	No	Yes	No	Yes		Yes	Yes	Yes	Yes	Yes	Yes	No	No	
Interior																					
Floors - Internal	C2030	Yes	m²	Yes	No	Yes	Yes	No	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	
Walls - Internal (Generally)	C1010	Yes	m²	Yes	No	Yes	No	Yes	Yes	Yes	Yes		No	No	No	Yes	No	Yes	No	No	
- Fire Rated Internal Wall	C1010	Yes	m²	Yes	No	Yes	No	Yes	Yes	Yes	Yes		No	No	No	Yes	No	Yes	No	No	
- Acoustically Rated Internal Wall	C1010	Yes	m²	Yes	No	Yes	No	Yes	Yes	Yes	Yes		No	No	No	Yes	No	Yes	No	No	
Windows - Internal	C1020	Yes	Qty	Yes	Yes	Yes	No	No	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	
Doors - Internal	C1030	Yes	Qty	Yes	No	Yes	No	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	No	No	No	
Ceilings (Generally)	C1070	Yes	m²	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	No	No	No	
- Fire Rated Ceiling	C1070	Yes	m²	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	No	No	No	
- Acoustically Rated Ceiling	C1070	Yes	m²	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	No	No	No	
Railings and Balustrades	C1090	Yes	m	Yes	No	No	Yes	No	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	No	Yes	No	
Fixtures, Furniture And Equipment																					
Fixed Furniture & Fittings	E2010	Yes	Qty	No	No	No	No	No	Yes	No	No		Yes	Yes	Yes	Yes	Yes	Yes	No	No	
Plumbing Fixtures	D2010	Yes	Qty	No	No	No	No	No	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	
Others																					
Raised Floor Construction	C1060	Yes	m²	Yes	No	Yes	No	No	Yes	No	Yes		Yes	Yes	Yes	Yes	Yes	Yes	No	No	
Stairs	B1080	Yes	Qty	Yes	Yes	No	No	No	Yes	No	Yes		Yes	Yes	Yes	Yes	Yes	No	Yes	No	
Lifts	D1010	Yes	Qty	Yes	No	No	No	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

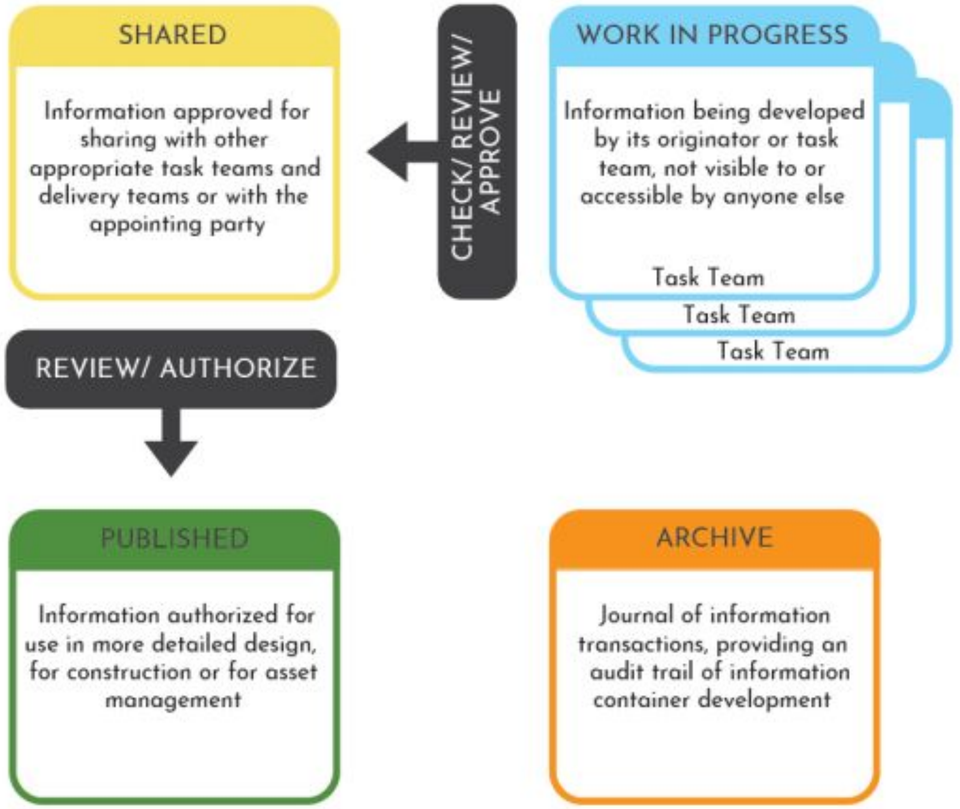
Information exchange - information requirements



Information exchange - information requirements



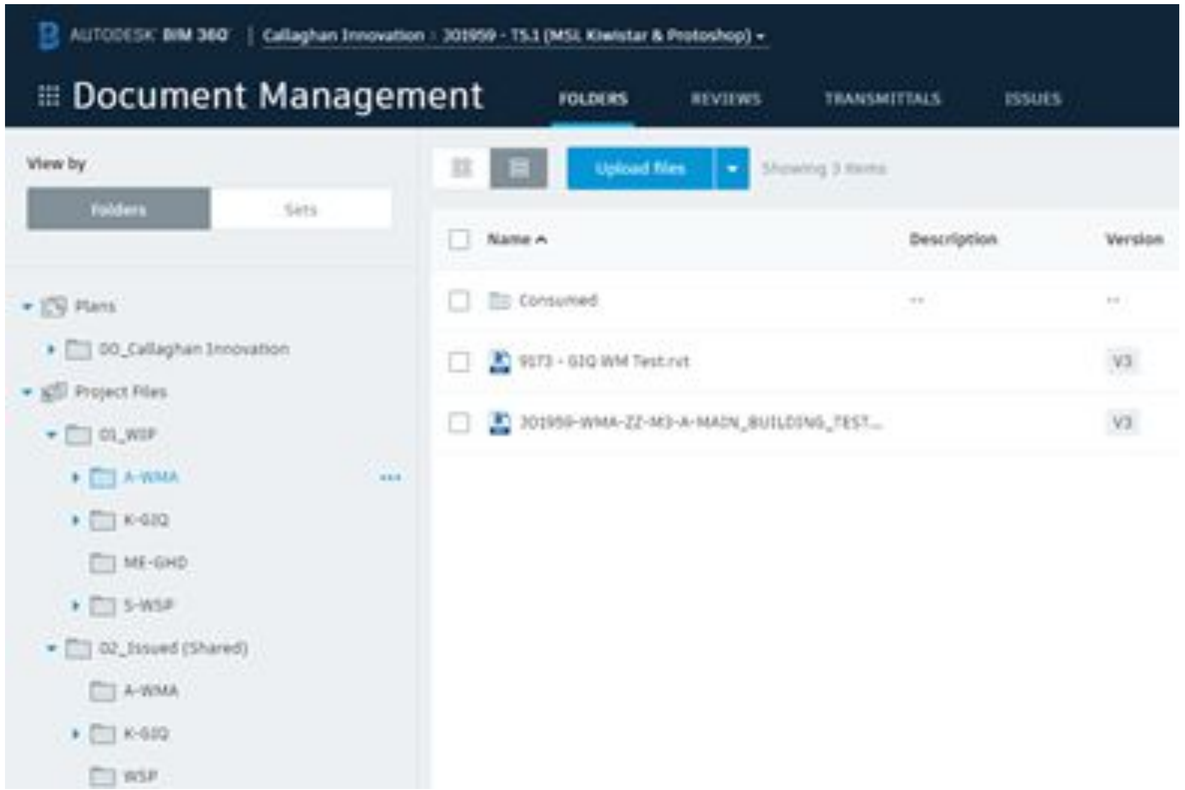
Common Data Environment



The Common Data Environment (CDE) uses solutions to support processes which ensure that information is managed and readily available for those who need it, when they need it.

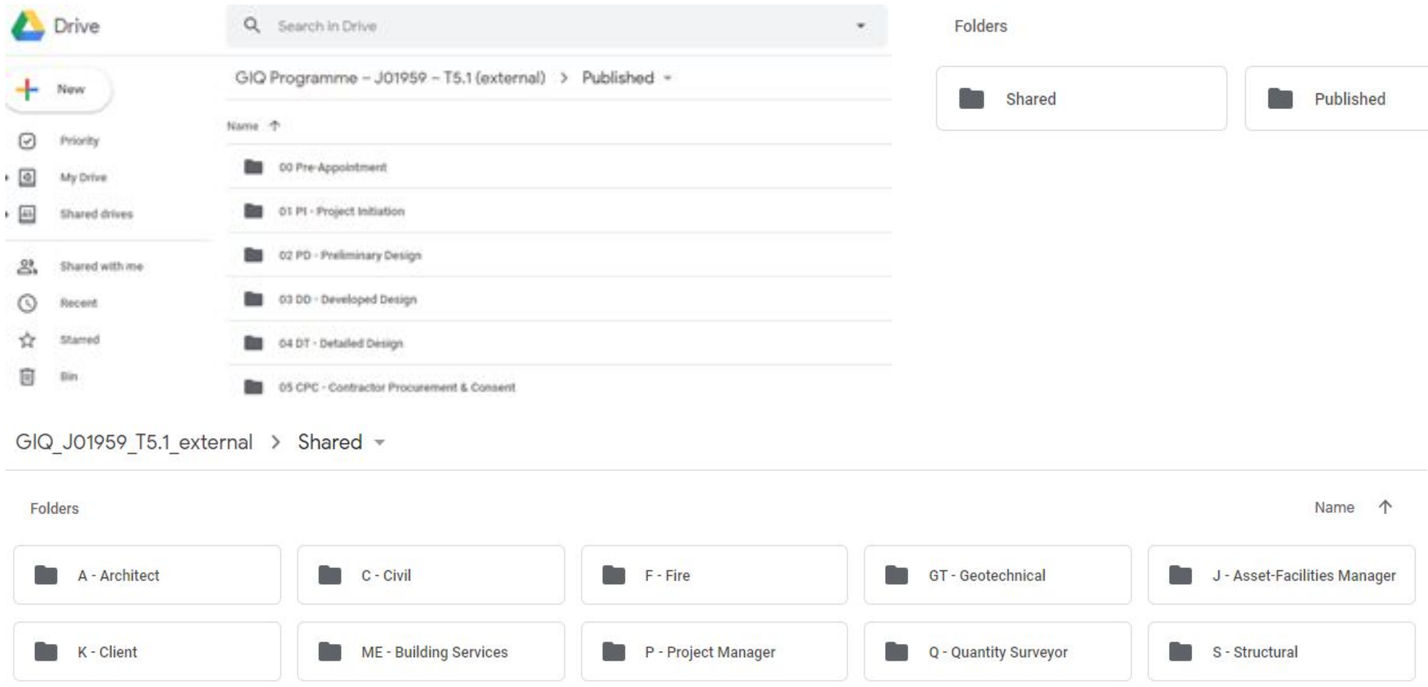
Graphical, model data

BIM 360 is the CDE for Graphical Model Data



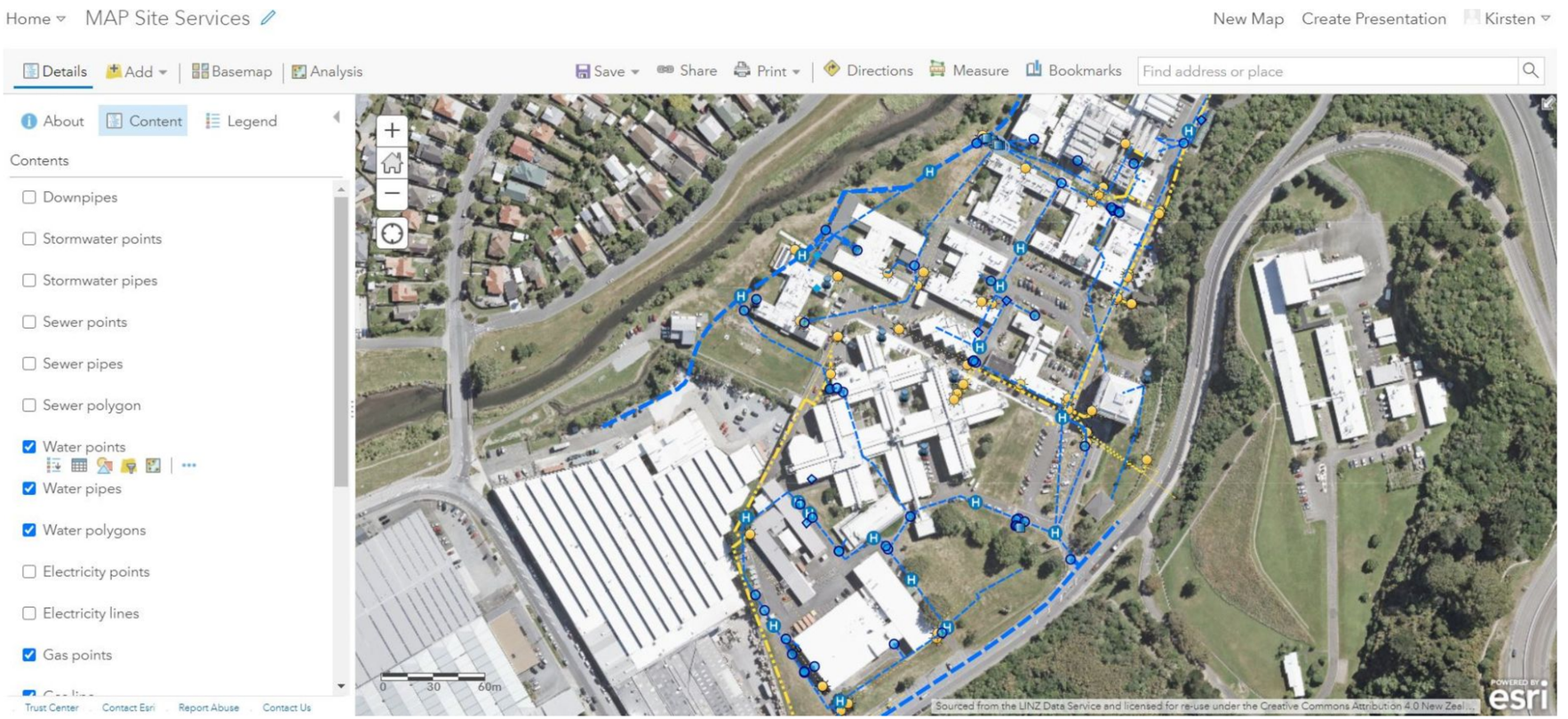
Documentation / non-graphical data

Google Drive is the CDE for documentation and non-graphical project information



GIS data

Esri ArcGIS (via AGOL) forms the basis of the cloud-based CDE for GIS data



Challenges of working to ISO 19650

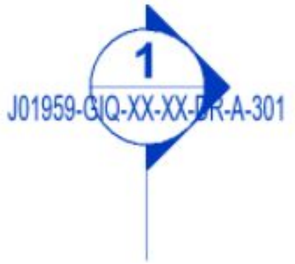
Challenges of working to ISO 19650

When good information becomes too much information.

- **Often aligning digital data is the biggest challenge for any project. With ISO 19650 we have a solution for this alignment challenge.**
- **Organizations have invested heavily in developing and refining their systems for optimum efficiency, deviating from these systems adds complexity and effort to the overall process.**
- **When embarking on early adopter ISO 19650 projects it can be easier to limit the amount of uptake and compliance with ISO 19650 to those that return the most value, while limiting the disruption on the supply chain.**
- **Education is key to successful transfer from legacy systems to ISO 19650.**

Challenges of working to ISO 19650

Implementing ISO 19650 (and adopted File Naming) into Revit Workflows.

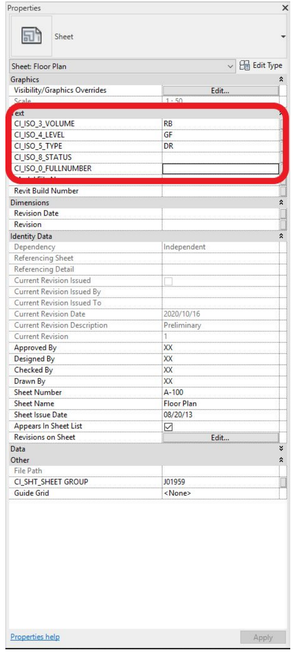


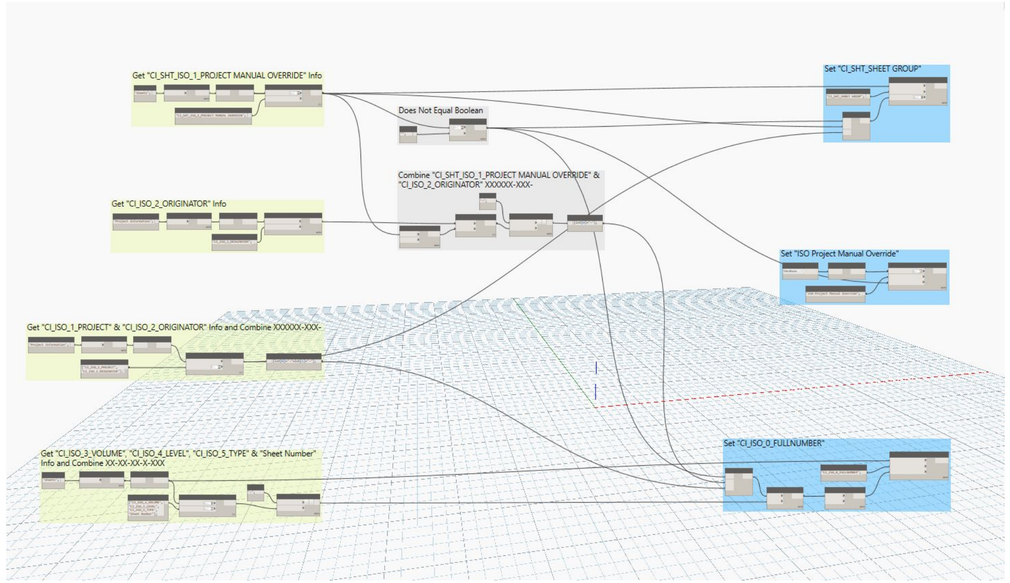
ISO 19650 CONTAINER SHCEDULE

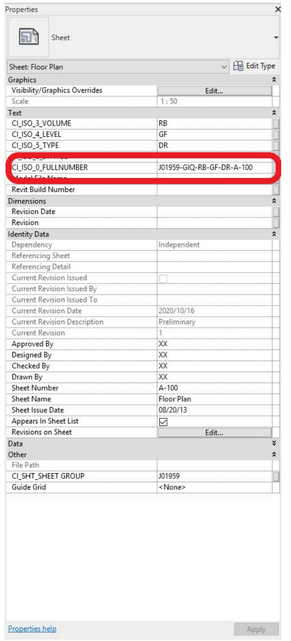
CI_ISO_1_PROJECT	CI_ISO_2_ORIGINATOR	CI_ISO_3_VOLUME	CI_ISO_4_LEVEL	CI_ISO_5_TYPE	CI_ISO_6-7_ROLE-NUMBER	REV.	SHEET NAME
J01959	GIQ	XX	XX	DR	K-000	1	Cover Sheet
J01959	GIQ	XX	XX	XX	K-001	2	General Legends
J01959	GIQ	XX	XX	DR	K-003	1	Cover Sheet and Drawing Schedule
J01959	GIQ	XX	XX	DR	K-010	1	Location Plan
J01959	GIQ	XX	XX	DR	K-011	1	Site Plan
J01959	GIQ	RB	GF	DR	K-100	1	Floor Plan
J01959	GIQ	RB	ZZ	DR	K-200	1	Elevations
J01959	GIQ	RB	ZZ	DR	K-300	1	Sections
J01959	GIQ				K-301		Unnamed
J01959	GIQ	RB	GF	DR	K-400	1	Details
J01959	GIQ	RB	ZZ	DR	K-500	1	Door and Window Schedule

DRAWING LIST

ISO 19650 DRAWING NO.	SHEET NAME	REV.	REV. DATE
J01959-GIQ-XX-XX-DR-A-000	Cover Sheet	1	2020/10/16
J01959-GIQ-XX-XX-XX-A-001	General Legends	2	2020/10/19
J01959-GIQ-XX-XX-DR-A-003	Cover Sheet and Drawing Schedule	1	2020/10/16
J01959-GIQ-XX-XX-DR-A-010	Location Plan	1	2020/10/16
J01959-GIQ-XX-XX-DR-A-011	Site Plan	1	2020/10/16
J01959-GIQ-RB-GF-DR-A-100	Floor Plan	1	2020/10/16
J01959-GIQ-RB-ZZ-DR-A-200	Elevations	1	2020/10/16
J01959-GIQ-RB-ZZ-DR-A-300	Sections	1	2020/10/16
J01959-GIQ-RB-GF-DR-A-400	Details	1	2020/10/16
J01959-GIQ-RB-ZZ-DR-A-500	Door and Window Schedule	1	2020/10/16







Working in a High-Trust (Cloud-based) environment

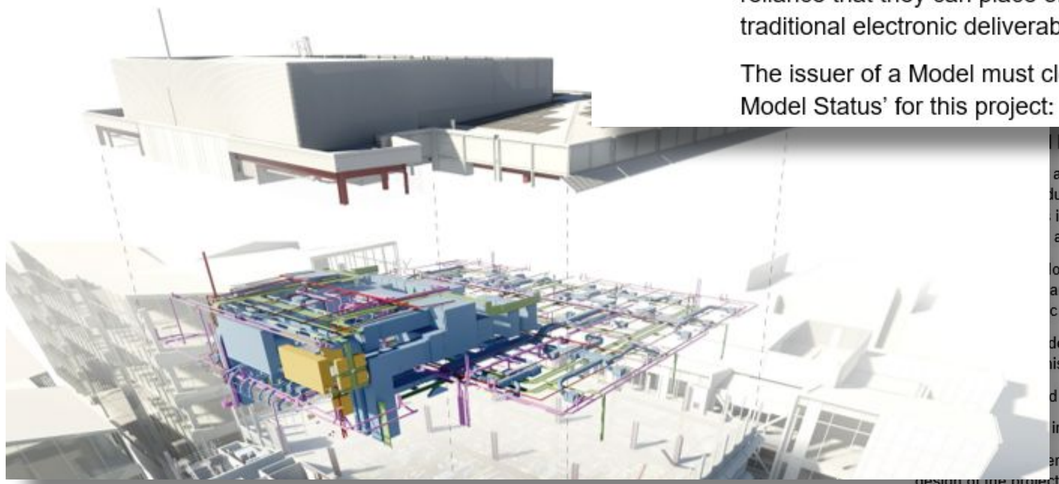
Having a clear plan is key

CallaghanInnovation
New Zealand's Innovation Agency

WARREN AND MAHONEY

BIM EXECUTION PLAN

Callaghan Innovation Tranche 5.1



WARREN AND MAHONEY

Intellectual Property

table is to identify who are the responsible parties for each identified BIM use on the

	Responsible Parties	Priority	Notes
ing	All Consultants	High	Autodesk Revit
ination	All Consultants	High	Navisworks and Clash Detection
ization	Architecture	High	3d Rendering and VR
aboration	All Consultants	High	Revizto, BIM360 Design

2.3 Intellectual Property and Model Exchange

With a Model(s) as a project deliverable there is far more interdependency between the documentation of the design disciplines during the design phases and sub-trades during the construction phase. To maximise the benefits of BIM this information must be available for others to use during the development of design of the project on a known and understood basis.

The exchange of Models is the very basis of the BIM process. All users need to understand the level of reliance that they can place on the models they are receiving. Models can contain far more information than traditional electronic deliverables.

The issuer of a Model must clearly define what it can (and cannot) be used for, below is a list of approved Model Status' for this project:

Property and Model Exchange

a project deliverable there is far more interdependency between the documentation of the during the design phases and sub-trades during the construction phase. To maximise the information must be available for others to use during the development of design of the and understood basis.

odels is the very basis of the BIM process. All users need to understand the level of an place on the models they are receiving. Models can contain far more information than c deliverables.

del must clearly define what it can (and cannot) be used for, below is a list of approved is project:

d for Information – Issued for Information only;

in Progress – Issued for ongoing coordination;

enefits of BIM this information must be available for others to use during the development of design of the project.

WARREN AND MAHONEY

Project Participants

he responsibility to follow the intent and procedures as detailed in this BEP to

Project Participants

del to the LOD specified in the BEP using the level of skill required under its rvices Agreement with the Client; and

s outside the Project Participant's reasonable control (including acts or Client, other Project Participants' and any third party but excluding that Project able endeavours to:

fied in this BEP at the time specified therein and in et out in this BEP;

he procedures set out in this BEP; and

ut in this BEP.

al obligation as between Project Participants other ontained in the Project Participant's Consultancy

t does not convey any ownership right in the Data or in se granted in a separate license, the receiving Project a is specifically limited to designing, constructing, nsistent with the terms of this BEP, and nothing Data.

mited to copyright) subsisting in Data and any proprietary work contained in Data st or remain vested in the Project Participant that provided that Data.

llowing basis:

t be limited to CAD, Revit or BIM models;

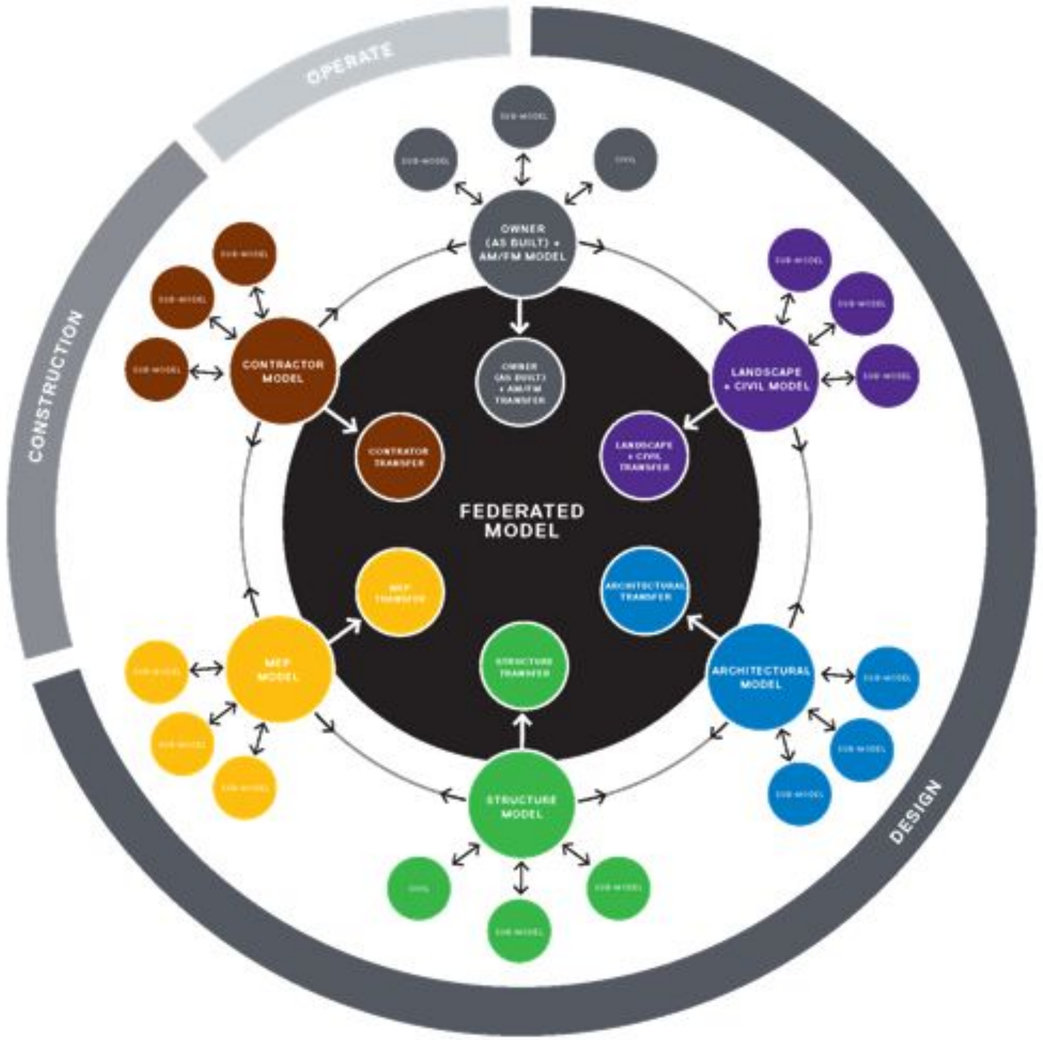
r information and /or convenience and for use related to the Project;

r any purpose other for preparation of the Model and Modelling for use on the

stands and accepts that the Data may deteriorate or be inadvertently or thorisation of the Model Element Author;

The Project Participant alone is responsible to check, verify, and otherwise confirm the accuracy of Data.

Enabling collaboration

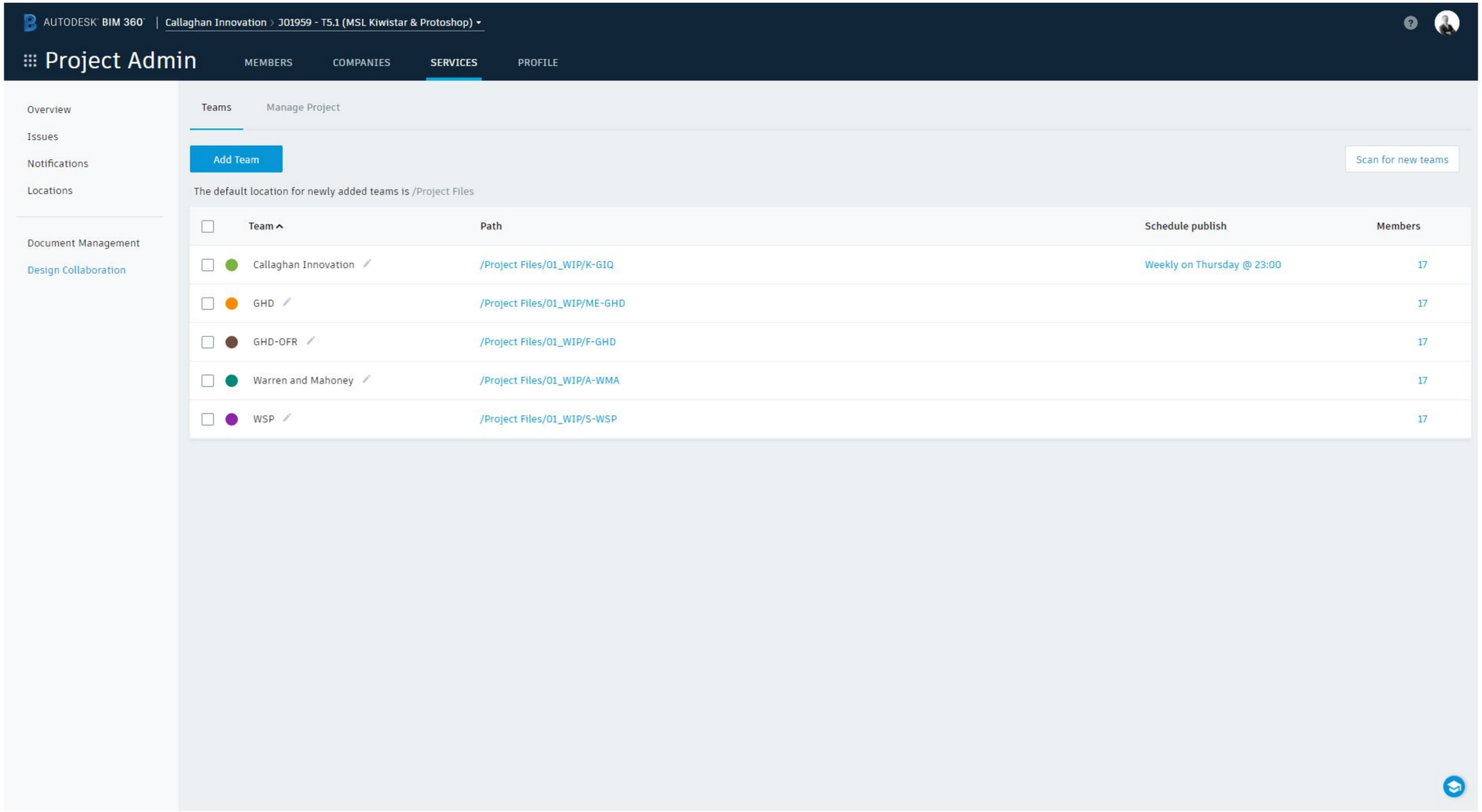


Autodesk BIM 360

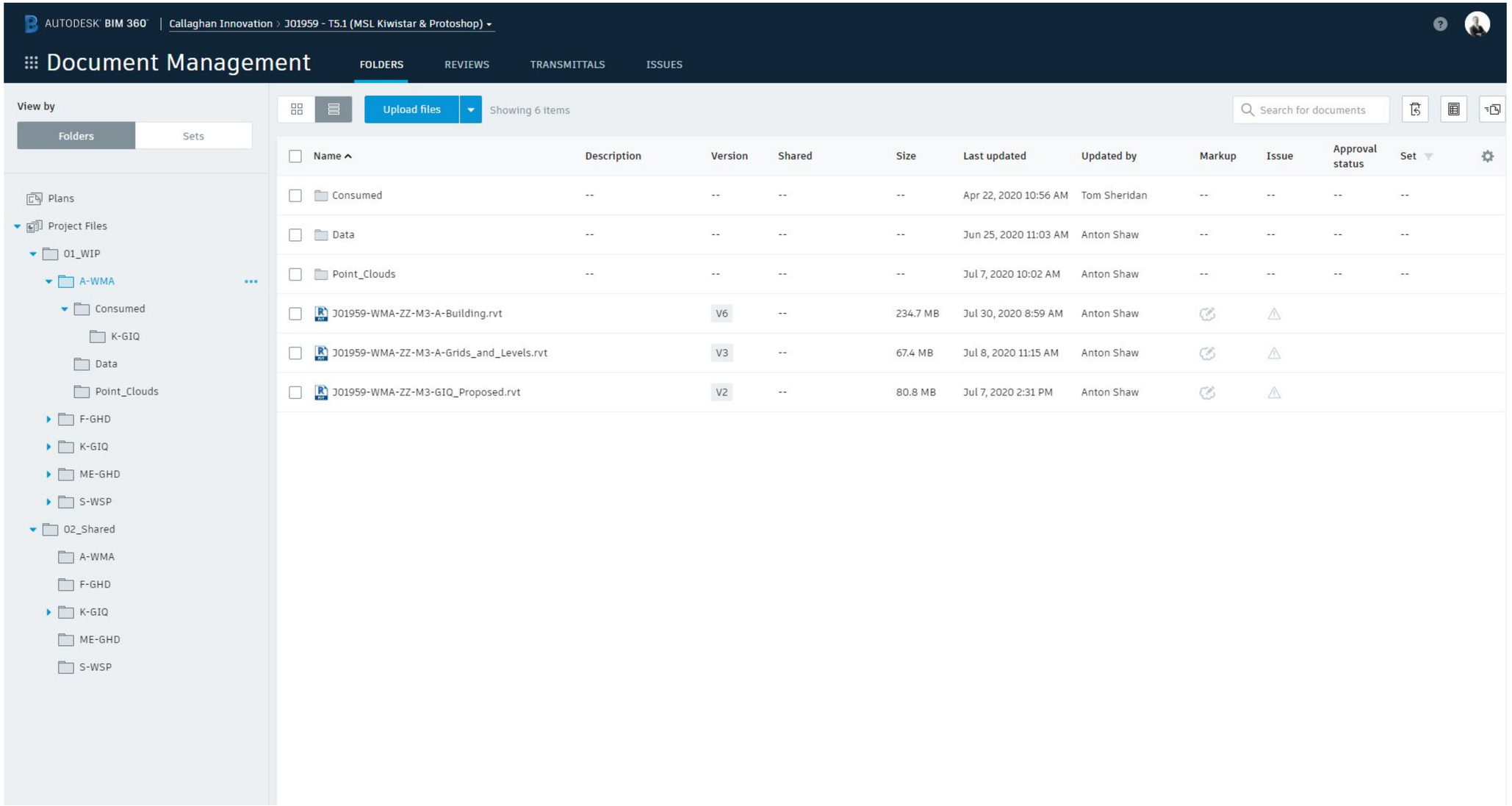
Working in a high-trust (live) BIM 360 environment

- **Autodesk BIM 360 was identified early on as providing an ideal platform for the projects Common Data Environment (CDE).**
- **Key components included:**
  - Managed ‘Open’ Collaboration of all consultants BIM data (not just Revit models).
  - The ability to have ‘Live’ (on Save to Central) model sharing.
  - Simplified administration of the CDE.
  - Transparent history of model sharing with the build-in ‘swimlanes’.
  - 2D and 3D Model viewing capabilities.
  - Compliant data security measures (Cloud Security Assessment)
  - Able to be Client Hosted but managed by the appointed Delivery Team.

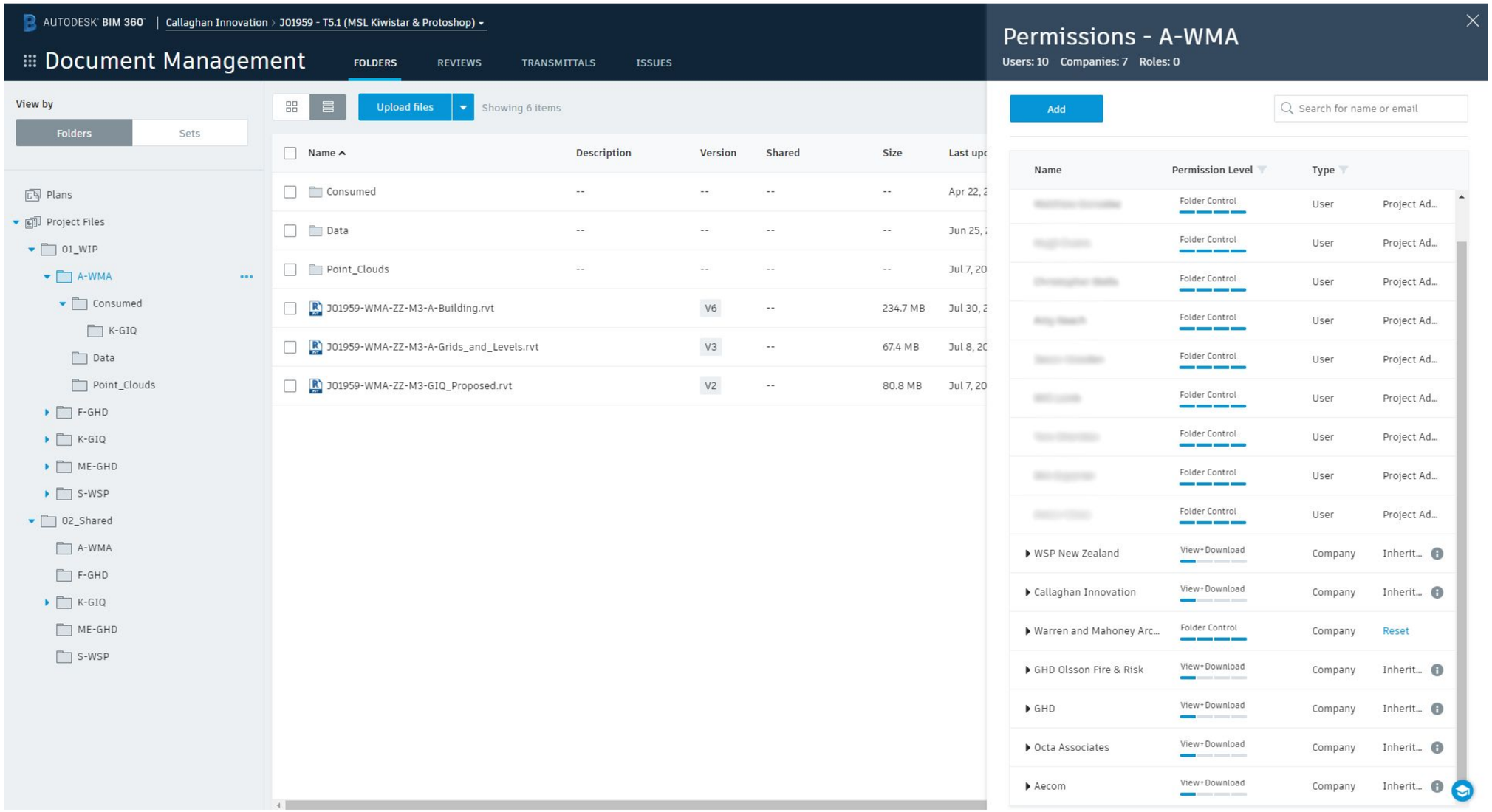
Simplified administration



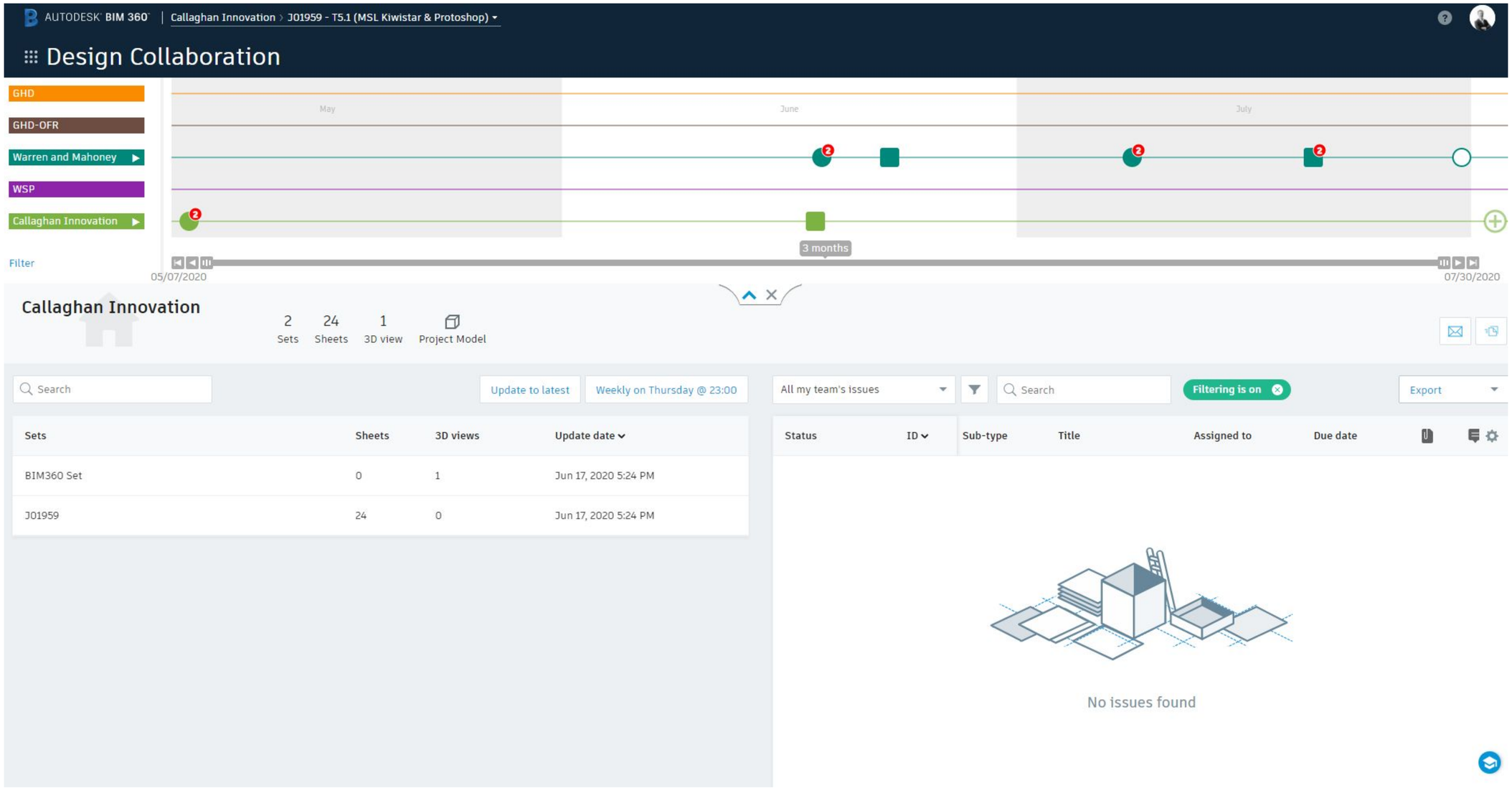
Structured collaboration



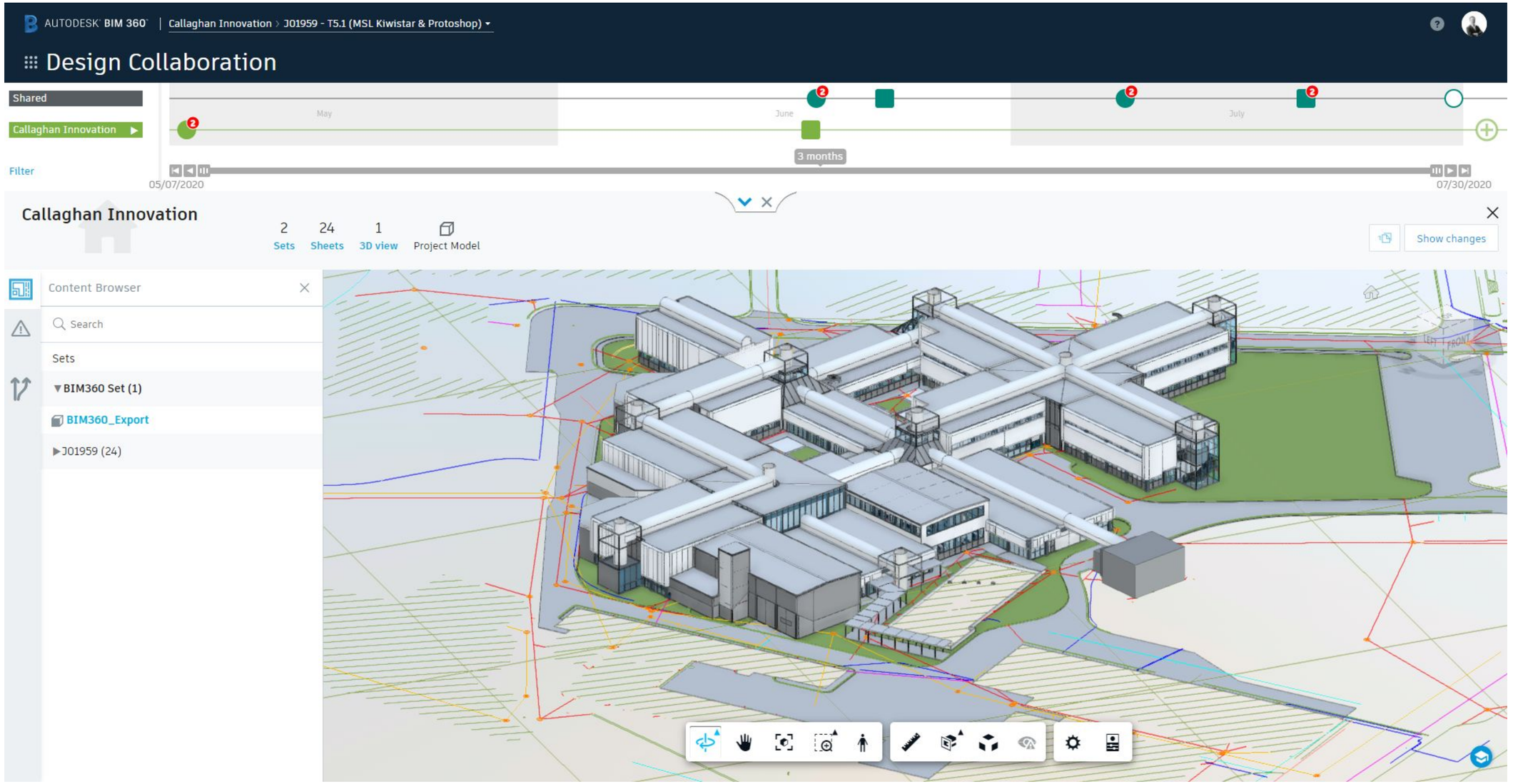
Open access to project data



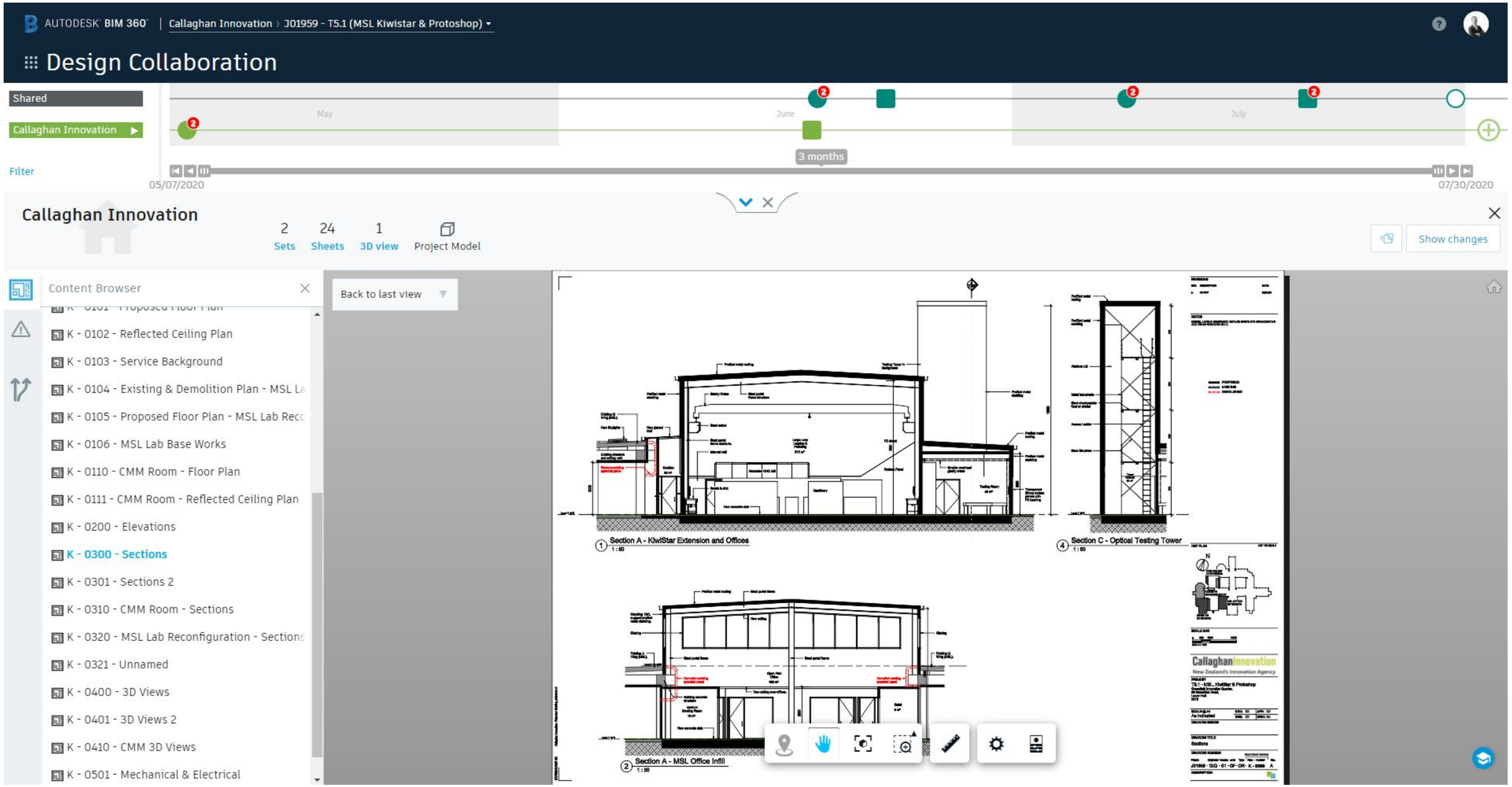
Tracked formal information exchange



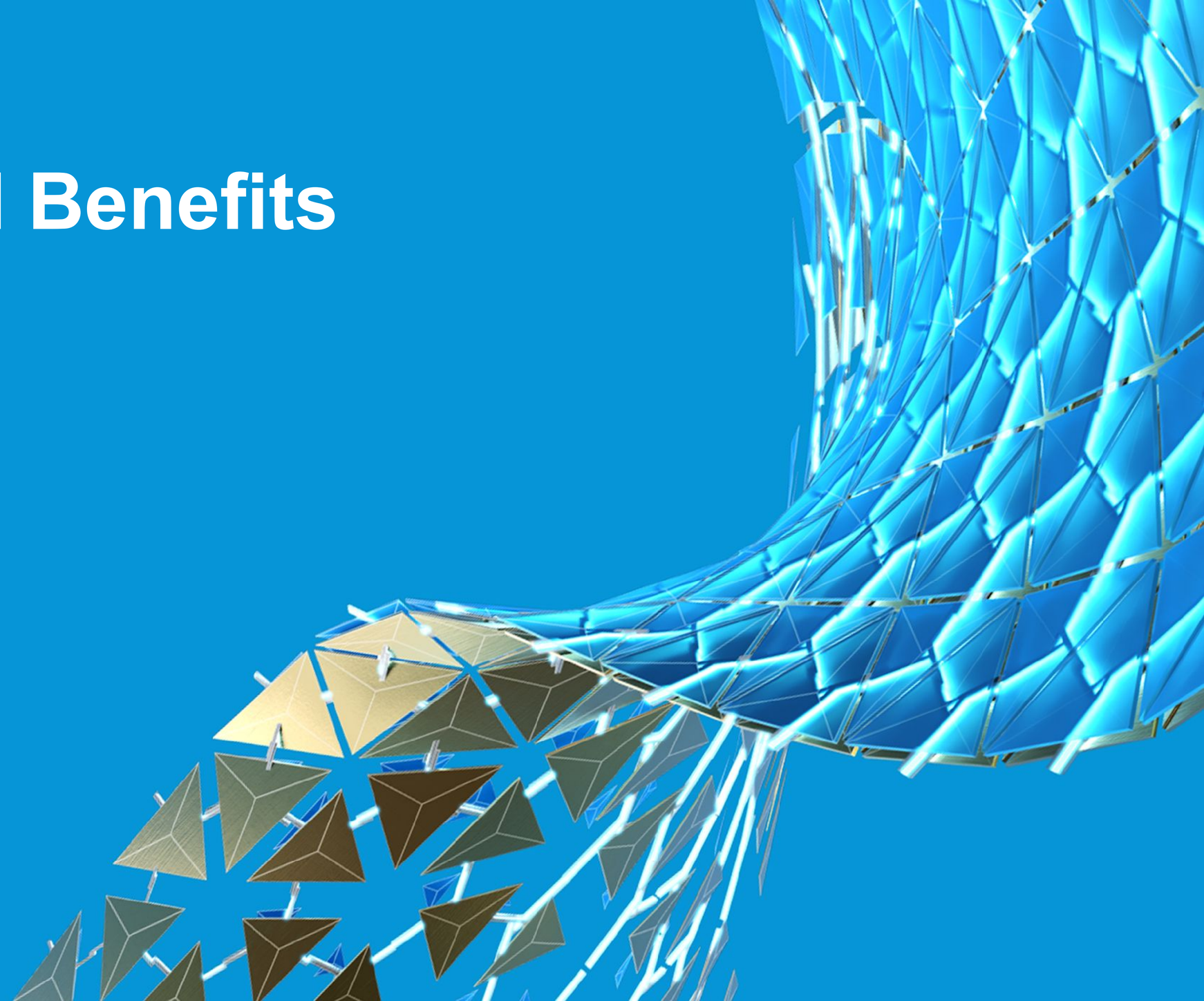
Greater visibility and insights



Single source of truth



Unexpected Benefits



COVID-19

Image: CDC/Alissa Eckert

COVID-19

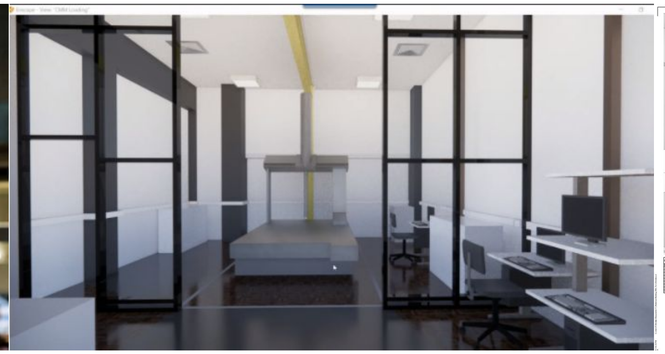
A global pandemic and Working from Home (WFH)

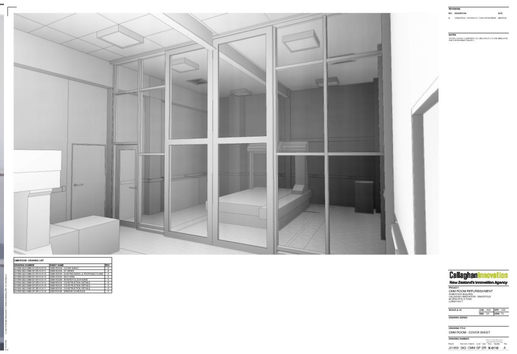
- **As soon as the project started everyone in the project team was thrust into ‘Alert Level 4’ “Lockdown”.**
- **Our innovative digital strategy for this project quickly became our ‘new normal’ as we grappled with a new way of working.**
- **Autodesk BIM 360, with Google Meet (and other cloud-based technology), is just how we do projects now.**
- **Allows flexible working & WFH, with the ease of more regular collaboration, supplemented with in person site based meetings as government restrictions allow.**

The Unexpected continued...

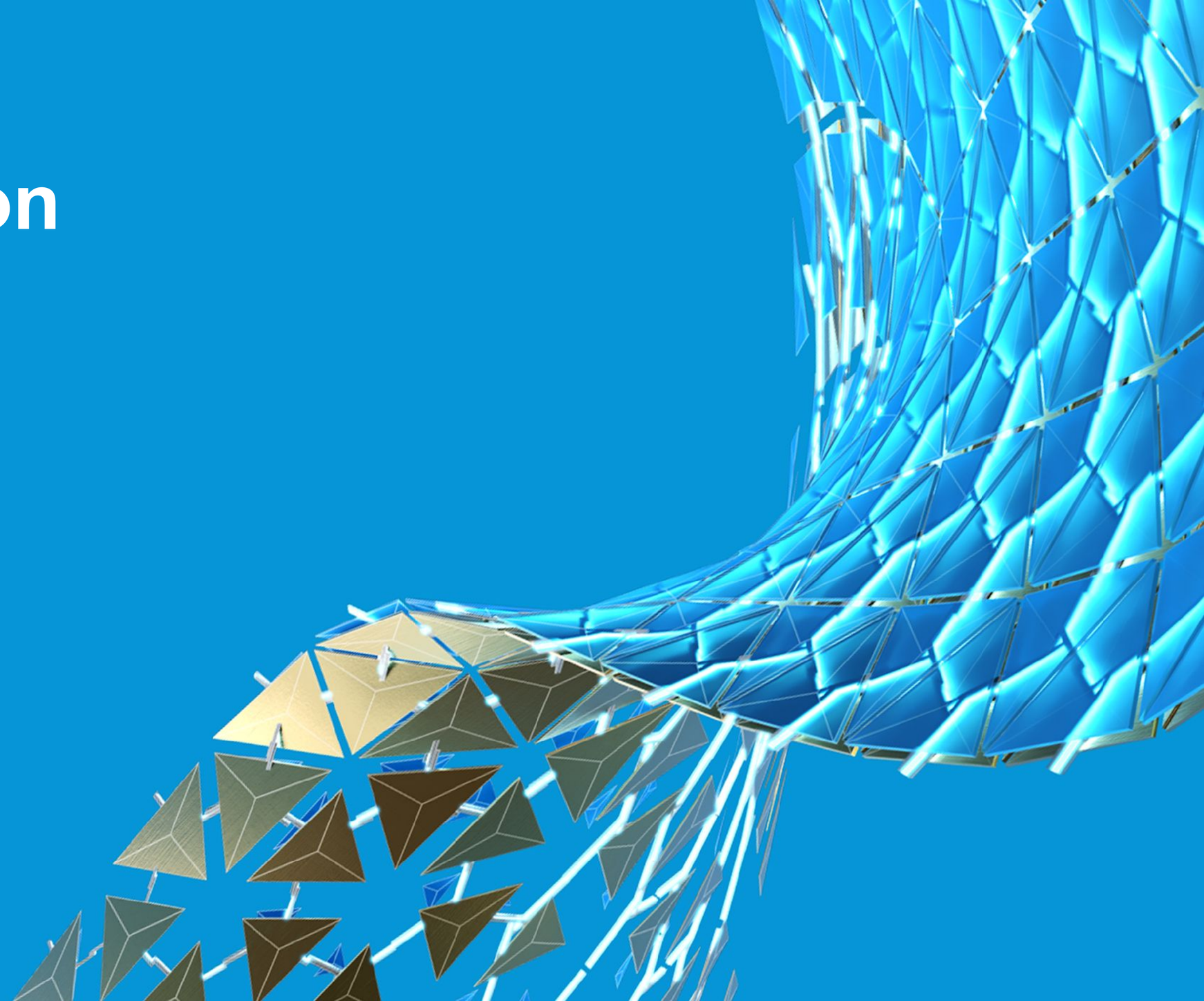
3D Model Coordination and VR

- **BIM 360 opened up a new way of working in a remote environment.**
- **After returning to our primary places of work these tools were continued to be used by the team to increase engagement in the virtual environment.**
- **Virtual Reality and interactive 3D model coordination sessions are examples where the team are augmenting their day to day with what was previously considered ‘nice to have’ digital workflows.**
- **Resulting in higher engagement, better collaboration, higher-quality design deliverables.**





Future Vision



GIQ

Masterplan (Work in Progress)

Wainuiomata Road

Buildings to be retained

NOTE: Other ancillary buildings shown as set to be retained

Indicative Biotech Hub Zone

Indicative HVMS Zone

Processing Building (b. 1980)

GSF

DSP2

Library Building (b. 1985)

Waiwhetu Stream

G Block

MSL

Robertson Building (b.1982)

AMC

Gracefield Road

Bell Road

“Rome wasn’t built in a day, but they were laying bricks every hour”

John Heywood

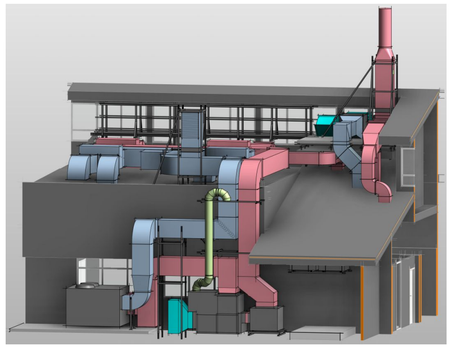
Future Vision

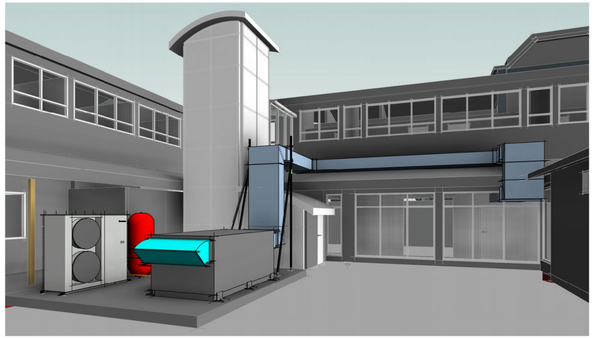
Digital Transformation is a Journey.

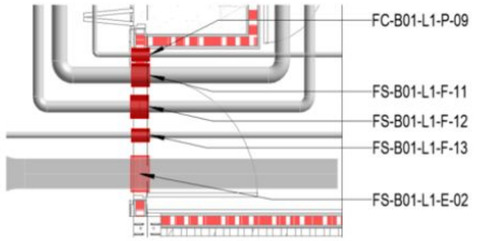
- **The team is committed to progressing and building on the foundations laid to date areas of focus include:**
  - Further use of BIM in the Operational and Facilities management processes, health, safety and hazard identification, and embodied carbon analysis;
  - Researching the use of 3D printing and the use of ‘smart’ devices in the active monitoring and enabling preventative maintenance of critical building services and site wide infrastructure;
  - Enabling the use of the 3D Model on campus via ‘game technology’ and mobile devices, providing operations & maintenance staff ‘superpowers’ to see through walls, explore the past and see into the future digitally.
- **For GIQ our journey has just begun....**

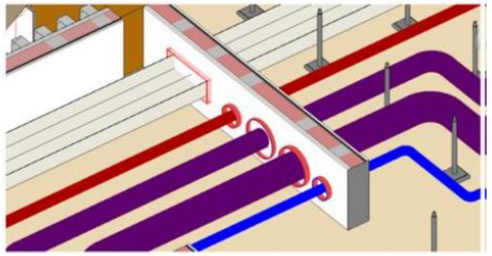
Better by Design

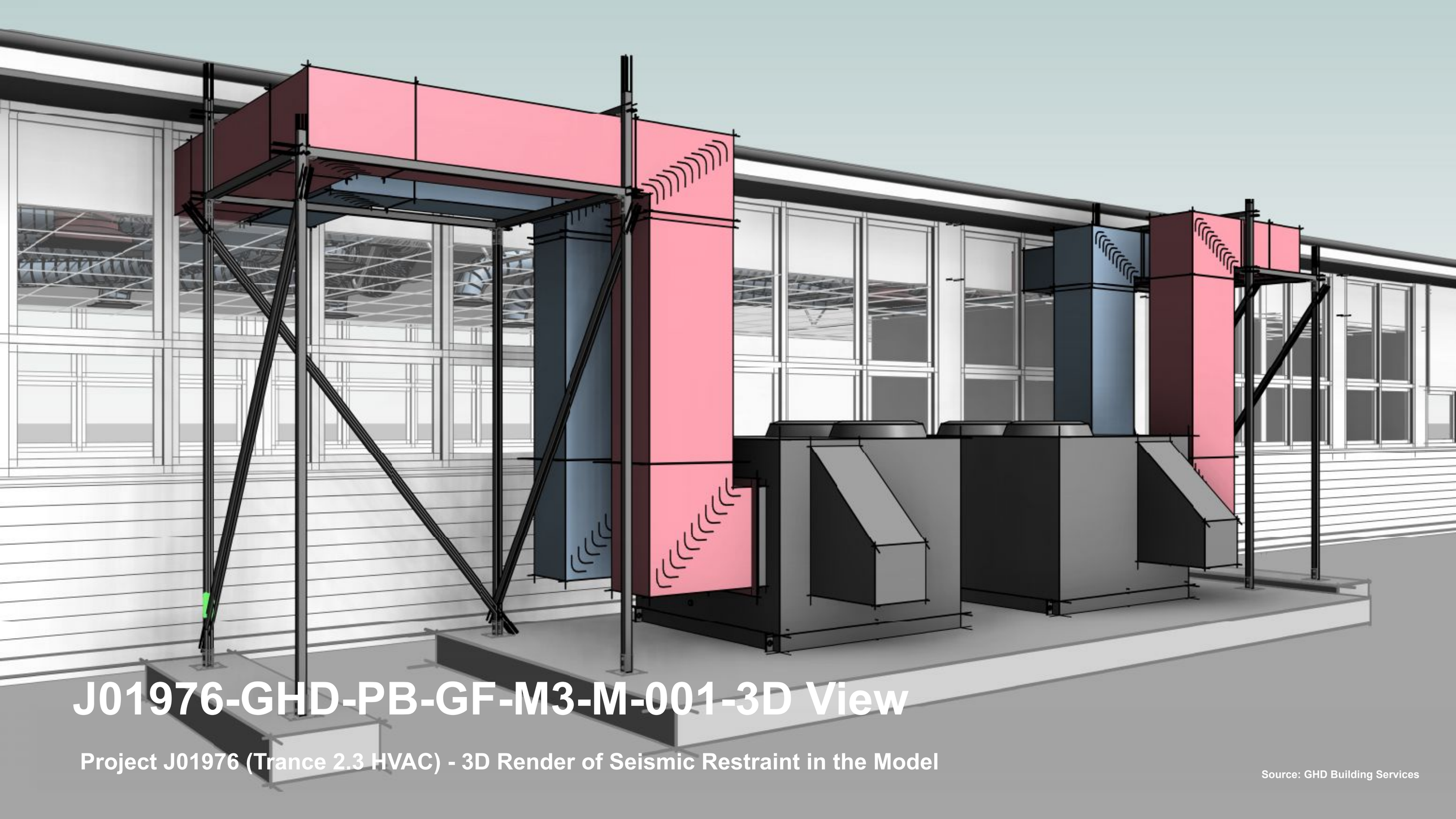
Enhanced seismic (non-structural elements) and passive fire modelling.











J01976-GHD-PB-GF-M3-M-001-3D View

Project J01976 (Trance 2.3 HVAC) - 3D Render of Seismic Restraint in the Model

Source: GHD Building Services

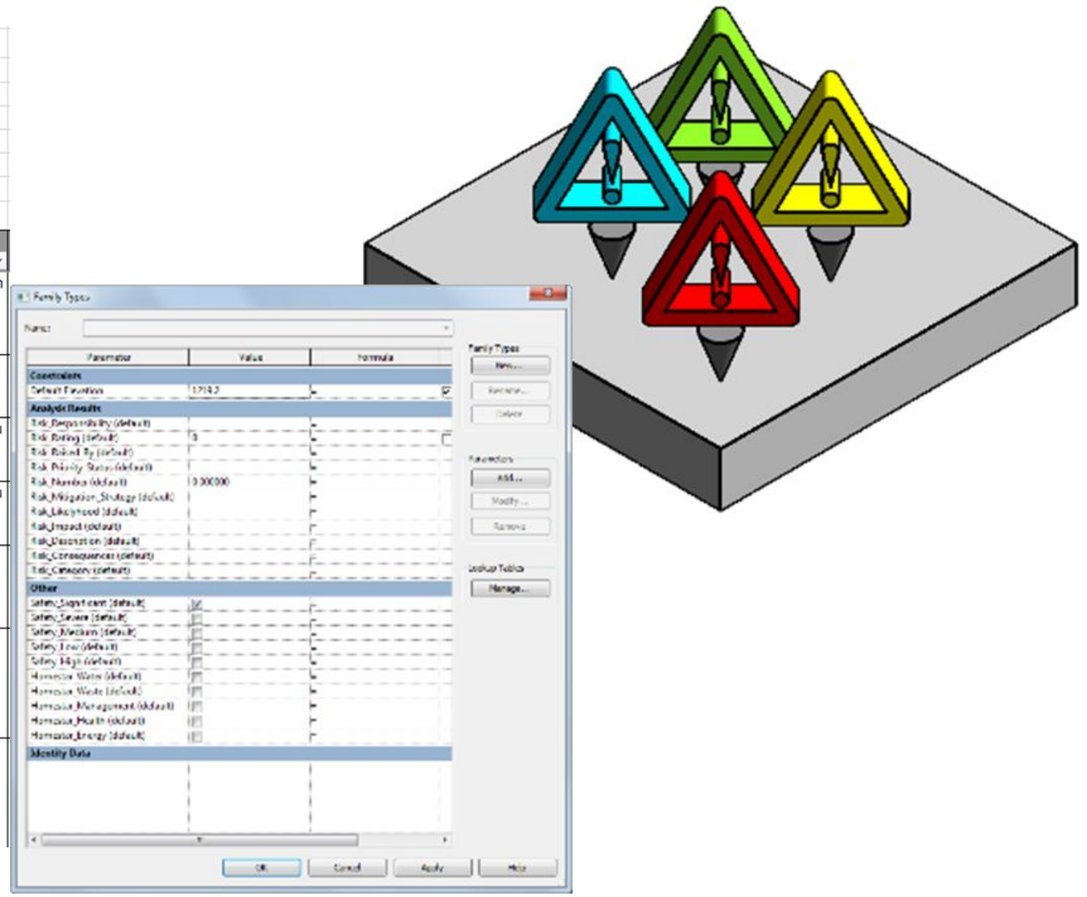
Safer Facilities

Capturing health and safety, operational risks and hazards in BIM.

	Impact	1	2	3	4	5
	Likelyhood	Trivial	Minor	Moderate	Major	Extreme
1	Rare	1	2	3	4	5
2	Unlikely	2	4	6	8	10
3	Moderate	3	6	9	12	15
4	Likely	4	8	12	16	20
5	Almost Certain	5	10	15	20	25

Risk Rating	
Severe 25	Stop - urgent assessment required
High 16-20	Hold - immediate Strategy Plan
Sig 10-15	Improve control measures, reduce risk
Med 3-9	Review and assess implication on project
Low 1-2	Proceed, minimal impact on project

Risk No	Raised By	Category	Type	Risk	Consequences	Likelihood	Impact	Risk Rating	Risk Mitigation Strategy
49	RTV	Design	Stage 3 / 4	Open deck car park	Lack of planning for future Stage 4 'open deck' car park subject to Fire Engineered solution	Moderate	Major	12	Design allowance for the provision of mechanical exhaust ventilation and retro fitting of sprinklers to Stage 3/4 car park, if natural ventilation options unachievable
50	WAM	Design	Stage 3	Egress / planning	Rooftop Plant Room and office and carpark egress	Rare	Minor	2	Assessment to be determined with regards to egress
51	RTV	Design	Stage 3	Link Bridge	Fire Engineered solution for removal of drenchers not adopted	Rare	Minor	2	Assessment to be determined with regards alternate solution in lieu of drenchers
52	RTV	Design	Stage 3	West Core Staff Room	Fire Engineered solution for removal of drenchers not adopted	Rare	Minor	2	Assessment to be determined with regards alternate solution in lieu of drenchers
53	WAM	Procurement Planning	Stage 3	Inflexible DA Conditions for staged approvals	Delay	Likely	Major	16	Review draft DA conditions, dialogue with council 7-5-13
54	RTV	Design	Stage 3	Poor or late compliance of DA conditions / team certifications	Delay	Moderate	Moderate	9	Prompt consultant responses
55	RTV	Design	Stage 3	Lack of understanding of the FER	Fire Engineer not satisfied with solutions	Moderate	Moderate	9	Fire Eng to review Tender docs and shop drgs



Protecting the Environment

Using BIM to make better and more informed decisions.

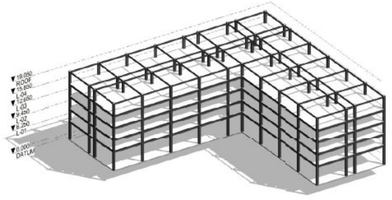
REVIT

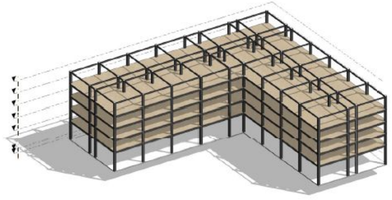
CONCRETE FLOOR

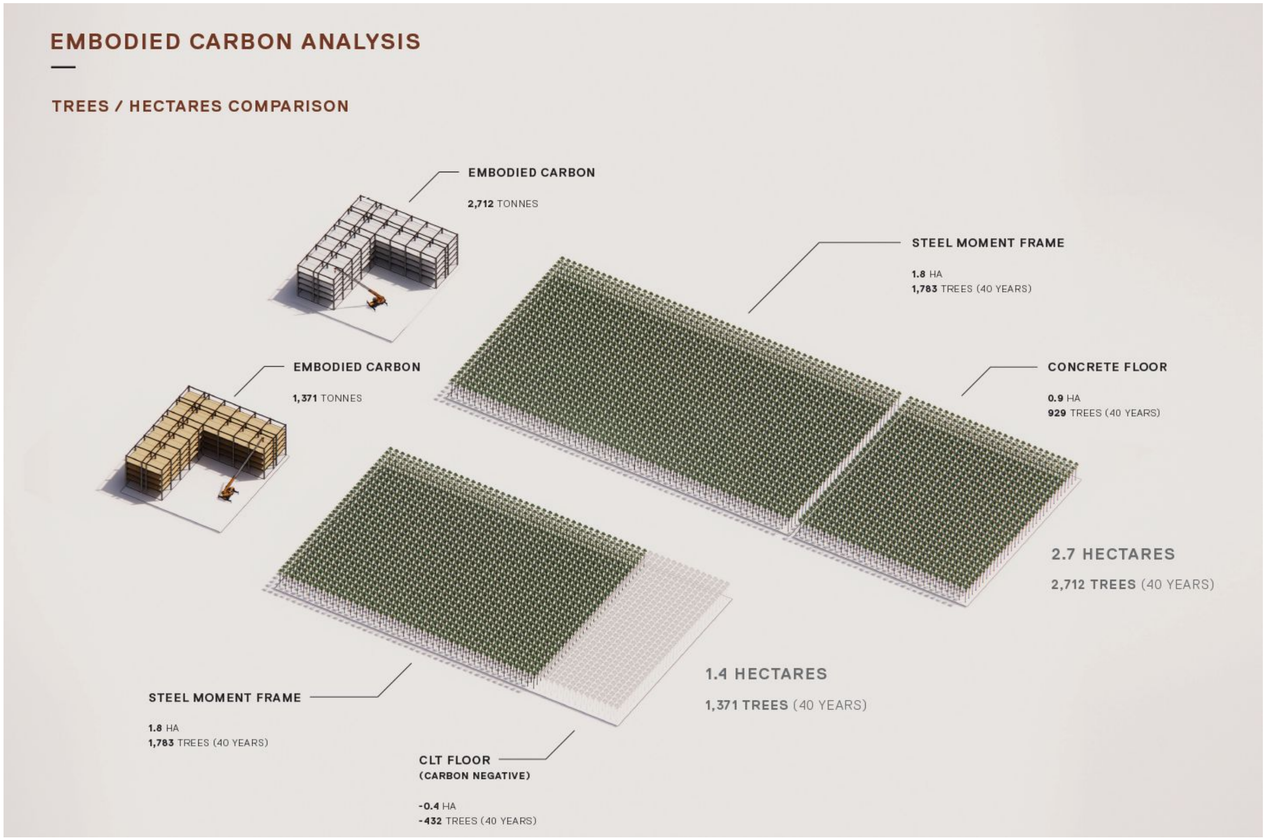
Family	Type	Material: Description	Material: Volume	Material: Unit weight	Material: IAM Embodied Carbon KgCO2/Kg	IAM Calculated Embodied Carbon CO2 (Tonnes)	Trees (Pinus Radiata)	Land (Hectares)	Level
Floor	Floor_150_Comflor	CONCRETE	221.13 m³	23.6 kN/m³	0.37	176	176	0.2	L01
Floor	Floor_150_Comflor	CONCRETE	202.58 m³	23.6 kN/m³	0.37	177	177	0.2	L02
Floor	Floor_150_Comflor	CONCRETE	202.58 m³	23.6 kN/m³	0.37	177	177	0.2	L03
Floor	Floor_150_Comflor	CONCRETE	202.58 m³	23.6 kN/m³	0.37	177	177	0.2	L04
Floor	Floor_150_Concrete	CONCRETE	252.73 m³	23.6 kN/m³	0.37	221	221	0.2	L00
Structural Column_Rectangular Square Hollow Section_Column_Concrete Filled	SHS_500x500x22.0	CONCRETE	217.52 m³	1227.2 kN/m³	0.37	190	190	0.2	L00
Structural Framing_UB_Universal Beam_IAM	305x165x40UB	STEEL	2.99 m³	1308.5 kN/m³	2.85	66	66	0.1	
Structural Framing_UB_Universal Beam_IAM	530x210x82UB	STEEL	53.20 m³	5234.1 kN/m³	2.85	467	467	0.9	
Comflor60_24	Comflor60	STEEL	9.19 m³	44544.1 kN/m³	2.85	200	200	0.2	
Structural Column_Rectangular Square Hollow Section_Column_Concrete Filled	SHS_500x500x22.0	STEEL	38.31 m³	4002.6 kN/m³	2.85	840	840	0.8	L00
Grand total: 774			1351.81 m³	9934.5 kN/m³		2,712	2712	2.7	

CLT FLOOR

Family	Type	Material: Description	Material: Volume	Material: Unit weight	Material: IAM Embodied Carbon KgCO2/Kg	IAM Calculated Embodied Carbon CO2 (Tonnes)	Trees (Pinus Radiata)	Land (Hectares)	Level
Floor	Floor_135_CLT	CLT	227.46 m³	4.7 kN/m³	-1.01	-108	-108	-0.1	L01
Floor	Floor_135_CLT	CLT	227.46 m³	4.7 kN/m³	-1.01	-108	-108	-0.1	L02
Floor	Floor_135_CLT	CLT	227.46 m³	4.7 kN/m³	-1.01	-108	-108	-0.1	L03
Floor	Floor_135_CLT	CLT	227.46 m³	4.7 kN/m³	-1.01	-108	-108	-0.1	L04
Floor	Floor_150_Concrete	CONCRETE	252.73 m³	23.6 kN/m³	0.37	221	221	0.2	L00
Structural Column_Rectangular Square Hollow Section_Column_Concrete Filled	SHS_500x500x22.0	CONCRETE	217.52 m³	1227.2 kN/m³	0.37	190	190	0.2	L00
Structural Framing_UB_Universal Beam_IAM	305x165x40UB	STEEL	2.99 m³	1308.5 kN/m³	2.85	66	66	0.1	
Structural Framing_UB_Universal Beam_IAM	530x210x82UB	STEEL	53.20 m³	5234.1 kN/m³	2.85	467	467	0.9	
Structural Column_Rectangular Square Hollow Section_Column_Concrete Filled	SHS_500x500x22.0	STEEL	38.31 m³	4002.6 kN/m³	2.85	840	840	0.8	L00
Grand total: 194			1443.80 m³	11874.8 kN/m³		1,371	1371	1.4	

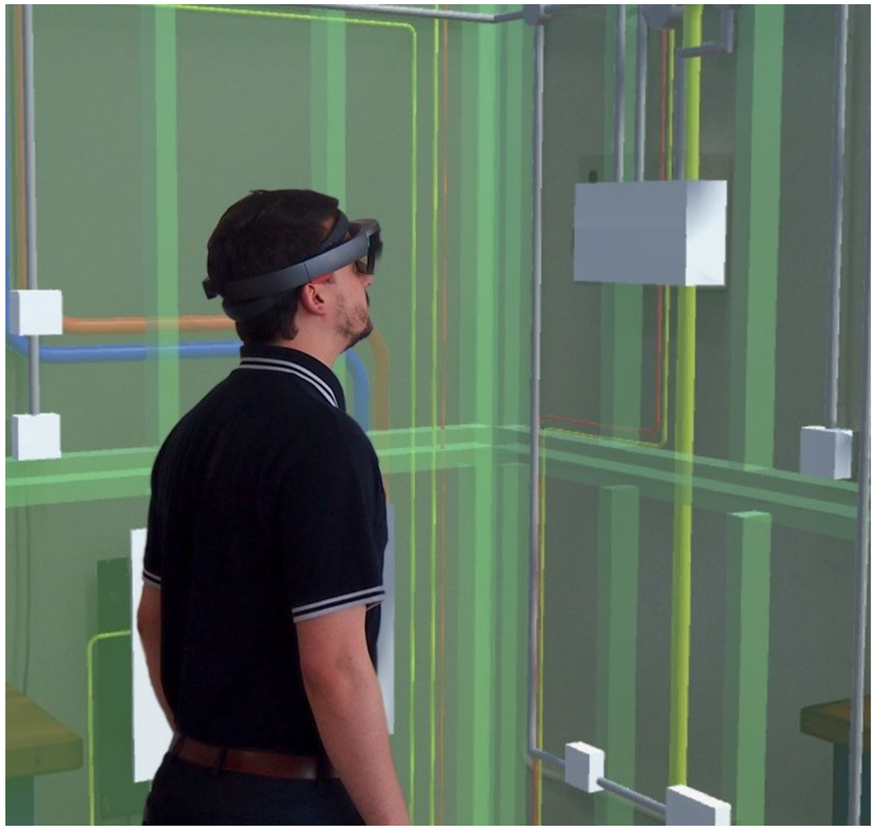


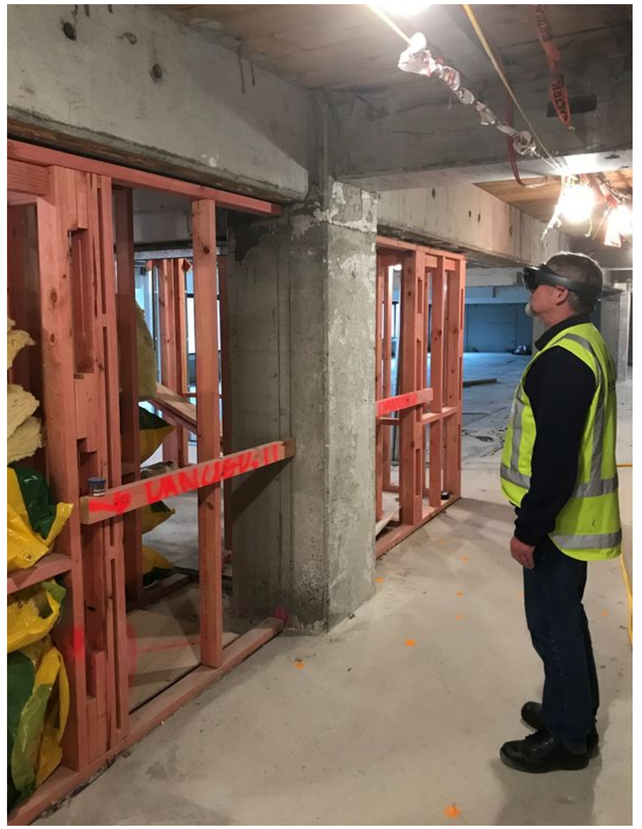




Working with ‘Super Powers’

Using Augmented and Virtual Reality with BIM to ‘expose’ the ‘hidden’.





Constructing with ‘lego’ bricks

Using 3D printing to unlock new methods of construction using traditional materials.