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 grew 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
Oil & Gas Refining, Petrochemicals, Fertilizers, Polyolefins, Power Large-scale contracting

Refining, Hydrogen & Syngas Production, Sulphur Recovery and Process Heaters

Development and licensing of Urea Technology

Green Acceleration Project, Technological initiatives for energy transition

Flexible solutions in Renewable Energy

Downstream Innovative Technologies

Project development to originate business through early involvement in investment initiatives

Engineering and contracting in Transportation and Civil Engineering

MORE THAN

9,114 professionals

~6,114 employees

+3,000 professionals

in Electrical & Instrumentation

45 COUNTRIES

50 OPERATING COMPANIES
~6,114 employees worldwide

+3,000 professionals in Electrical & Instrumentation

Maire Tecnimont is a multicultural and multinational Group

Average age: 41.9 years
Approx. 69% graduates
<table>
<thead>
<tr>
<th>PETROCHEMICALS</th>
<th>FERTILIZERS</th>
<th>OIL &amp; GAS REFINING</th>
<th>POWER</th>
<th>GREEN CHEMISTRY &amp; RENEWABLES</th>
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<tbody>
<tr>
<td>WELL ROOTED TECHNOLOGY ORIENTATION: MARKET LEADER (#1) FOR INSTALLED CAPACITY (last 10yrs)</td>
<td>MARKET SHARE IN LICENSING UREA PLANTS TECHNOLOGY (#1 worldwide)*</td>
<td>WELL RECOGNIZED LEADERSHIP IN LICENSING HYDROGEN TECHNOLOGY AND IN LICENSING SULPHUR RECOVERY AND TAIL GAS TREATMENT TECHNOLOGY</td>
<td>21GW INSTALLED WORLDWIDE</td>
<td>TECHNOLOGIES FOR ENERGY TRANSITION:</td>
</tr>
<tr>
<td>30% MARKET SHARE IN POLYOLEFIN PLANTS</td>
<td>MARKET SHARE IN LICENSING UREA GRANULATION TECHNOLOGY (#2 worldwide)*</td>
<td>WORLD CLASS TRACK RECORD IN LARGE GAS TREATMENT PLANTS AND REFINERY PROCESS UNITS</td>
<td></td>
<td>5 PROPRIETARY</td>
</tr>
<tr>
<td>50% MARKET SHARE IN LDPE PLANTS</td>
<td>54%</td>
<td>7th</td>
<td>OVER 3 UNDER PARTNERSHIP FOR EXCLUSIVE LICENSING</td>
<td></td>
</tr>
<tr>
<td>Since 1970 MORE THAN 200 POLYETHYLENE AND POLYPROPYLENE PLANTS **</td>
<td>Since 1924 MORE THAN 172 AMMONIA AND UREA PLANTS**</td>
<td>Since 1971 MORE THAN 250 HYDROGEN AND SULPHUR RECOVERY UNIT PROJECTS**</td>
<td>Since 1962 MORE THAN 280 POWER GENERATION PROJECTS</td>
<td>OVER 20 WITH A ROLE OF INTEGRATOR &amp; EPC</td>
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<td>RESEARCH PROJECTS:</td>
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<td></td>
<td></td>
<td></td>
<td>OVER 10 WITH A ROLE OF PARTNER / COORDINATOR</td>
</tr>
</tbody>
</table>

~1,500 Cumulated Patents

Strong commitment to technology development

€56 MN INVESTED IN INNOVATION

70 R&D PROJECTS

In Green Acceleration (last 5yrs)
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

Common BIM based environment where all the disciplines, partners and vendors can collaborate supported by custom functionalities.
BIM360: 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
Key drivers: 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

Adjusted steel structures cost

% reduction adjusted steel structure tons

Civil Contract baseline

Reduction in average extra work

Total cost per extra revision

Number of deliverables

Reduction of extra revisions

Average projects
### Assumptions: Civil Use Case

- **Adjusted steel structures cost reduction in fabrication**
- **Cost savings for BIM civil**
- **Civil contract extra works cost reduction in site**
- **Average number of revisions**

<table>
<thead>
<tr>
<th>Table 1: Adjusted Steel Structures at Vendor Shop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Column 1</td>
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<tr>
<td>-----------------------------------------------</td>
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<tr>
<td>Value 1</td>
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### Table 2: Civil Contract Extra Works at Site

<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
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<tr>
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<td>Value 2</td>
<td>Value 3</td>
<td>Value 4</td>
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</table>
Expected Benefits: Civil Use Case

- **Adjusted steel structures cost reduction in fabrication**: 20%
- **Civil contract extra works cost reduction in site**: 30%
- **Average number of revisions**: 50%

Only 50% achievable without chain integration with other disciplines.
Process assessment
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
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”

### Permission Matrix

<table>
<thead>
<tr>
<th>Role</th>
<th>Plans</th>
<th>DisciP</th>
<th>Others</th>
<th>Others</th>
<th>Library</th>
<th>Others</th>
<th>Others</th>
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<table>
<thead>
<tr>
<th>Permission Code</th>
<th>Permission Description</th>
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<td>1</td>
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<td>2</td>
<td>Folder Control</td>
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<tr>
<td>3</td>
<td>View + Download + Upload + Edit</td>
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<tr>
<td>4</td>
<td>View + Download + Upload</td>
</tr>
<tr>
<td>5</td>
<td>Upload Only</td>
</tr>
<tr>
<td>6</td>
<td>View + Download</td>
</tr>
<tr>
<td>7</td>
<td>View Only</td>
</tr>
<tr>
<td>8</td>
<td>Access Denied</td>
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</table>
**Design Collaboration (Internal/Vendor)**

Teams sharing design packages

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

<table>
<thead>
<tr>
<th>Sets</th>
<th>Sheets</th>
<th>3D views</th>
<th>Update date</th>
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</tr>
</tbody>
</table>
Explore package and compare with previous version (added/removed/modified objects) before consuming
Approval Workflow (Deliverable review)

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 included in the review
- Approval Status with Destination folder
- Markup included in the reviewed document
- Review cycle history
Design Review

Multidisciplinary Navisworks session updated on weekly basis
Design Review

Issue #20

TAG MISTAKE

Created by Mukesh Pandit (MareTechnomet) on Apr 13, 2020

Type: Coordination

Assigned to: KSHAMAK TANDEL

Due Date: Apr 14, 2020

Location: Unspecified

Location Details: Unspecified

Linked document: 4078-AA30-0021-ST001E-Uve.rvt [V10]

Owner: Mukesh Pandit
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

Plant 3D Model loaded from DesignReview_3DModels 00_Published

Civil Database connected with Revit Models loaded in WorkInProgress folder
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

Plant 3D Model loaded from DesignReview_3DModels
00_Published
00_FeasibilityApp

Dynamic Reports

Material Management Data
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

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

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

**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
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”

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”