AUTODESK. UNIVERSITY

Maire Tecnimont

BIM 360 for EPC Contractors: From Business Needs to Full Adoption

Mellacqua Marco

Plant Information Management Coordinator

Bitetto Fabio

Plant Information Management Coordinator

About the speaker

Marco Mellacqua

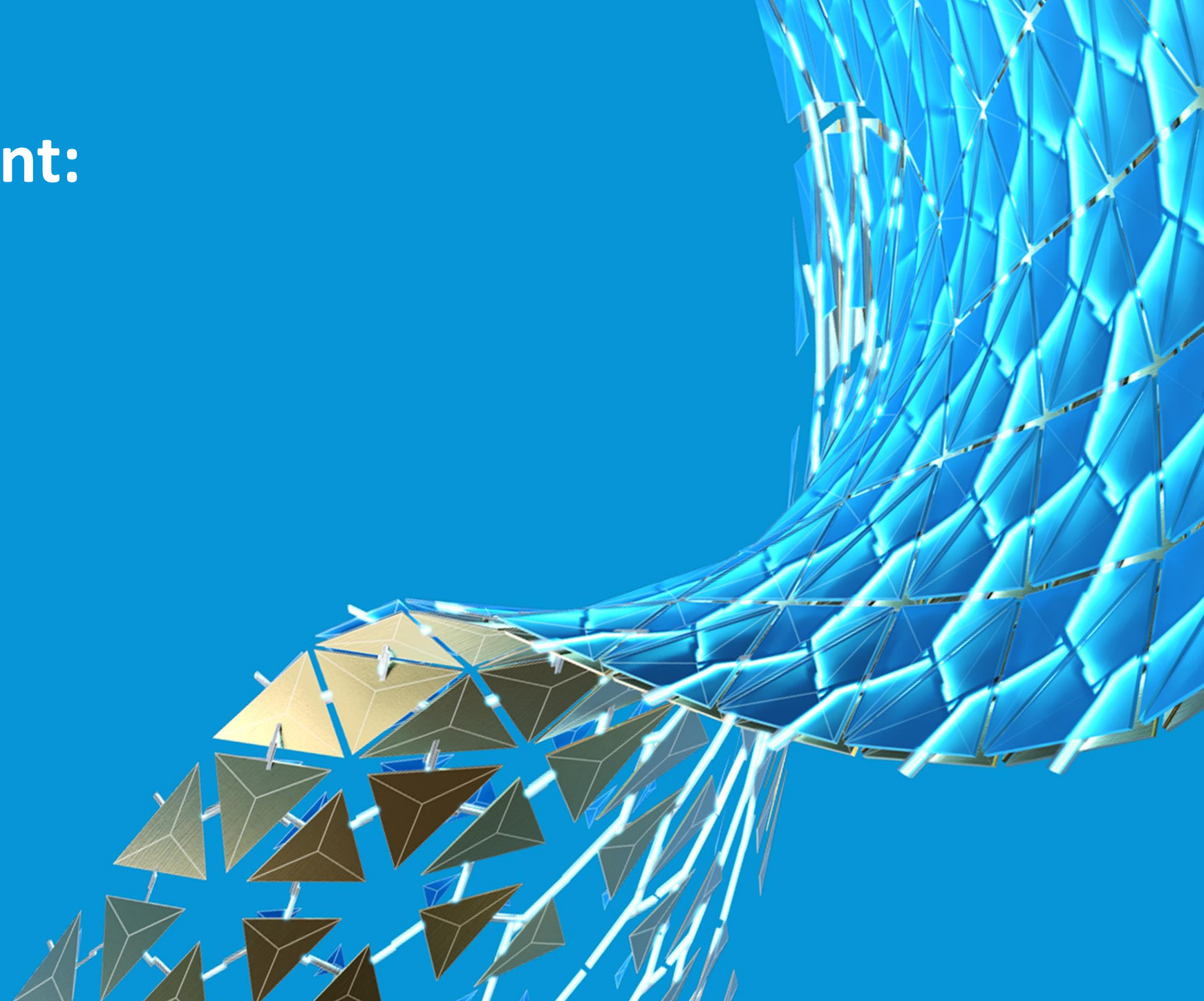
Marco is a Plant Information Management Coordinator at Maire Tecnimont. In the last years he has been strongly involved in the Company digital transformation process. Actually he is collaborating in several digital initiatives that aim to integrate digital technologies into Engineering and Construction business areas in order to make processes more efficient and effective and consequently to deliver more value to Clients. On the executive projects instead, he is taking care of the information management plan and its deployment ensuring the correct use of tools and methodologies and collecting feedbacks to implement in the above mentioned digital initiatives.

About the speaker

Fabio Bitetto

Fabio is a Plant Information Management Coordinator at Maire. Despite his young age, Fabio made several work experiences in which he grown his BIM and project management expertise focusing especially on energy and utilities. He also collaborated with the City of Milan for the European project “Horizon 2020”, focused on smart cities and energy efficiency. Fabio started the development of BIM in Maire Tecnimont, focusing on Underground Services. In the 2019 he has started a new experience as Plant Information Management Coordinator, managing all the Information Management aspects on projects.

Maire Tecnimont:
Who we are



INDUSTRY

| OIL&GAS REFINING | PETROCHEMICALS | FERTILIZERS | POWER | RENEWABLE & GREEN |

OPERATING COMPANIES

Maire Tecnimont

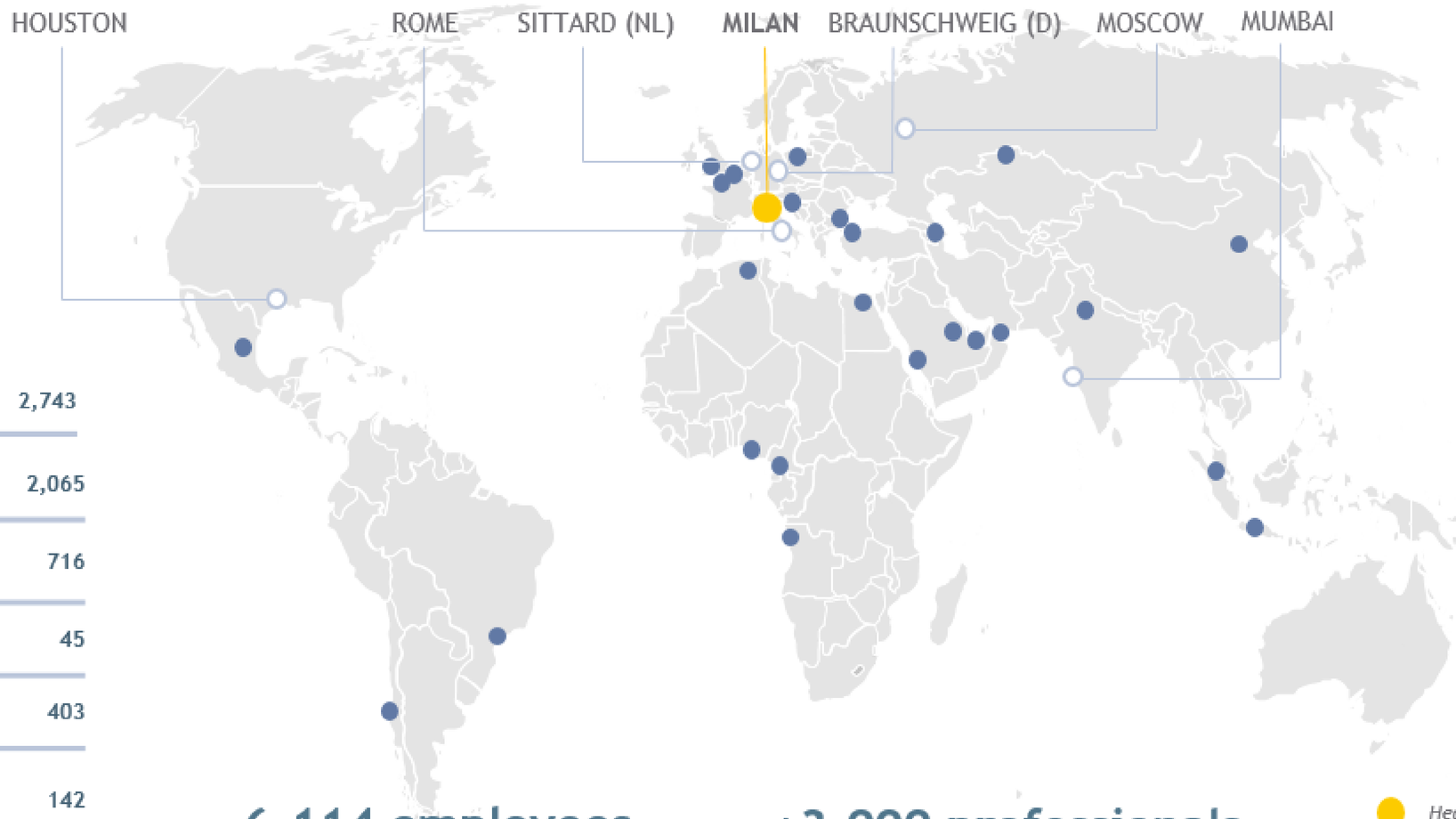
Tecnimont	Oil&Gas Refining, Petrochemicals, Fertilizers, Polyolefins, Power Large-scale contracting
KT Kinetics Technology	Refining, Hydrogen&Syngas Production, Sulphur Recovery and Process Heaters
Stamicarbon	Development and licensing of Urea Technology
NextChem Maire Tecnimont for Energy Transition	Green Acceleration Project, Technological initiatives for energy transition
Neosia Renewables	Flexible solutions in Renewable Energy
MET Gas Processing Technologies	Downstream Innovative Technologies
Met Development	Project development to originate business through early involvement in investment initiatives
Neosia	Engineering and contracting in Transportation and Civil Engineering

ORGANIZATION

MORE THAN
9,114
professionals

~6,114 employees
+3,000 professionals
in Electrical & Instrumentation

45 COUNTRIES
50 OPERATING COMPANIES



ITALY AND REST OF EUROPE	2,743
INDIA, REST OF ASIA AND AUSTRALIAN REGION	2,065
RUSSIA AND CASPIAN REGION	716
AMERICAS REGION	45
MIDDLE EAST REGION	403
NORTH AFRICA AND SUB-SAHARAN AFRICA REGION	142
TOTAL EMPLOYEES BY LOCATION	**6,114**

Average age: 41,9 years
Approx. 69% graduates

~6,114 employees
worldwide

+3,000 professionals
in Electrical & Instrumentation

- *Headquarters*
- *Main offices and engineering centres*
- *Subsidiaries, branches and representative offices*

Maire Tecnimont is a **multicultural** and **multinational Group**

PETROCHEMICALS

WELL ROOTED TECHNOLOGY ORIENTATION: MARKET LEADER (#1) FOR INSTALLED CAPACITY (last 10ys)

30% MARKET SHARE IN POLYOLEFIN PLANTS

50% MARKET SHARE IN LDPE PLANTS

Since 1970 MORE THAN **200** POLYETHYLENE AND POLYPROPYLENE PLANTS **

FERTILIZERS

54% MARKET SHARE IN LICENSING UREA PLANTS TECHNOLOGY (#1 worldwide)*

34% MARKET SHARE IN LICENSING UREA GRANULATION TECHNOLOGY (#2 worldwide)*

Since 1924 **172** AMMONIA AND UREA PLANTS**

OIL&GAS REFINING

WELL RECOGNIZED LEADERSHIP IN LICENSING HYDROGEN TECHNOLOGY AND IN LICENSING SULPHUR RECOVERY AND TAIL GAS TREATMENT TECHNOLOGY

WORLD CLASS TRACK RECORD IN LARGE GAS TREATMENT PLANTS AND REFINERY PROCESS UNITS

Since 1971 MORE THAN **250** HYDROGEN AND SULPHUR RECOVERY UNIT PROJECTS**

POWER

21GW INSTALLED WORLWIDE

7th RANK ENR WORLD TOP-10 POWER MARKET ENGINEERING COMPANIES 2016

Since 1962 MORE THAN **280** POWER GENERATION PROJECTS

GREEN CHEMISTRY & RENEWABLES

TECHNOLOGIES FOR ENERGY TRANSITION:

5 PROPRIETARY

3 UNDER PARTNERSHIP FOR EXCLUSIVE LICENSING

OVER **20** WITH A ROLE OF INTEGRATOR & EPC

RESEARCH PROJECTS:

OVER **10** WITH A ROLE OF PARTNER / COORDINATOR

DEVELOPED more than
1,000 MW wind
800 MW solar

DESIGNED more than
560 MW wind
300 MW solar

MANAGED more than
500 MW wind
150 MW solar

BUILT more than
480 MW wind
150 MW solar

~1,500
Cumulated Patents

Strong commitment to technology development

€56MN INVESTED IN INNOVATION

70 R&D PROJECTS

In Green Acceleration
(last 5ys)

Agenda

01. Digital transformation: Maire Tecnimont perspective

02. BIM360: Why?

03. Business Case Development

04. Process Assessment

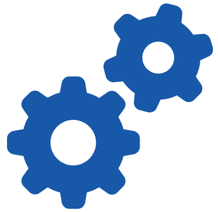
05. Current Status

06. Conclusions

Digital Transformation:
Maire Tecnimont perspective

For Maire Tecnimont 2 main focus areas related to Digital Solutions:

Internal focus



Increase efficiency and effectiveness of own internal processes

External focus

Enhance value proposition towards owners and operators

For Maire Tecnimont 2 main focus areas related to Digital Solutions:

Internal focus

Increase efficiency and effectiveness of own internal processes

01 Training & Engagement

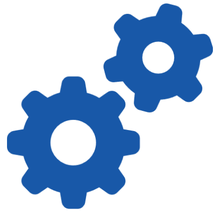
02 Landscaping and prioritization

03 Business cases, KPIs definition and roadmap

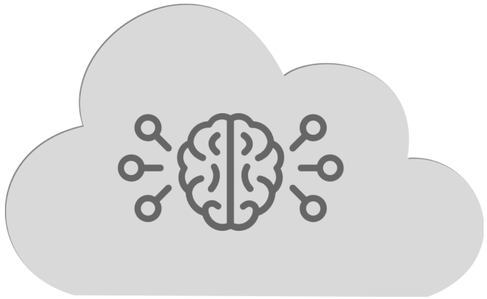
04 Program management & definition of scale up approach

For Maire Tecnimont 2 main focus areas related to Digital Solutions:

Internal focus



Increase efficiency and effectiveness of own internal processes



BIM CENTRIC COLLABORATION PLATFORM

Maire Tecnimont pain points:

01 Engineering disciplines design on different models, with no cross-visibility, leading to inconsistencies

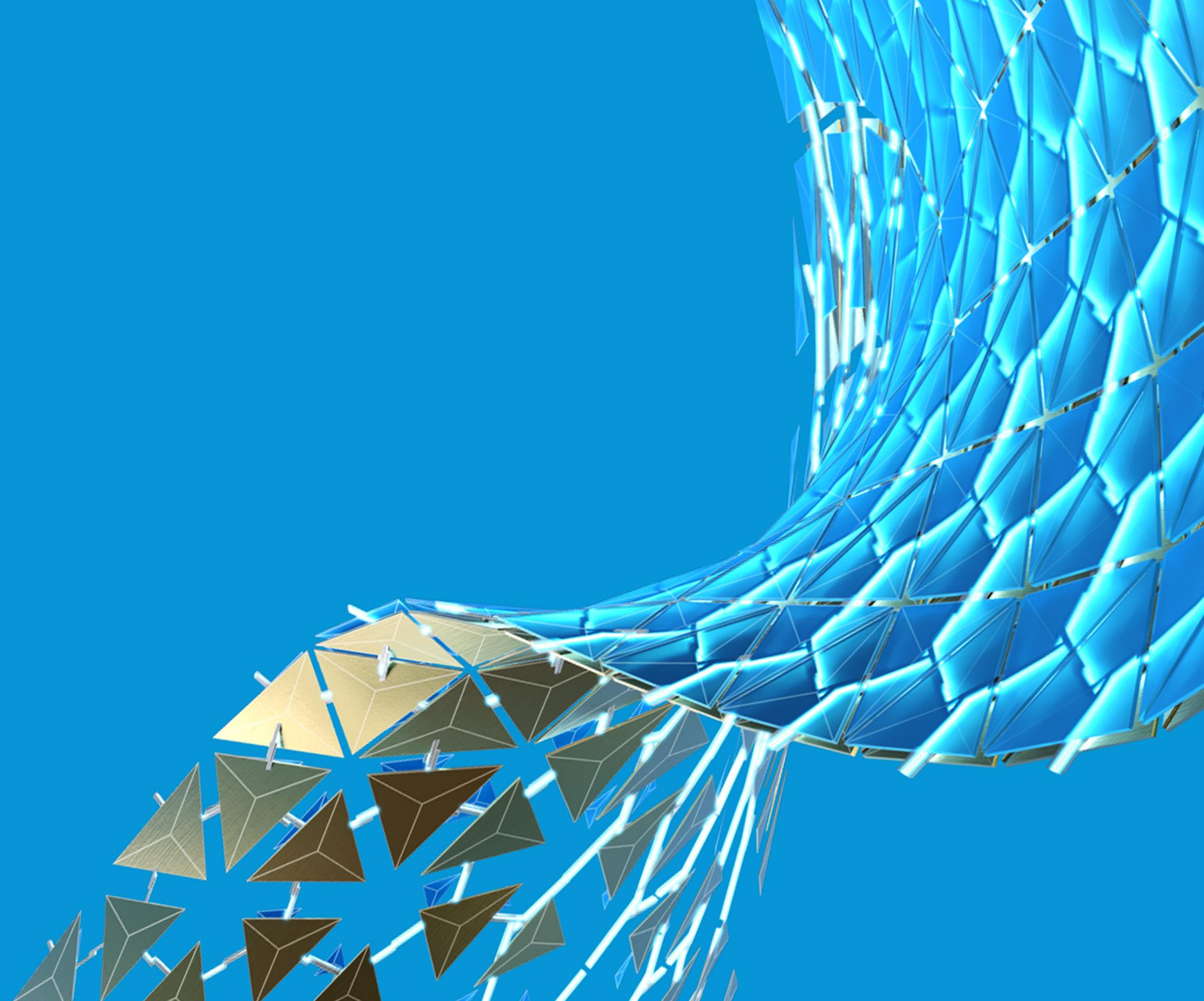
02 Inefficient approval processes

03 Construction has no real-time visibility on design changes, leading to reworks

04 Inefficient document collection

05 EPC info collected not leveraged

BIM360: Why?



Overall Scope Identification

Cluster description

Common BIM based environment where all the disciplines, partners and vendors can collaborate supported by custom functionalities

Inputs

All disciplines, partners & vendors model

Possibility to comment and approve models

3D & 2D

BIM Platform

- Single platform
- Engineering integrated workflow
- Daily update of 3D model
- Open platform with vendors

AUTODESK BIM 360

Output

Real-time platform for information sharing across disciplines

Collaborative production of deliverables

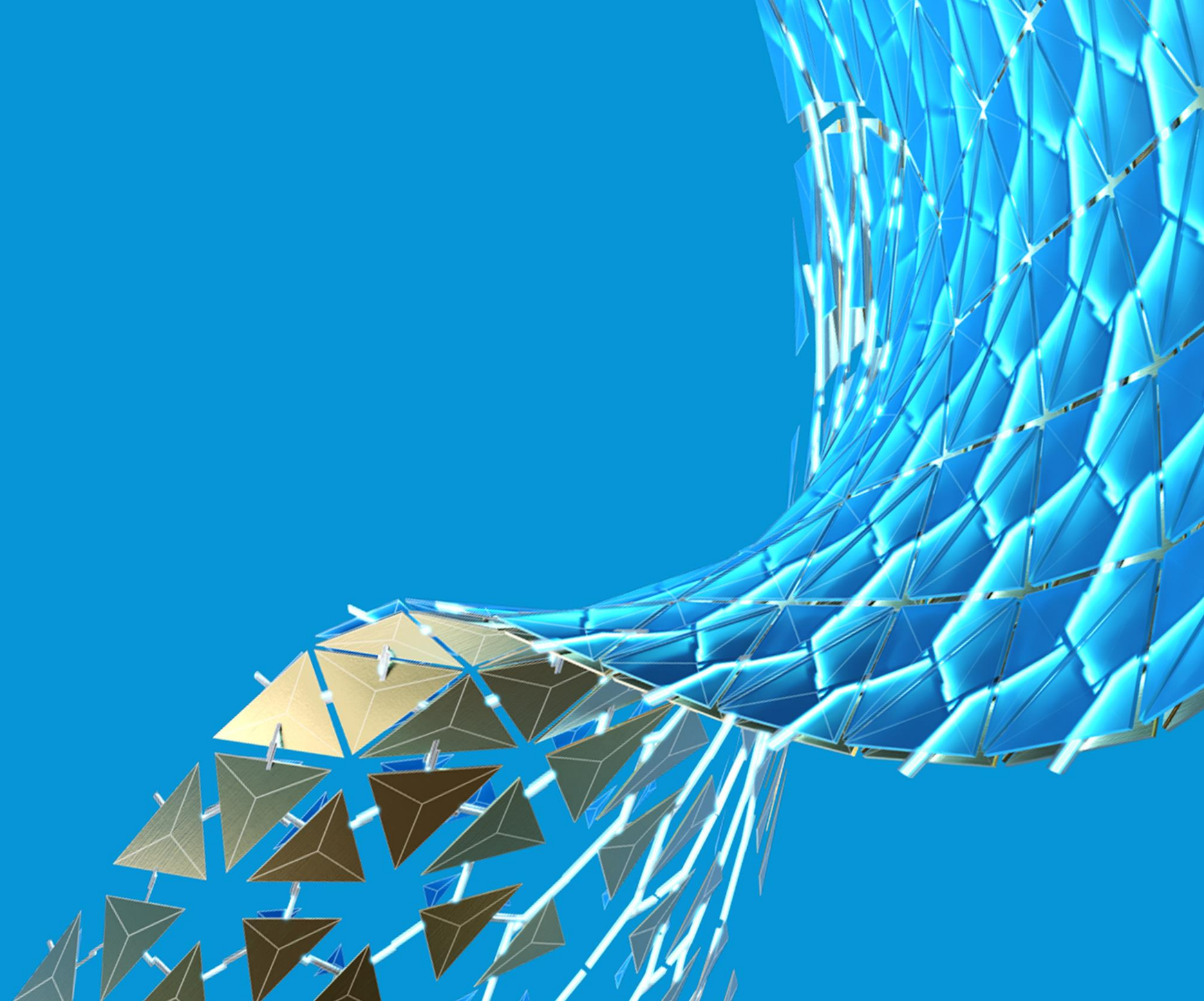
Data consistency

BIM360: Why?

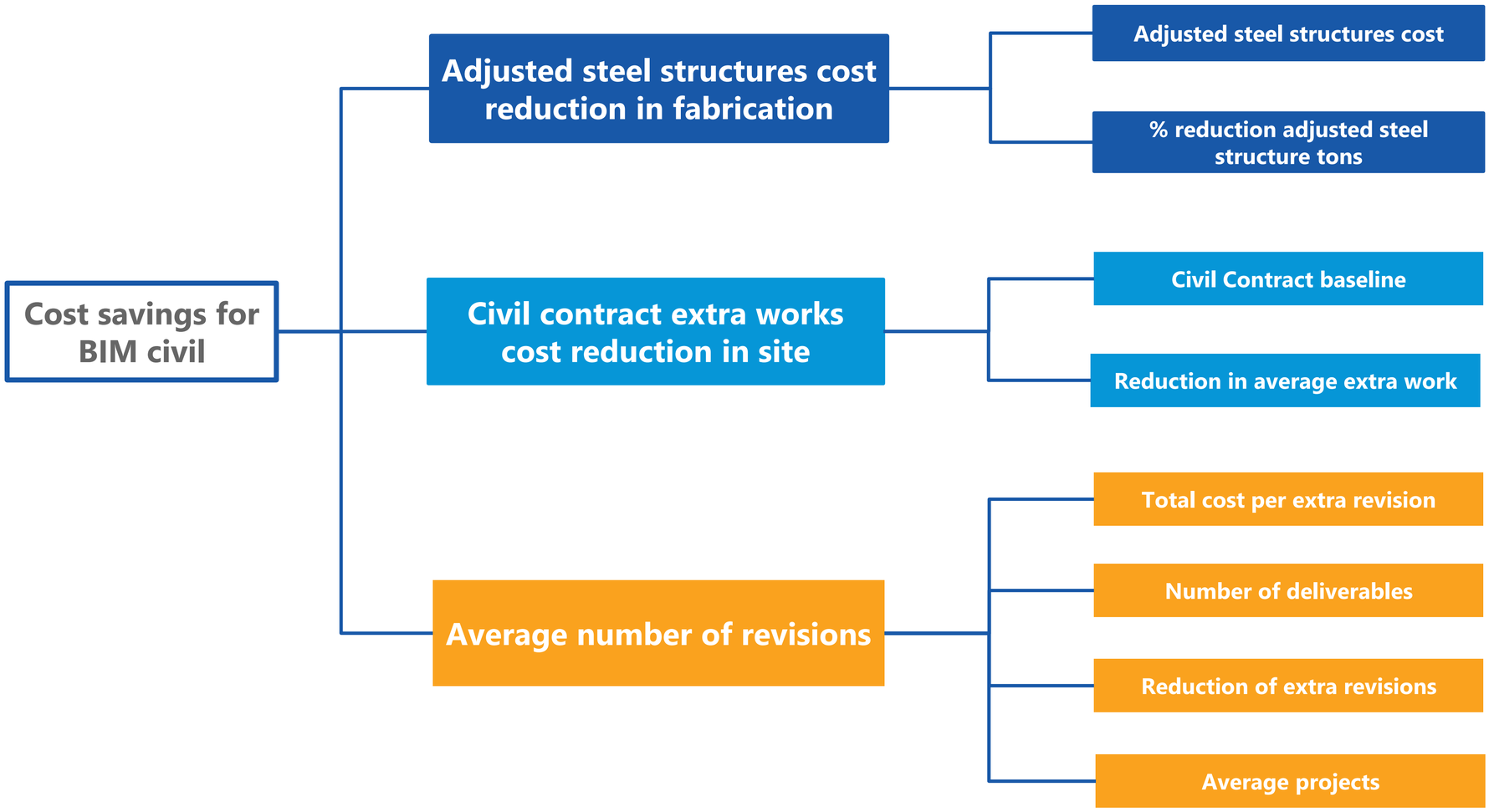
WHY

1. Cloud-based application
2. Model centric approach
3. Out of the box functionality of collaboration
4. Easily involve third partners
5. Compatibility
6. Customization/extension through Forge APIs

Business Case Development



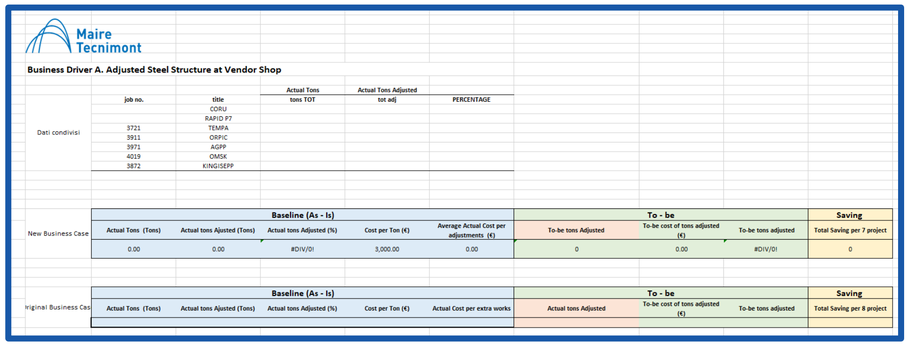
Key drivers: Civil Use Case



Assumptions: Civil Use Case

Cost savings for BIM civil

- **Adjusted steel structures cost reduction in fabrication**
- **Civil contract extra works cost reduction in site**
- **Average number of revisions**



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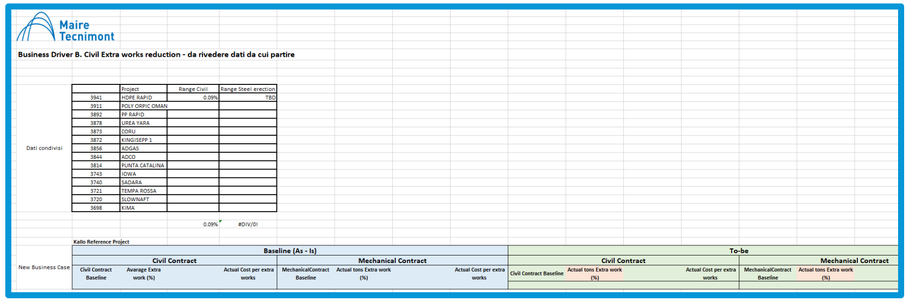
Business Driver A. Adjusted Steel Structure at Vendor Shop

	job no.	title	Actual Tons tons TOT	Actual Tons Adjusted tot adj	PERCENTAGE
Dati condivisi		CORU			
		RAPID P7			
	3721	TEMPA			
	3911	ORPIC			
	3971	AGPP			
	4019	OMSK			
	3872	KINGISEPP			

	Baseline (As - Is)					To - be			Saving
New Business Case	Actual Tons (Tons)	Actual tons Ajusted (Tons)	Actual tons Adjusted (%)	Cost per Ton (€)	Average Actual Cost per adjustments (€)	To-be tons Adjusted	To-be cost of tons adjusted (€)	To-be tons adjusted	Total Saving per 7 project
	0.00	0.00	#DIV/0!	3,000.00	0.00	0	0.00	#DIV/0!	0

	Baseline (As - Is)					To - be			Saving
Irginal Business Cas	Actual Tons (Tons)	Actual tons Ajusted (Tons)	Actual tons Adjusted (%)	Cost per Ton (€)	Actual Cost per extra works	Actual tons Adjusted	To-be cost of tons adjusted (€)	To-be tons adjusted	Total Saving per 8 project



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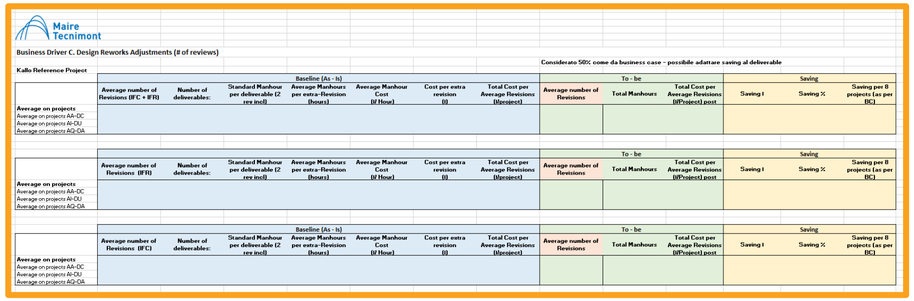
Business Driver B. Civil Extra works reduction - da rivedere dati da cui partire

		Project	Range Civil	Range Steel erection
Dati condivisi	3941	HOPE RAPID	0.09%	TBD
	3911	POLY ORPIC OMAN		
	3892	PP RAPID		
	3878	LOFA YARA		
	3873	CORU		
	3872	KINGISEPP 1		
	3856	ADGAS		
	3844	ADCO		
	3814	PUNTA CATALINA		
	3745	IOWA		
	3740	SADARA		
	3721	TEMPA ROSSA		
	3720	SLOVNAFT		
	3698	KIMA		
			0.09%	#DIV/0!

Kallo Reference Project

	Baseline (As - Is)				To-be			
	Civil Contract		Mechanical Contract		Civil Contract		Mechanical Contract	
New Business Case	Civil Contract Baseline	Average Extra work (%)	MechanicalContract Baseline	Actual tons Extra work (%)	Civil Contract Baseline	Actual tons Extra work (%)	MechanicalContract Baseline	Actual tons Extra work (%)
		Actual Cost per extra works		Actual Cost per extra works		Actual Cost per extra works		



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Business Driver C. Design Reworks Adjustments (# of reviews)

Kallo Reference Project

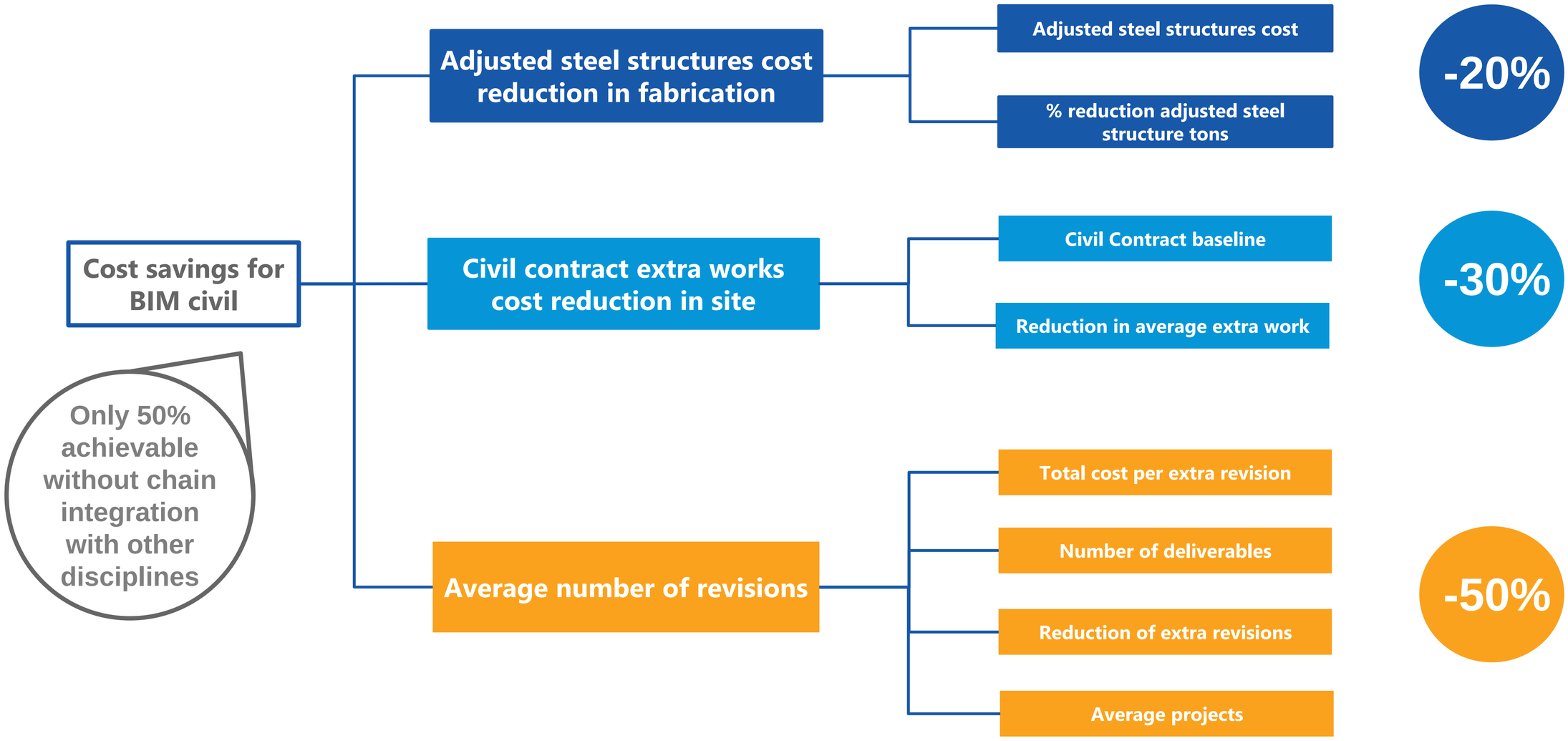
Considerato 50% come da business case - possibile adattare saving al deliverable

	Baseline (As - Is)						To - be		Saving		
	Average number of Revisions (IFC + IFTI)	Number of deliverables:	Standard Manhour per deliverable (Σ rev incl)	Average Manhours per extra-Revision (hours)	Average Manhour Cost (€ Hour)	Cost per extra revision (€)	Total Cost per Average Revisions (€project)	Average number of Revisions	Total Manhours	Total Cost per Average Revisions (€Project) post	Saving €	Saving %	Saving per 8 projects (as per DC)
Average on projects													
Average on projects AA-OC													
Average on projects AI-OU													
Average on projects AQ-OA													

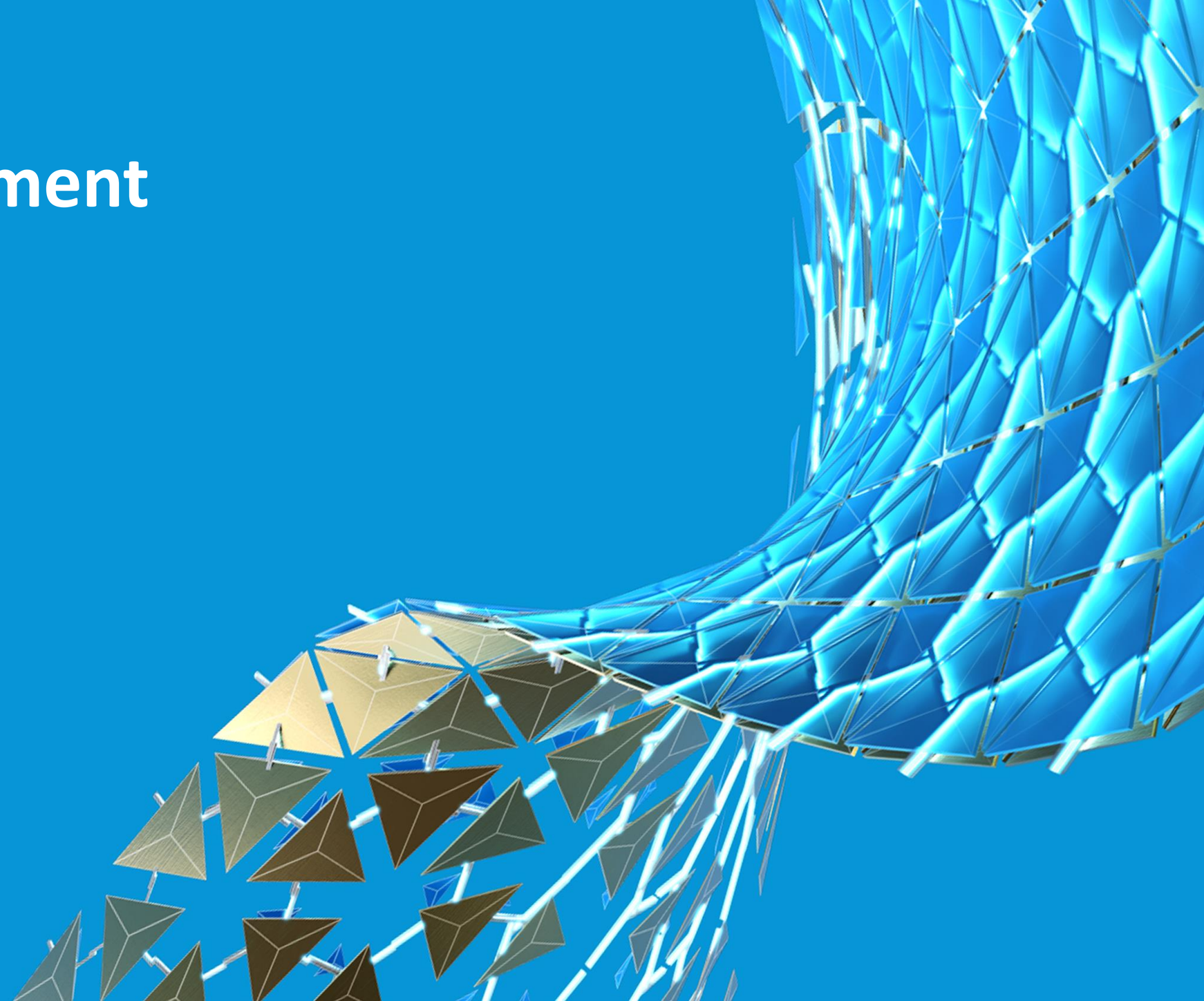
	Baseline (As - Is)						To - be		Saving		
	Average number of Revisions (IFTI)	Number of deliverables:	Standard Manhour per deliverable (Σ rev incl)	Average Manhours per extra-Revision (hours)	Average Manhour Cost (€ Hour)	Cost per extra revision (€)	Total Cost per Average Revisions (€project)	Average number of Revisions	Total Manhours	Total Cost per Average Revisions (€Project) post	Saving €	Saving %	Saving per 8 projects (as per DC)
Average on projects													
Average on projects AA-OC													
Average on projects AI-OU													
Average on projects AQ-OA													

	Baseline (As - Is)						To - be		Saving		
	Average number of Revisions (IFC)	Number of deliverables:	Standard Manhour per deliverable (Σ rev incl)	Average Manhours per extra-Revision (hours)	Average Manhour Cost (€ Hour)	Cost per extra revision (€)	Total Cost per Average Revisions (€project)	Average number of Revisions	Total Manhours	Total Cost per Average Revisions (€Project) post	Saving €	Saving %	Saving per 8 projects (as per DC)
Average on projects													
Average on projects AA-OC													
Average on projects AI-OU													
Average on projects AQ-OA													

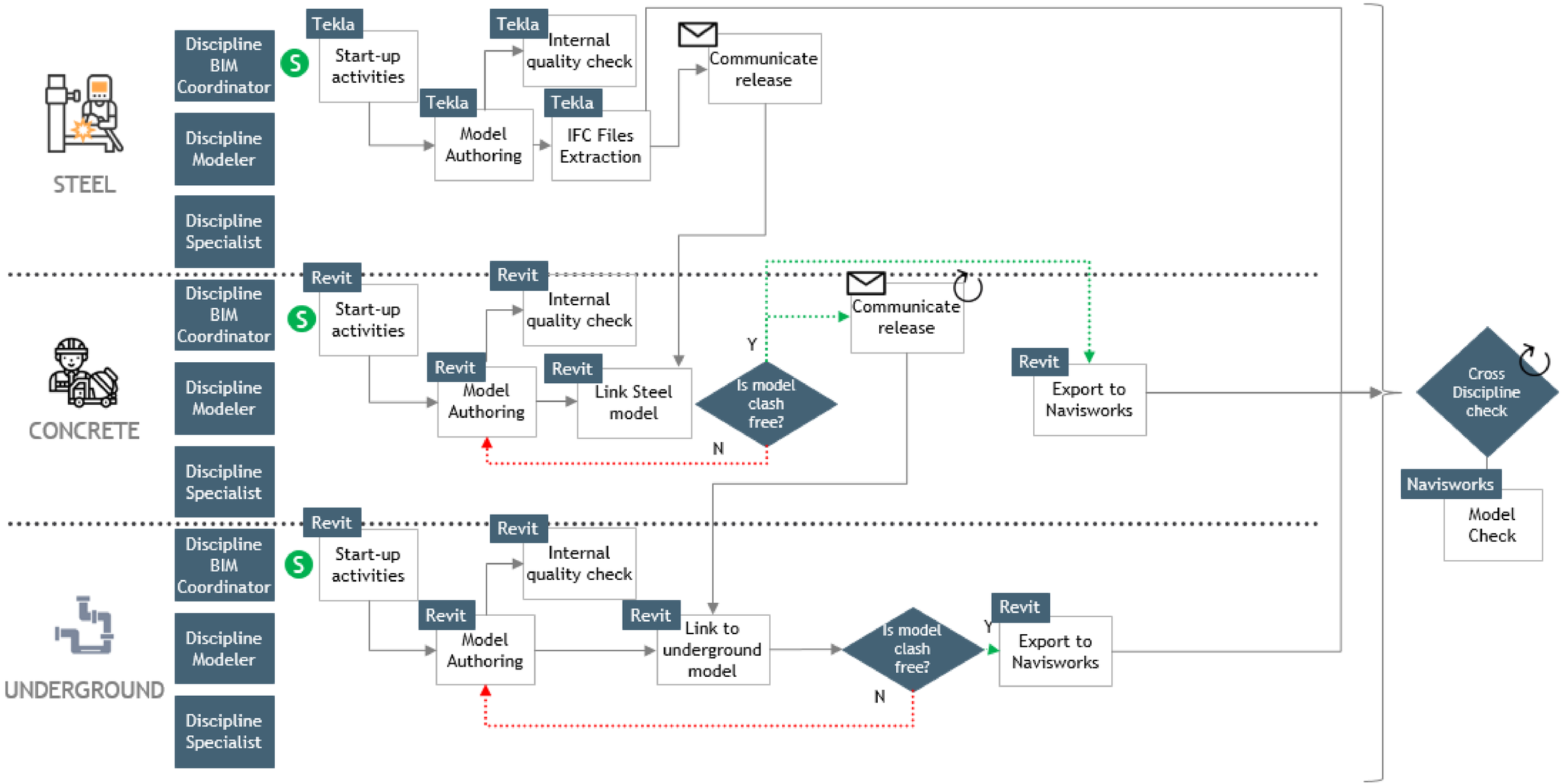
Expected Benefits: Civil Use Case



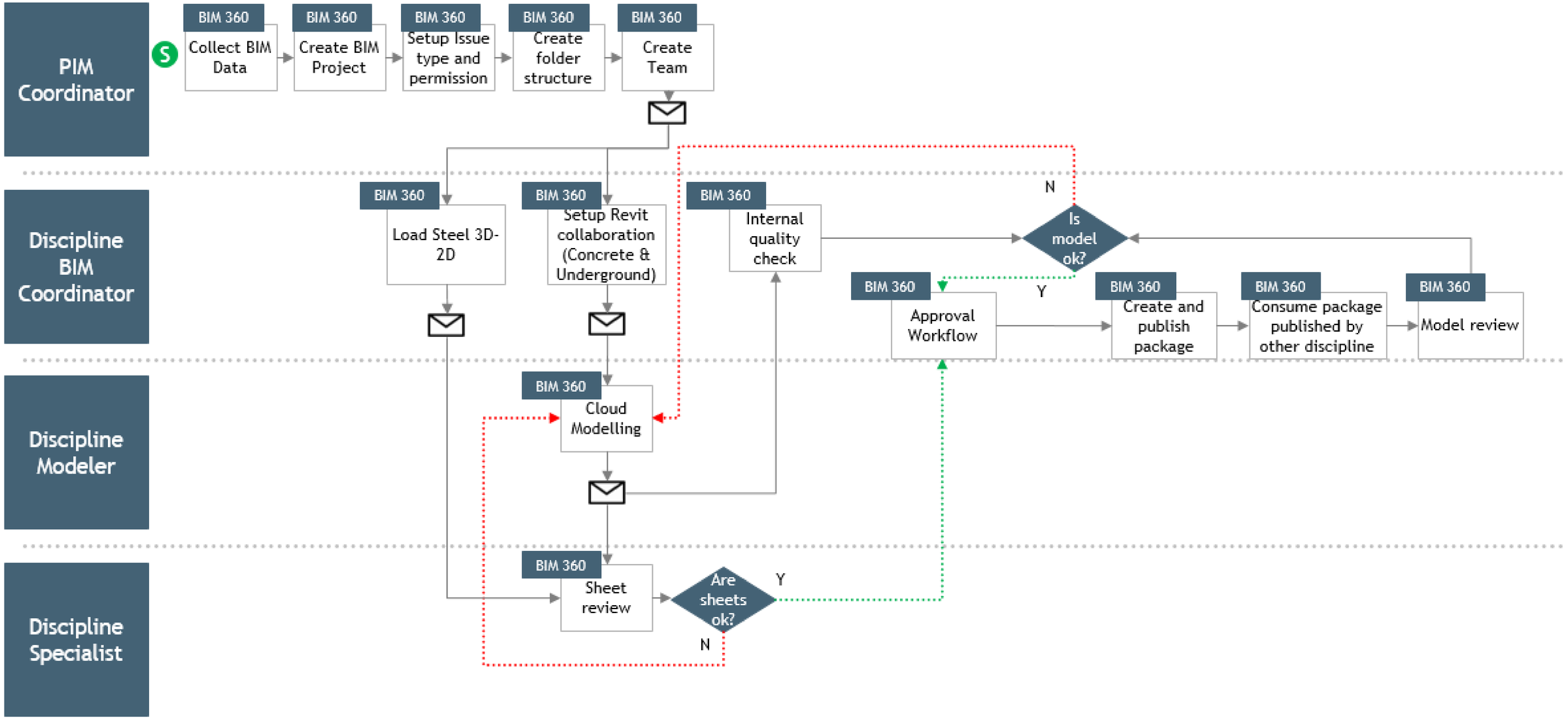
Process assessment



Civil Engineering Workflow: AS-WAS



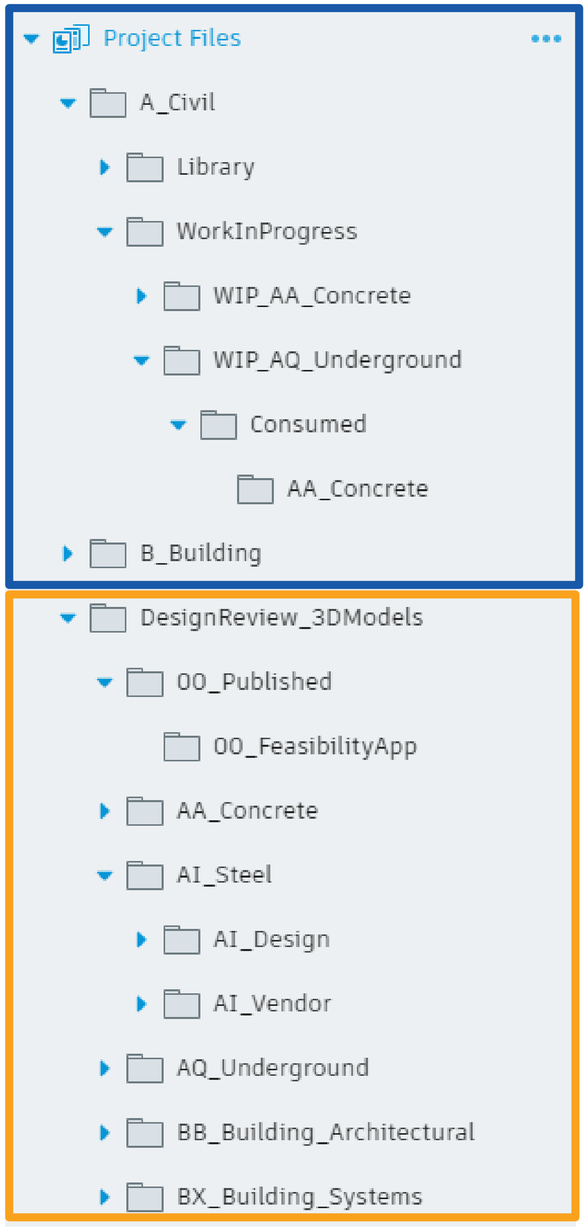
Civil Engineering Workflow: TO-BE



Digitized Processes:

1. Document Management Structure
2. Design Collaboration (Internal/Vendor)
3. Approval Workflow (Deliverable review)
4. Design Review
5. Forge Development/Customization

Document Management Structure



Discipline's Folder:

> **Library** - to host BIM content

> **WIP (Work In Progress)** - to host "live" sub-discipline models

> > **Consumed** - to host consumed shared models

> **Shared** – to host published models

Design Review Folder:

> **Published** – to host Plant Navisworks session

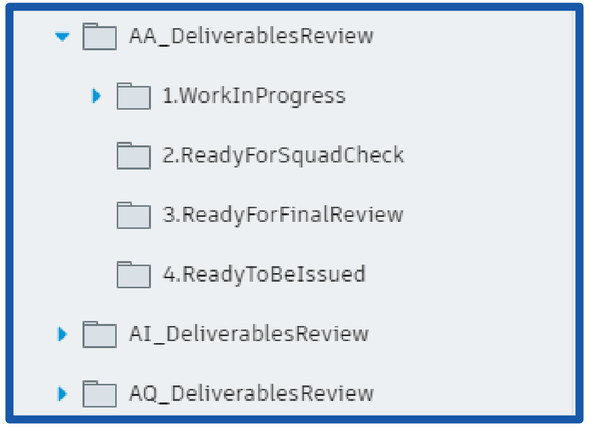
> > **FeasibilityApp** – to host models for Forge Feasibility App

> **Sub-discipline** – to host interoperable formats

> > **Design** – to host internal design files

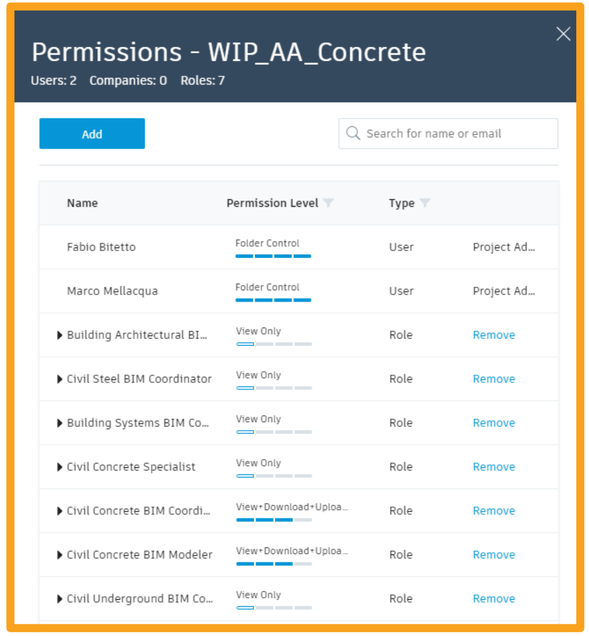
> > **Vendor** – to host SubCo design files

Document Management Structure



Deliverable Review Folder

> **Document Status** – to host deliverables as per their status (e.g. Work In Progress, Ready For Squad Check, Ready For Final Review, Ready To Be Issued)

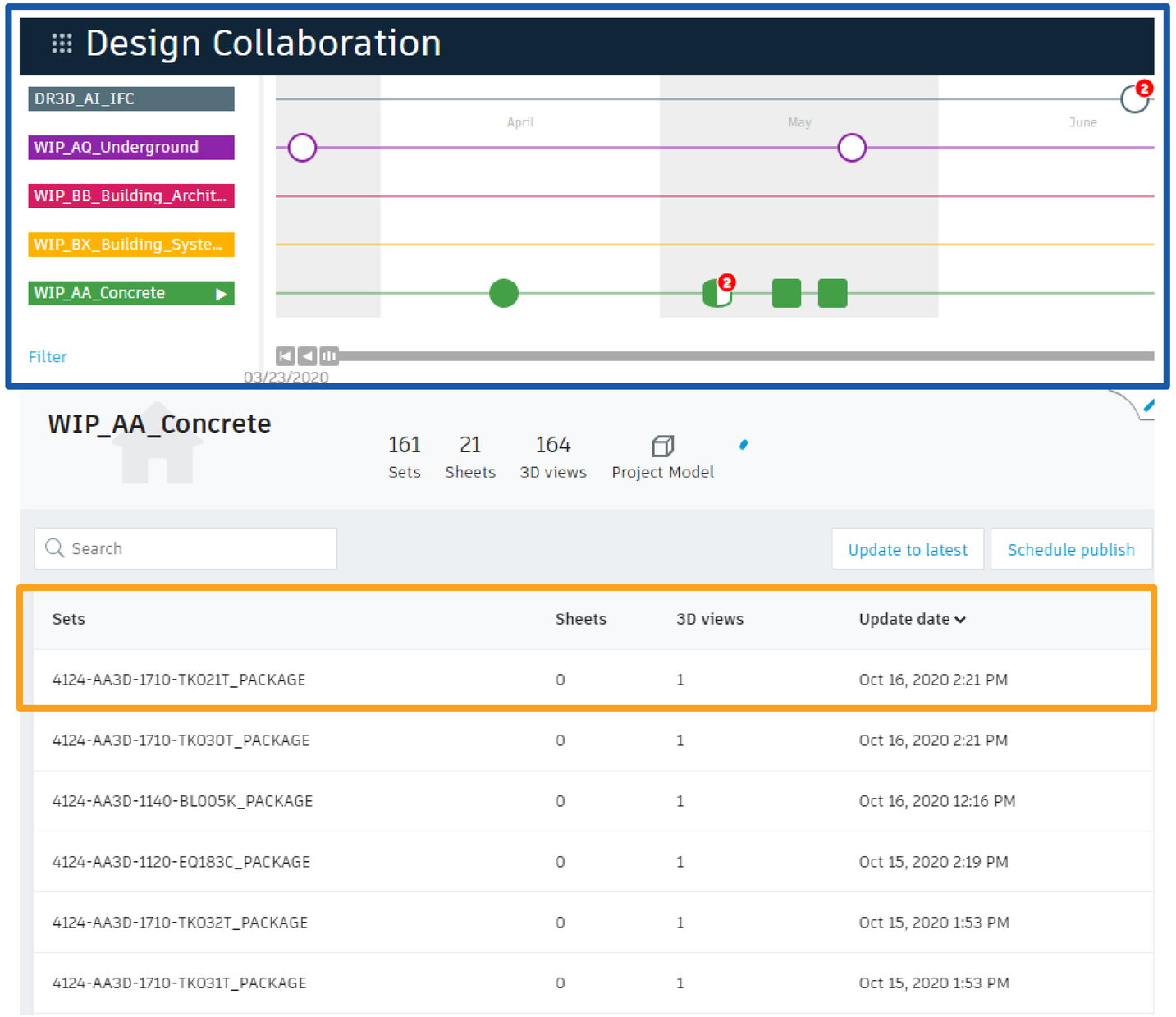


> To each folder the **permission** are set based on **standardized roles** (e.g. BIM Modeler, BIM Coordinator, etc.), defined in a **"Permission Matrix"**

Role	Plans		Project Files							
			DesignReview_3DModels		Library		Shared		WorkInProgress	
	Discipline	Others	Discipline	Others	Discipline	Others	Discipline	Others	Discipline	Others
PIM Coordinator	1	1	1	1	1	1	1	1	1	1
Piping 3D Administrator	8	8	3	6	8	8	8	8	8	8
Civil Project Leader	6	6	7	7	8	8	8	8	8	8
Civil Concrete Specialist	6	6	6	6	8	8	8	8	7	8
Civil Concrete BIM Coordinator	4	6	3	6	2	6	7	7	2	7
Civil Concrete BIM Modeler	4	6	4	6	6	8	7	7	3	8
Civil Steel Specialist	6	6	6	6	8	8	8	8	7	8
Civil Steel BIM Coordinator	4	6	3	6	2	6	7	7	2	7
Civil Steel BIM Modeler	4	6	4	6	6	8	7	7	3	8
Civil Underground Specialist	6	6	6	6	8	8	8	8	7	8
Civil Underground BIM Coordinator	4	6	3	6	2	6	7	7	2	7
Civil Underground BIM Modeler	4	6	4	6	6	8	7	7	3	8

Permission Code	Permission Description
1	Project Admin
2	Folder Control
3	View + Download + Upload + Edit
4	View + Download + Upload
5	Upload Only
6	View + Download
7	View Only
8	Access Denied

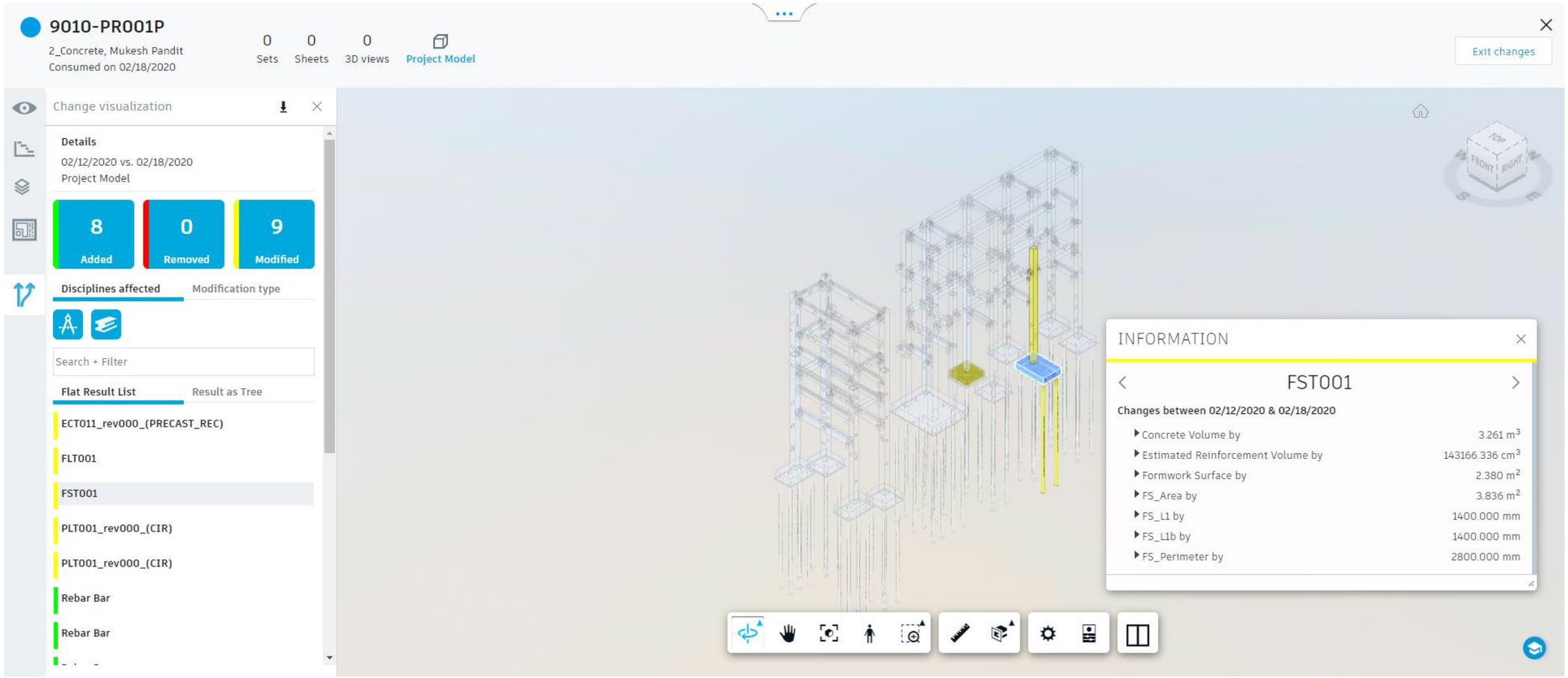
Design Collaboration (Internal/Vendor)



Teams sharing design packages

Standardized Naming convention to identify sets and related content (.rvt, .ifc, .pdf, etc.)

Design Collaboration (Internal/Vendor)



Explore package and compare with previous version (added/removed/modified objects) before consuming

Approval Workflow (Deliverable review)

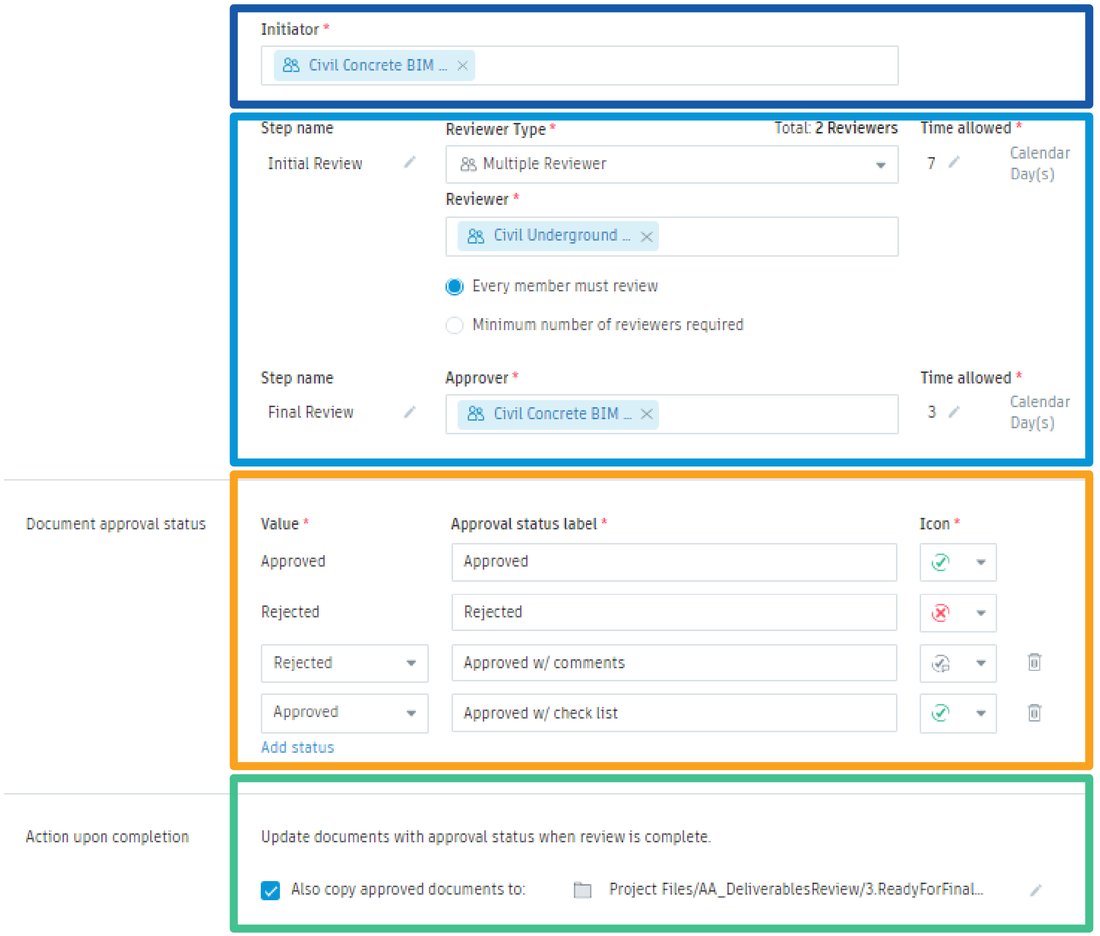
Workflow	Initiator
AA-AI-TEST	Civil Concrete Specialist, Civil Concrete BIM Model...
AA-ReadyForFinalReview-Basin	Civil Concrete BIM Coordinator
AA-ReadyForFinalReview-Piperack	Civil Concrete BIM Coordinator
AA-ReadyForFinalReview-Substation	Civil Concrete BIM Coordinator
AA-ReadyForIssueToClient-Basin	Civil Concrete BIM Coordinator
AA-ReadyForIssueToClient-Piperack	Civil Concrete BIM Coordinator

AA-ReadyForFinalReview-Basin

Standard Pre-defined Approval Workflow based on:

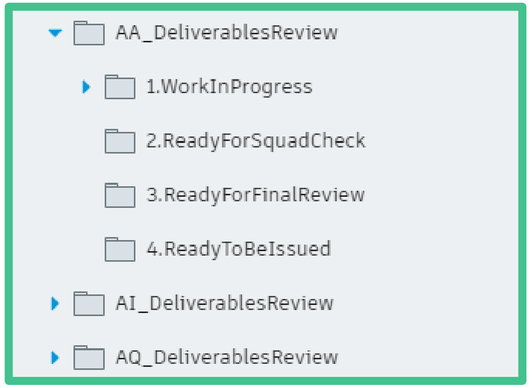
- **Discipline (Reinforced Concrete, Underground, etc)**
- **Reason of Issuing (Issue for Review, Issue for Construction, etc)**
- **Type of Structure (Basin, Pipe Rack, etc)**

Approval Workflow (Deliverable review)

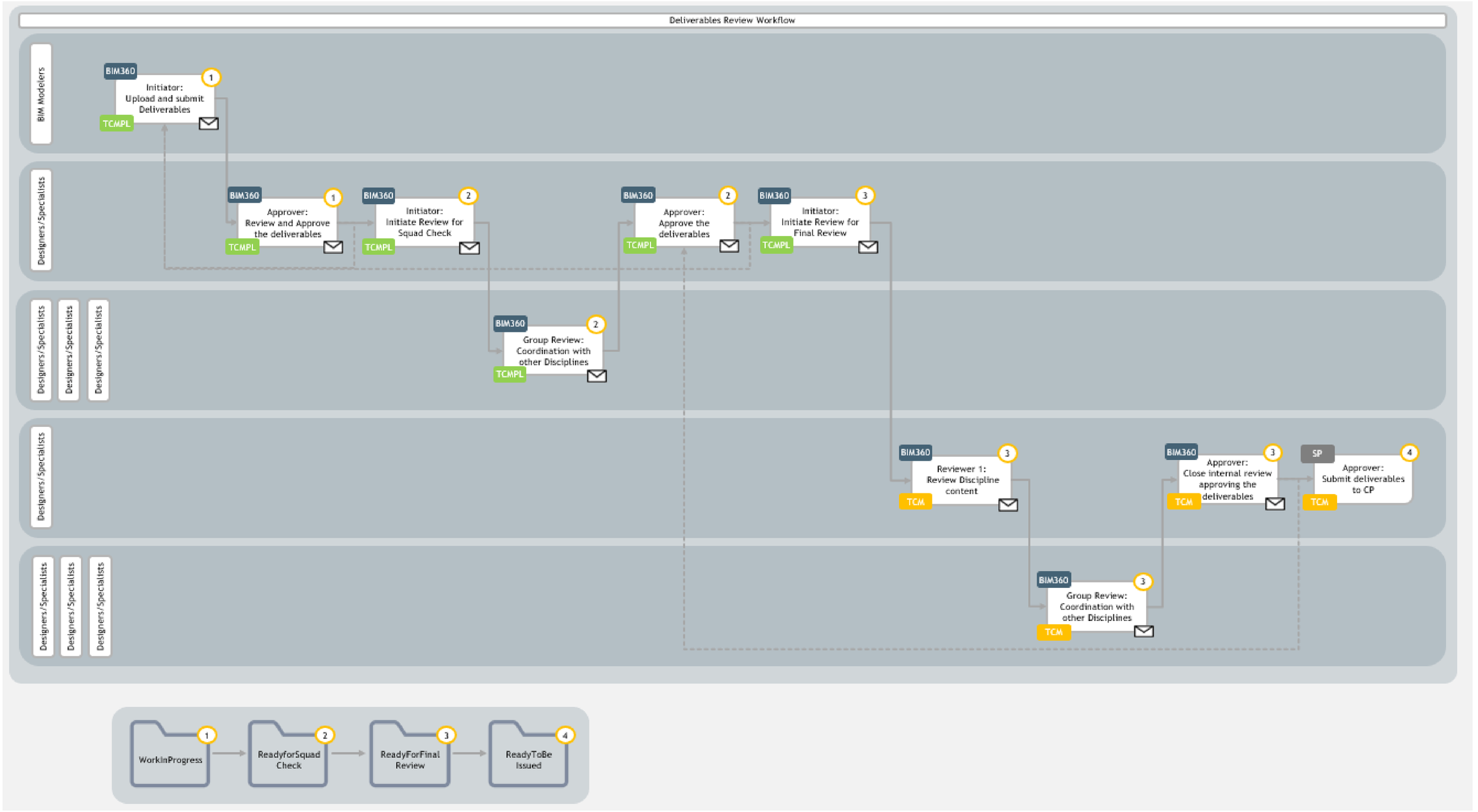


For each Approval Workflow has been defined:

- **Initiator Role**
- **Custom Review Step with pre-defined roles and time allowed**
- **Custom Status values**
- **Standard destination folder for approved documents**



Approval Workflow (Deliverable review)



Approval Workflow (Deliverable review)

Document Management | FOLDERS | REVIEWS | TRANSMITTALS | ISSUES

Reviews › Review detail

CLOSED #32

Approval Workflow Standard Name

AQ-ReadyForIssueToClient-UndergroundArea

Export Report | This review is closed.

For all the documents it's assumed that checking is performed according to the Project "Document Checking Plan" and with the details provided by the "General Check List for Documents and Drawings".

Please find the digital form of the General Check List at the following link: Show more

Name	Description	Version	Markup	Comments	Approval status	Action upon completion
4078-AQ-DA-9000000005-IS03.pdf	--	V2	0	No comments yet.	Approved	Copied to Project Files/AQ_...

Document included in the review

Approval Status with Destination folder

PROGRESS

Initiator Initial Review

GB **Gabriele Bocco** Jul 14, 11:41 AM

<g.bocco@tecnimont.it>

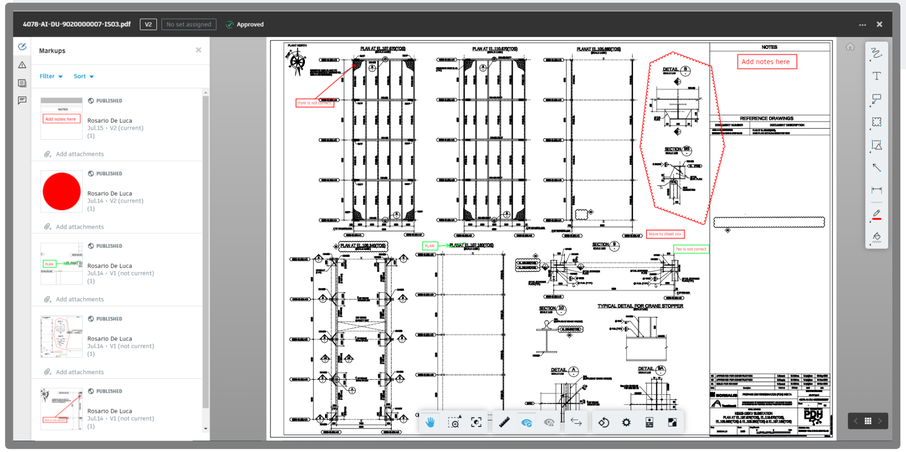
Submitted to Approver

Approver Final Review

AT **Alice Temporin** Jul 14, 11:44 AM

<a.temporin@tecnimont.it>

Review ended

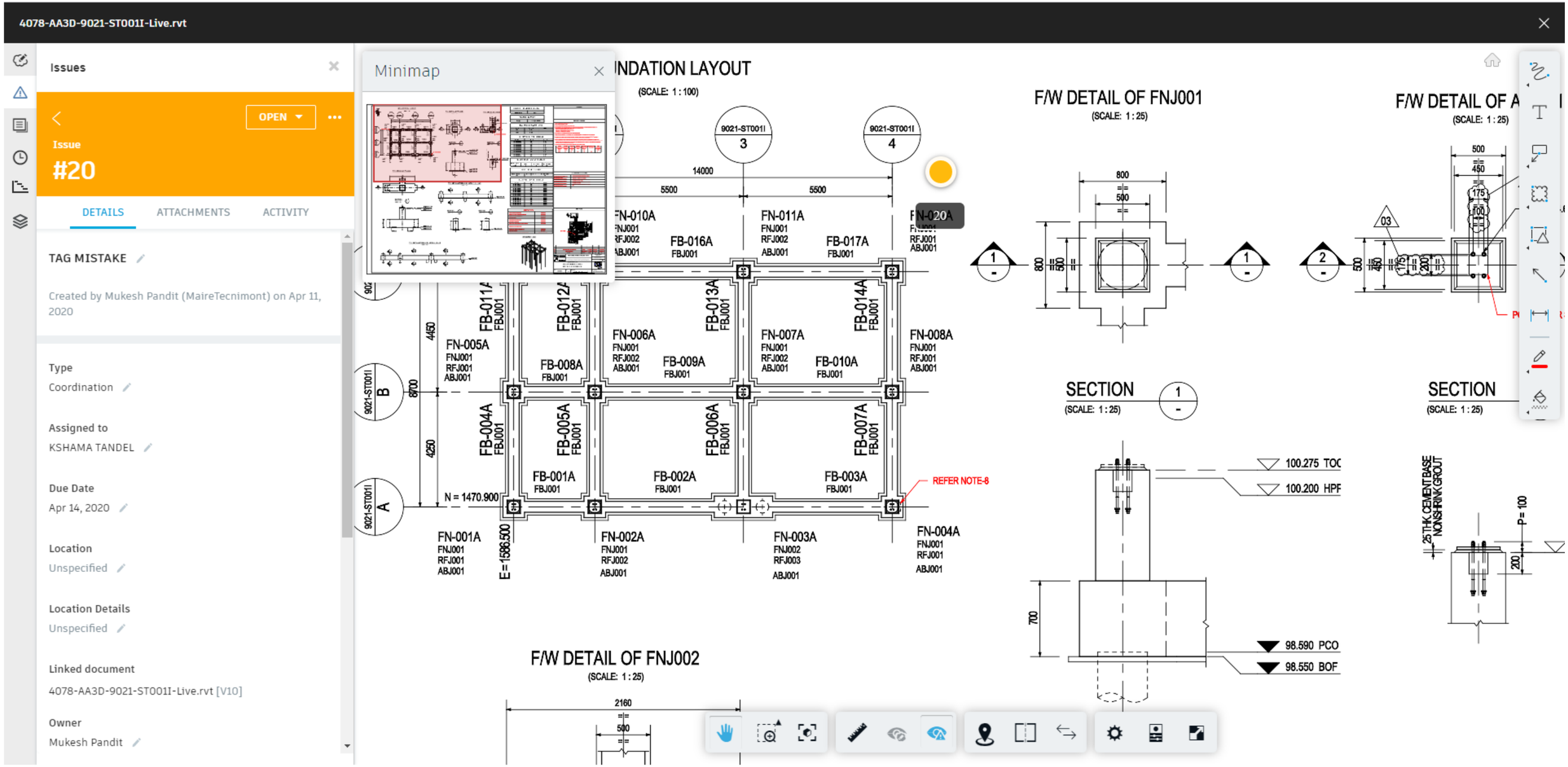


Markup included in the reviewed document

Review cycle history

Design Review

Design Review

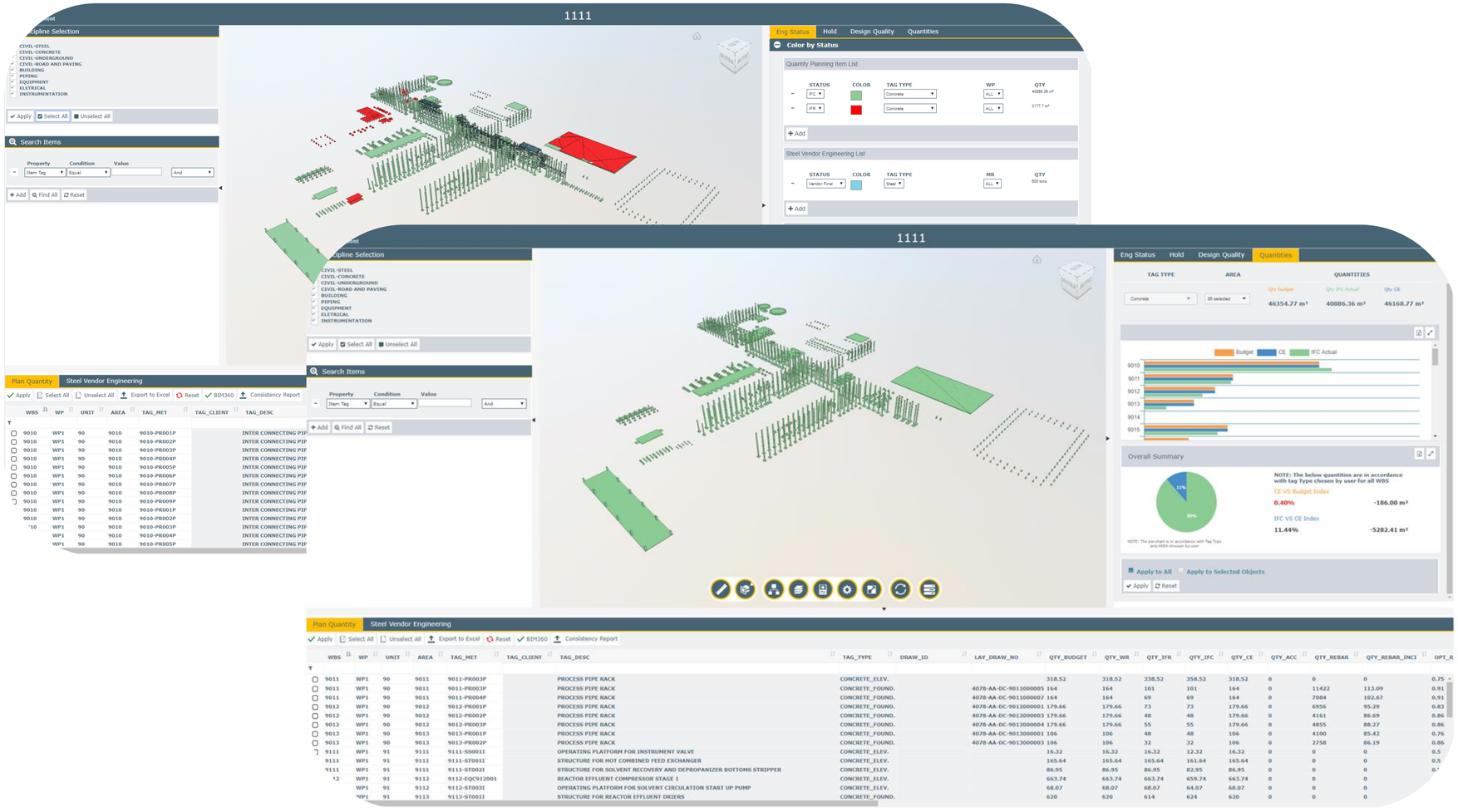


Forge Development/Customization

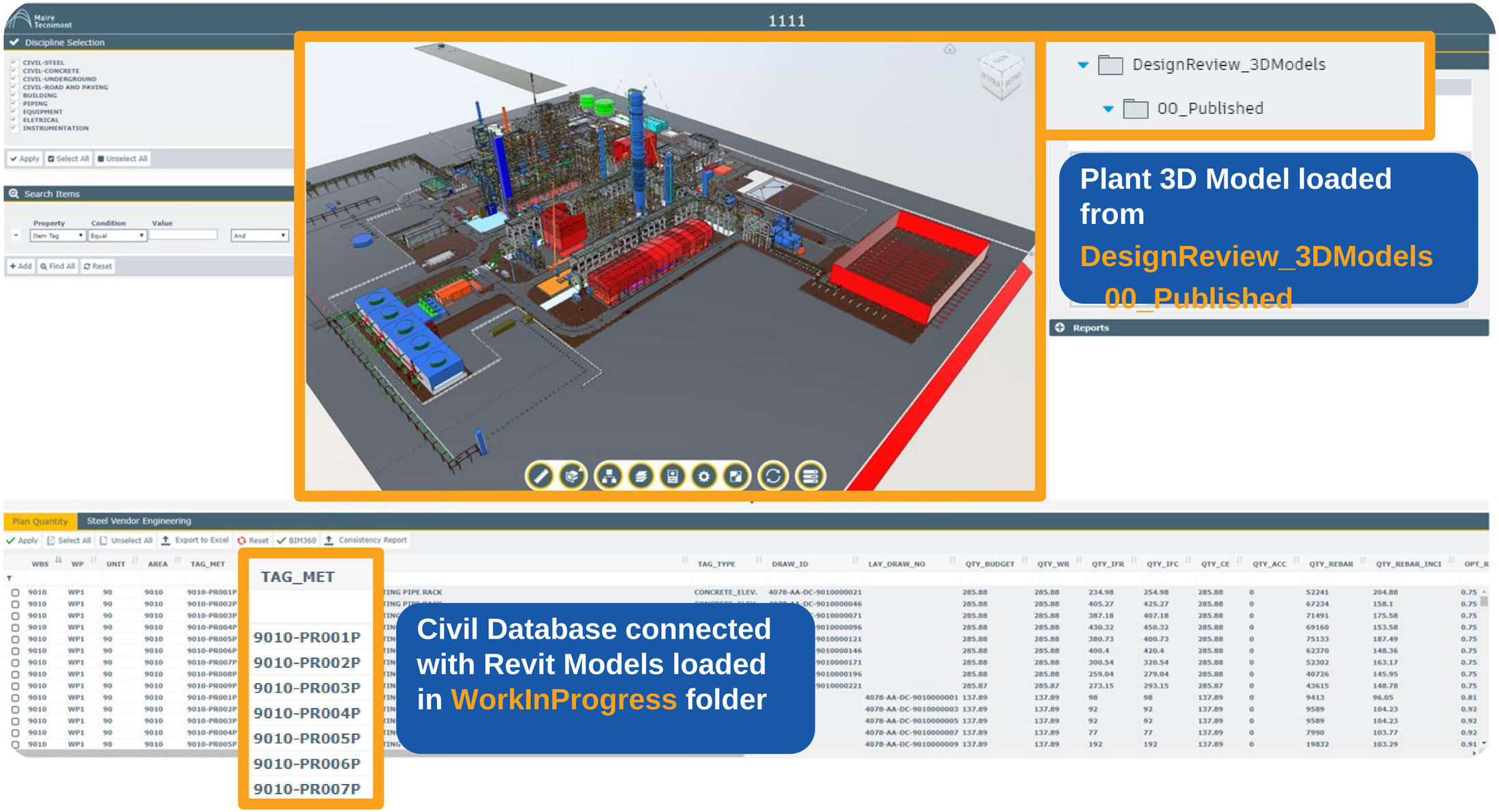
Project dashboard to manage and visualize all the civil engineering data

Features

- Visualize Engineering Status
- Hold Management
- Design Quality Monitoring
- Key Quantities Monitoring



Forge Development/Customization

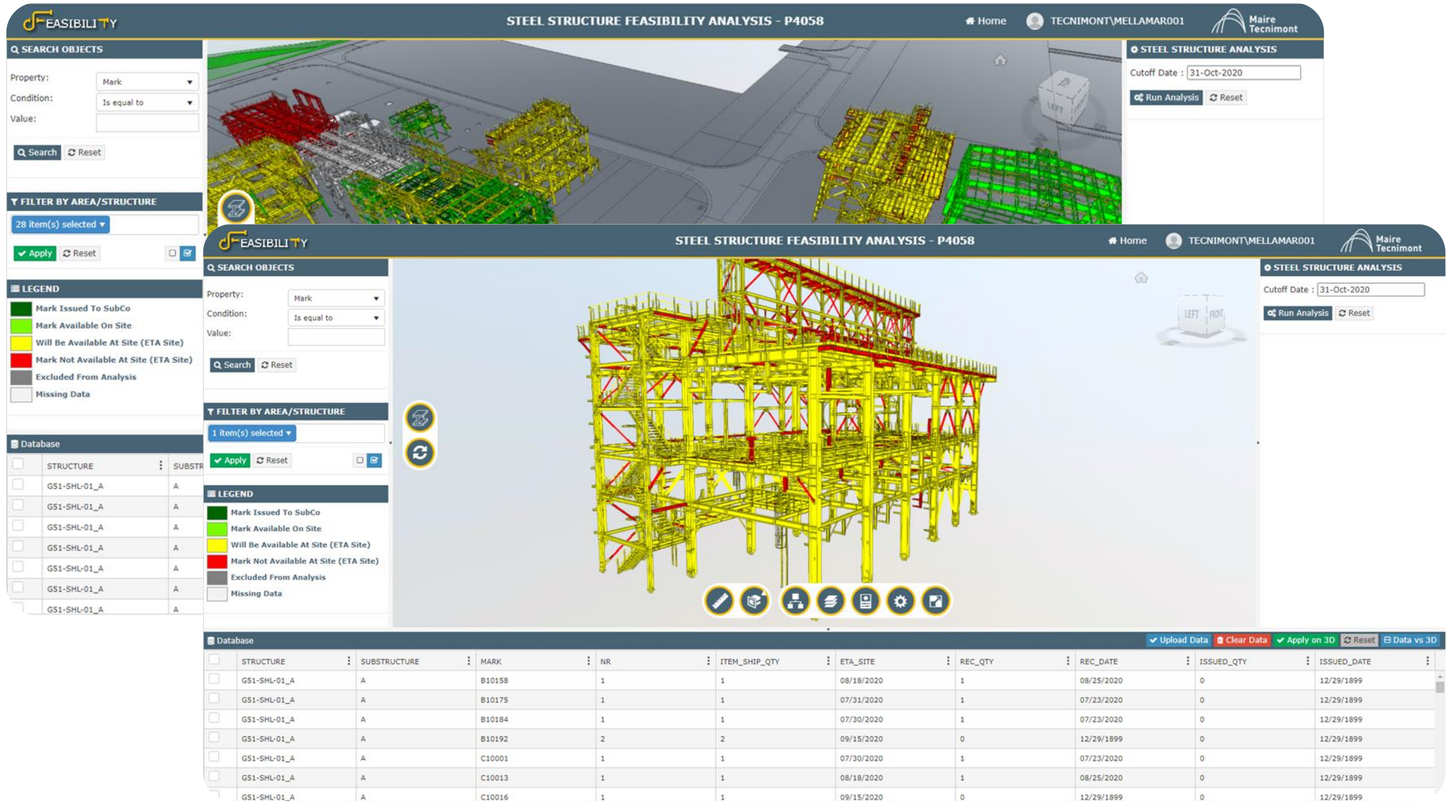


Forge Development/Customization

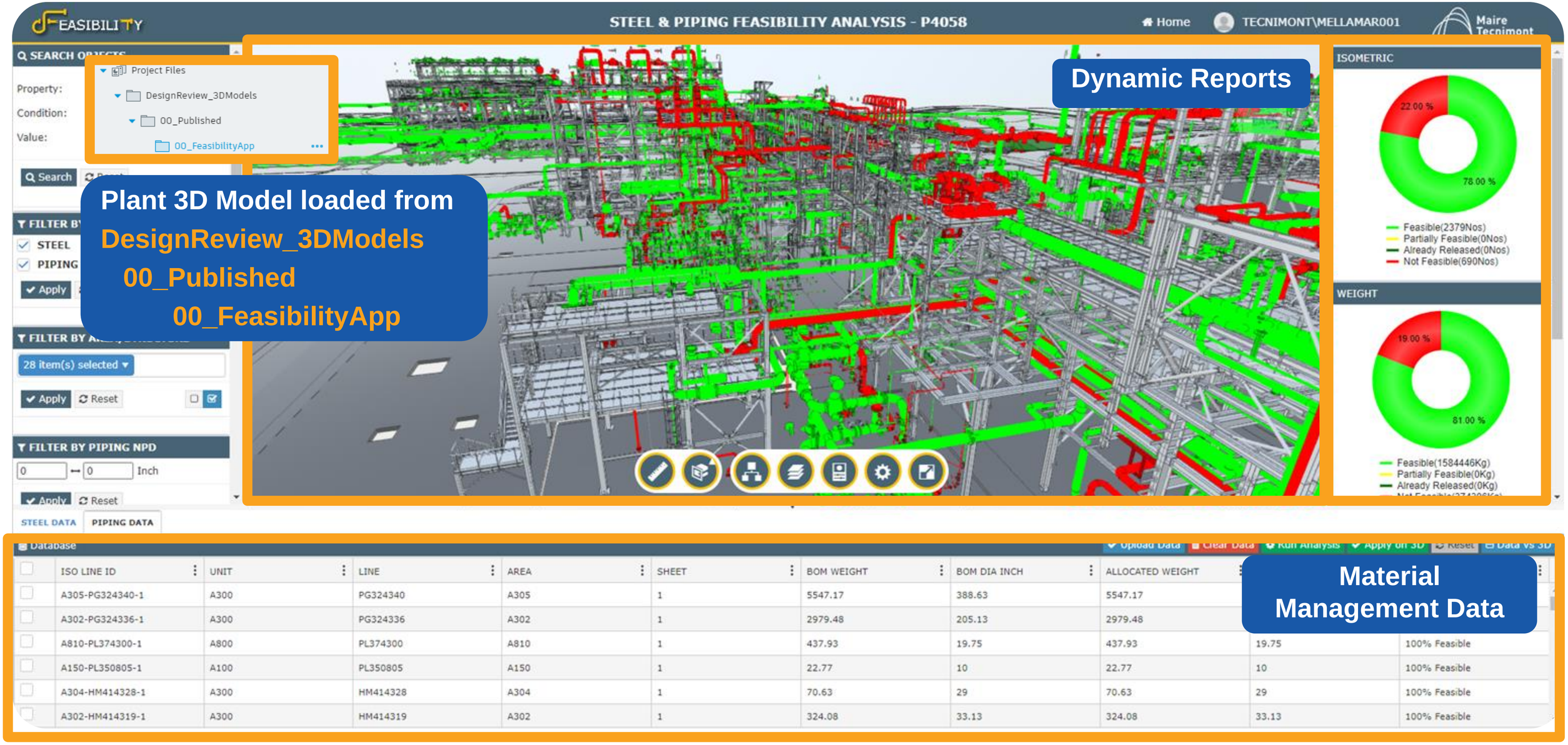
Project dashboard to manage and visualize the steel structures erection feasibility

Features

- Feasibility analysis of steel structures and pipe components
- Model query
- Dynamic reports
- Review of data quality



Forge Development/Customization



ISO LINE ID	UNIT	LINE	AREA	SHEET	BOM WEIGHT	BOM DIA INCH	ALLOCATED WEIGHT		
A305-PG324340-1	A300	PG324340	A305	1	5547.17	388.63	5547.17		
A302-PG324336-1	A300	PG324336	A302	1	2979.48	205.13	2979.48		
A810-PL374300-1	A800	PL374300	A810	1	437.93	19.75	437.93	19.75	100% Feasible
A150-PL350805-1	A100	PL350805	A150	1	22.77	10	22.77	10	100% Feasible
A304-HM414328-1	A300	HM414328	A304	1	70.63	29	70.63	29	100% Feasible
A302-HM414319-1	A300	HM414319	A302	1	324.08	33.13	324.08	33.13	100% Feasible

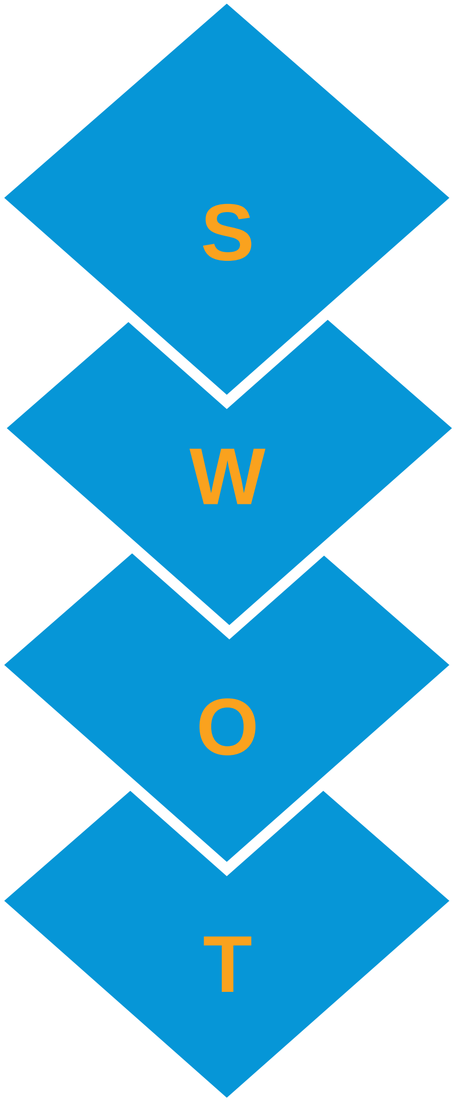
SWOT Analysis

Strength

- Centralize models and deliverables in a single, cloud-based platform
- Real time collaboration during design development
- Reduce project errors and minimize confusion when determining what is the latest set of project files
- Integrated review from anywhere

Weakness

- Design collaboration cannot be extended to typical Plant design formats (.vue, .rvm, etc.)
- Design Collaboration module performances



Opportunity

- Possibility to include vendor and partners to collaborate on the platform
- Collaboration across disciplines with comments and issues track record

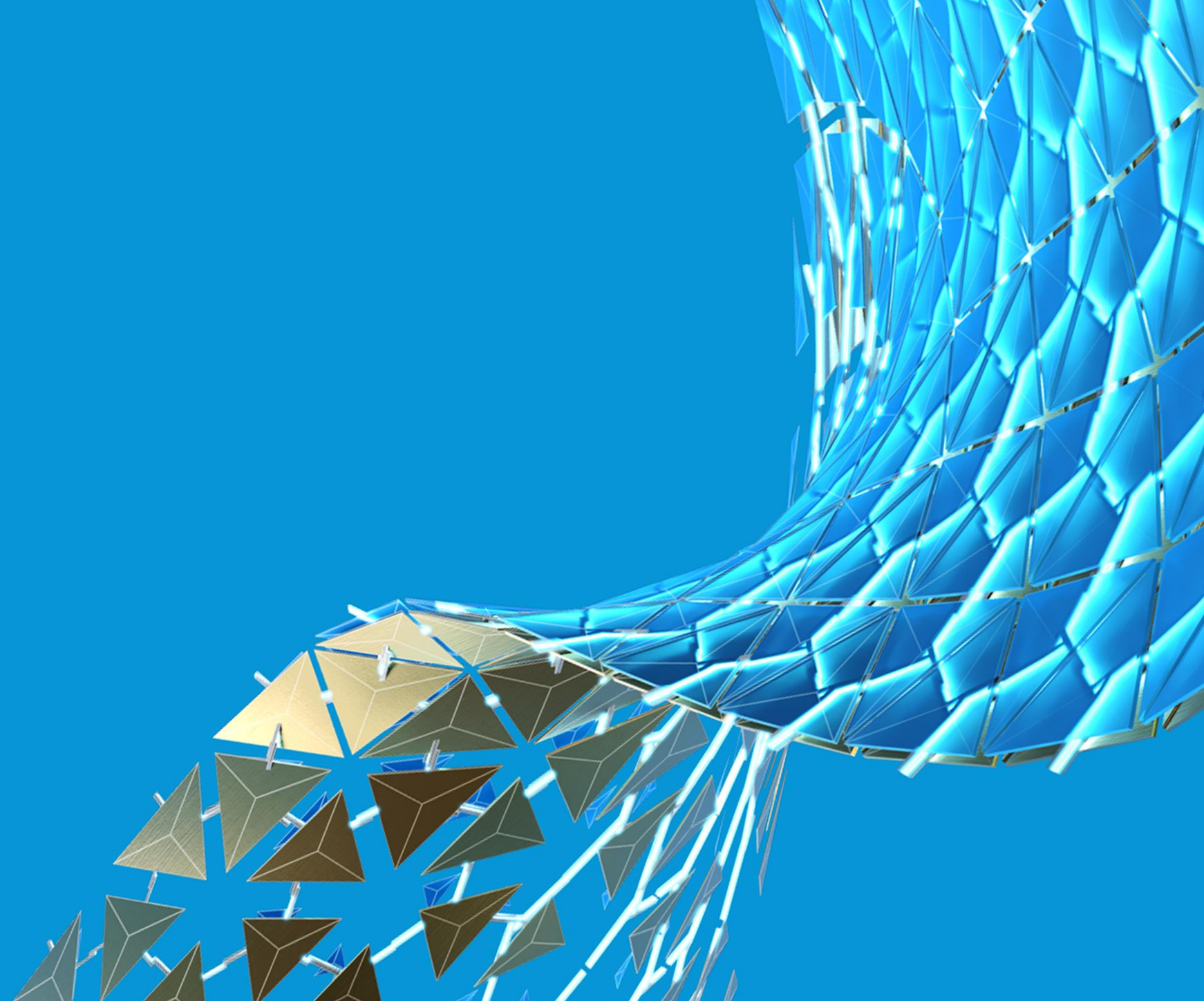
Threat

- Create Package/ Publish/ Consume logics
- Low flexibility in the approval workflow definition

Main Criticalities & Workaround

- Design collaboration do not support huge number of models per single team
  - Split the team in sub-teams with a maximum of 100 sets to be managed
- Approval workflow settings not duplicable among projects
  - Need to duplicate manually from project to project
- Approval workflow settings not enough flexible
  - Need to work on several workflow leveraging document mgmt folder structure. The workflow results a bit affected by such rigidity
- No APIs to interact with approval workflow
  - N/A

Current Status



Before COVID-19

One Pilot Project on board

34 Users

Actual Status

10 Projects On Board
Standard for all **incoming projects**

253 Users
(Milan + Mumbai)

4 Companies of Maire Tecnimont Group

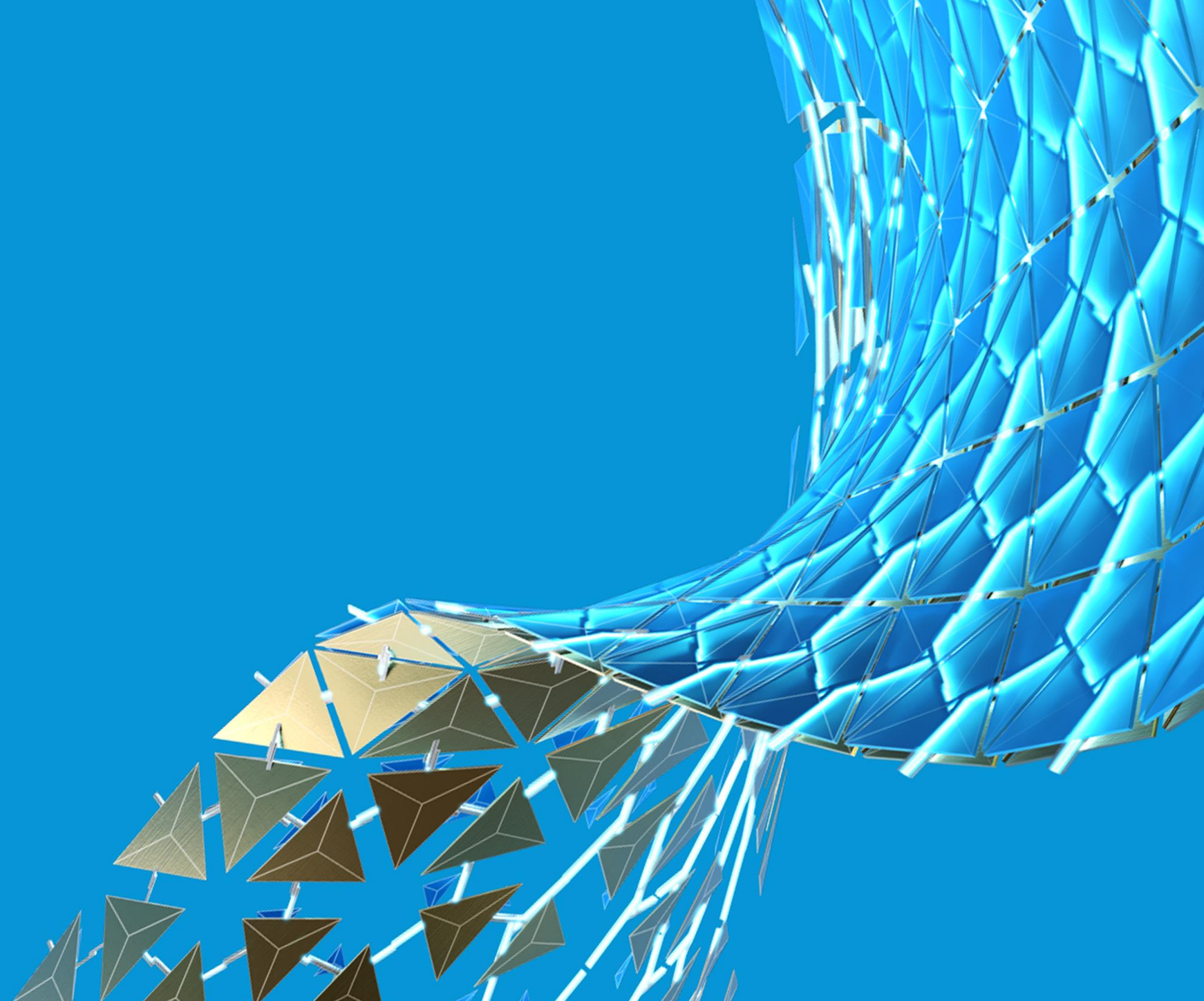
Further development

Extend the use of the platform to other discipline (Piping, Process, etc.)

Evaluation of the latest released modules (Asset, Build, etc.)

Evaluation of ACC Connect to integrate third part apps (e.g. Office 365)

Conclusions



BUSINESS MANAGER

“Digital transformation can strongly contribute to business empowerment and the implementation of such collaborative platform is a great proof of this attitude”

PROJECT MANAGER

“The implementation of BIM 360 platform helped us in reducing bottlenecks and streamline overall project delivery“

PIM COORDINATOR

“From information management point of view BIM 360 platform represents a disruptive tool that help us to minimize inconsistencies and reworks”

DISCIPLINE LEADER

“In BIM 360 project latest data are available to the whole team with just one click, the communication between stakeholders is strongly enhanced and people are focused to value-added activities”

Thanks & Enjoy AU2020

Maire Tecnimont