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18 - 21 FEBRUARY 2023

RIYADH FRONT EXHIBITION AND CONFERENCE CENTER (RFECC)

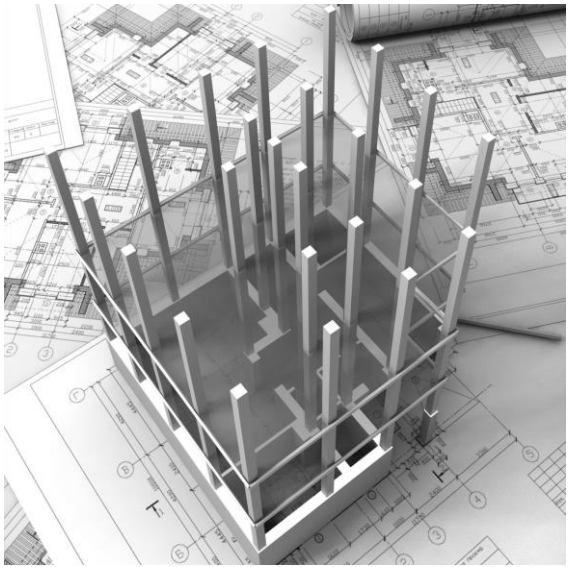
Toward The Ultimate Utilization Of Digitalization In The Construction

Fawwaz Hammad

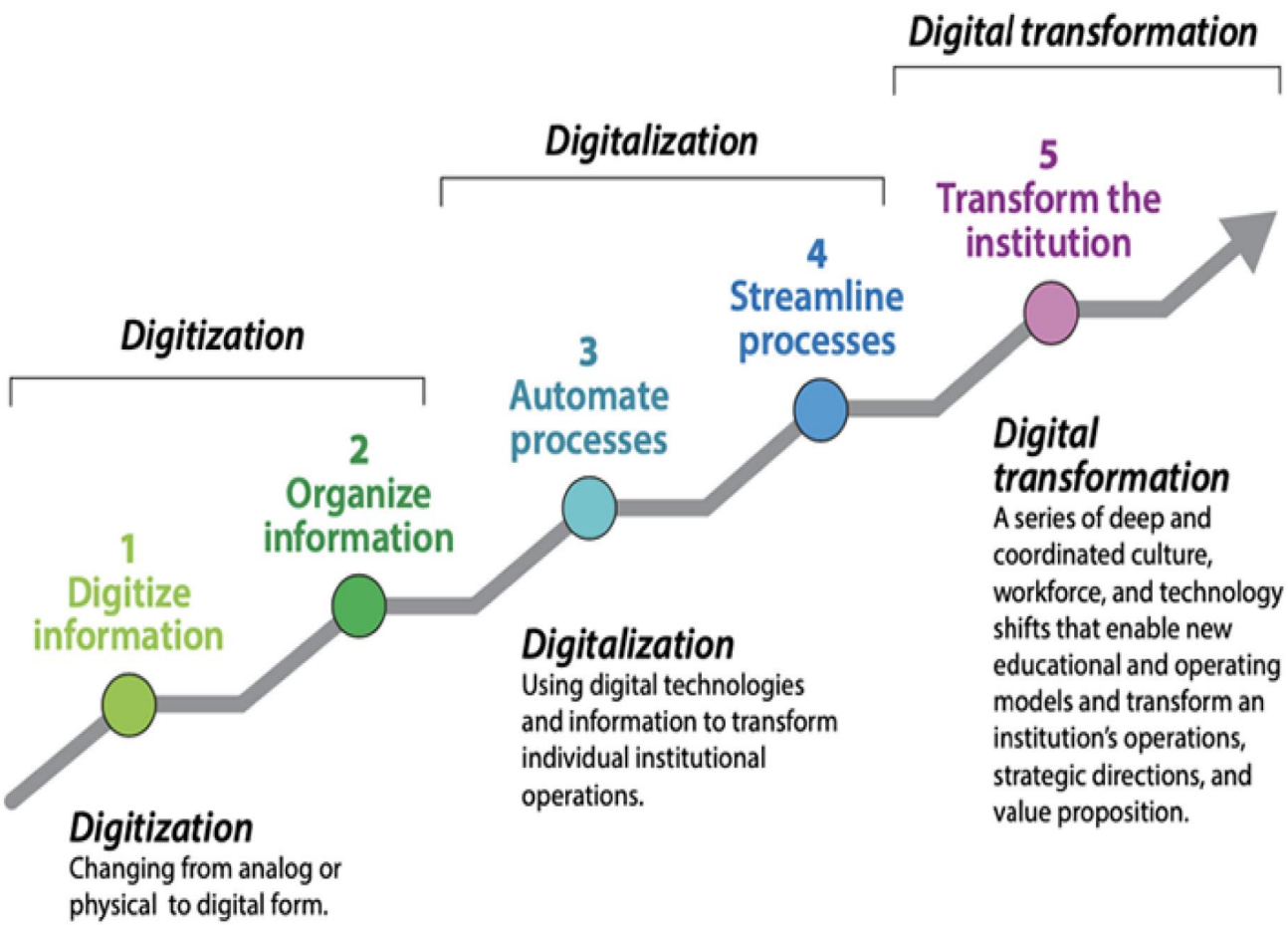
Technology Talks / 21 Feb

www.thebig5saudi.com

Introduction



Construction Digitalization is a dynamic process of integrating digital innovative tools to the entire lifecycle of a construction project. The construction sector needs to embrace new digital technologies and adopt new innovations in processes and organization in construction practices that will lead to new levels of productivity & efficiency. The talk will shed light on the necessity in the best utilization of the digitalized tools by the construction firms throughout the project lifecycle from inception to handover stages and the potential value at each stage.



Talks Technology

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Objectives

Maximize using digital tools

Tasks Automation

Accuracy Enhancement

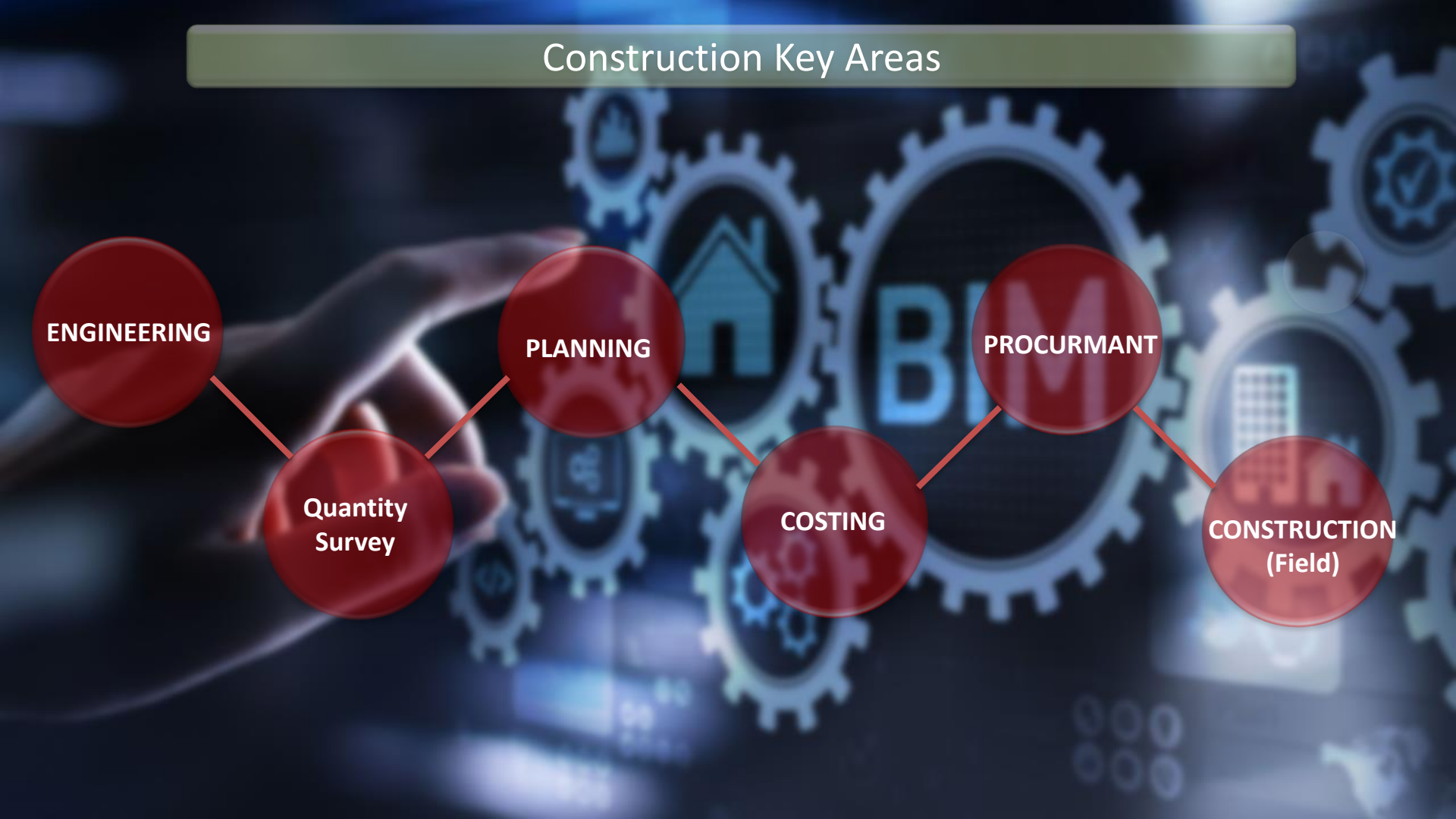
Improved collaboration

Increased Safety and Risk mitigation

Staff Efficiency and
Increased productivity

Cost Saving

Construction Key Areas



ENGINEERING

Design Collaboration & CDE

Clash Detection

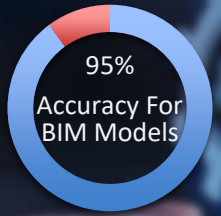
Dynamo & Generative Design

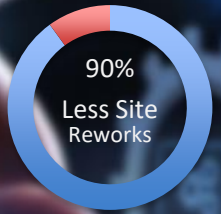
Modeling Automation

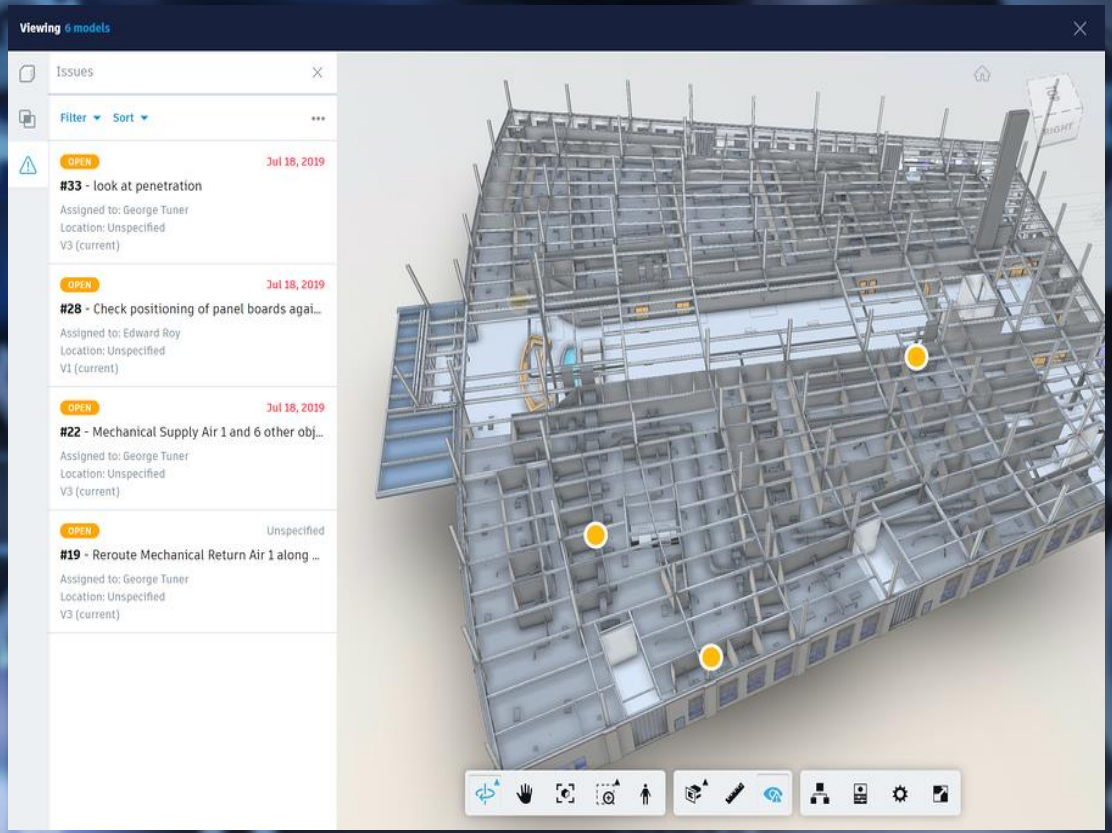
ENGINEERING

Design Collaboration & CDE

- Link all production team together including team at site, by sharing all BIM models on cloud base platform, This leads to have a single source for latest up-to-date information
- Having the BIM models published, project stakeholders will be able to review, comment and place remarks on the same platform. This will allow for better tracking of the flow of documents and reviews



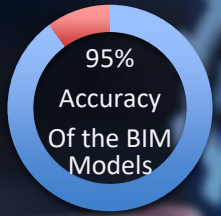


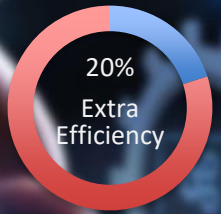


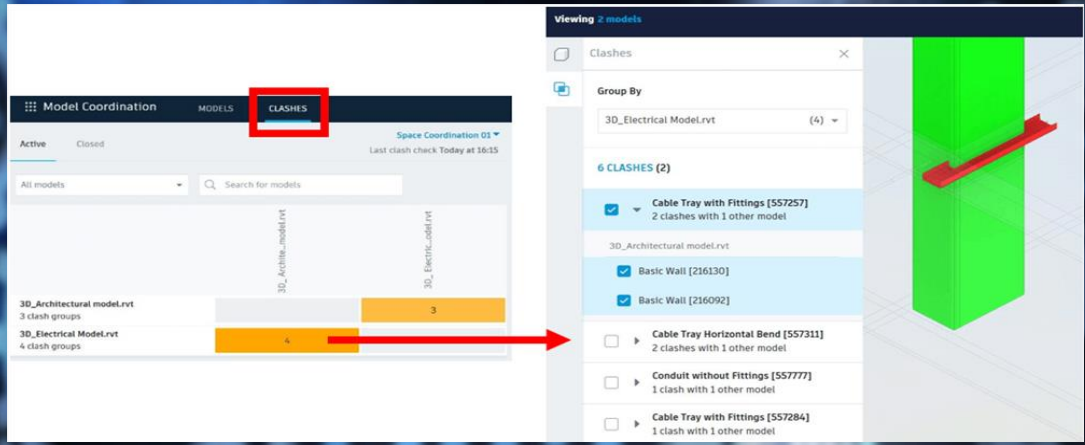
ENGINEERING

Clash Detection & Resolution

- BIM 360 model Coordination provides a collaborative environment to publish, review, and run clashes on 3D BIM models.
- When uploading the BIM models to BIM 360, the model coordination module will allow for locating any active clashes
- All project members can visit those clashes and start solving them on real time
- Automation of clash detection and resolution can be achieved through specific tools, which will allow for significant time saving in the coordination process



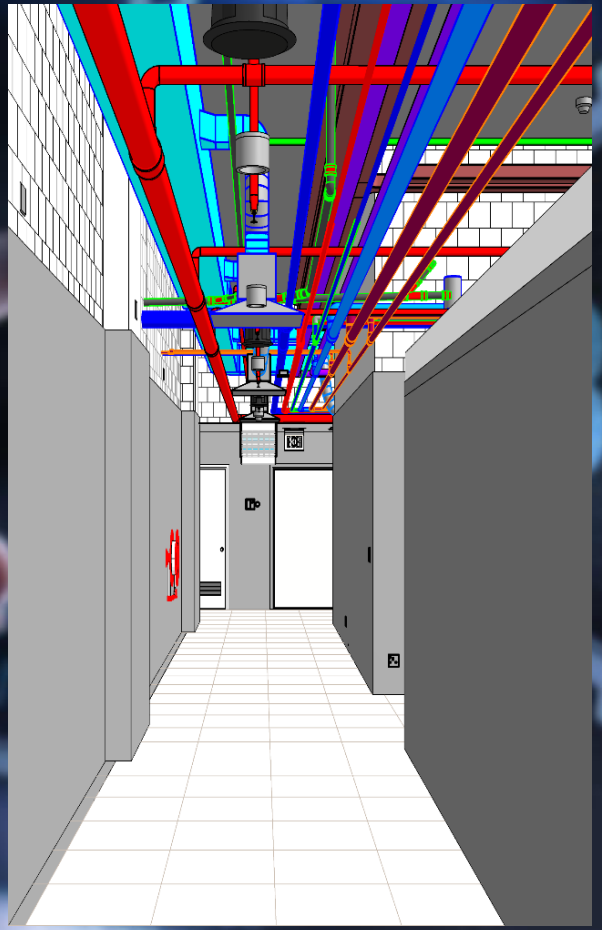




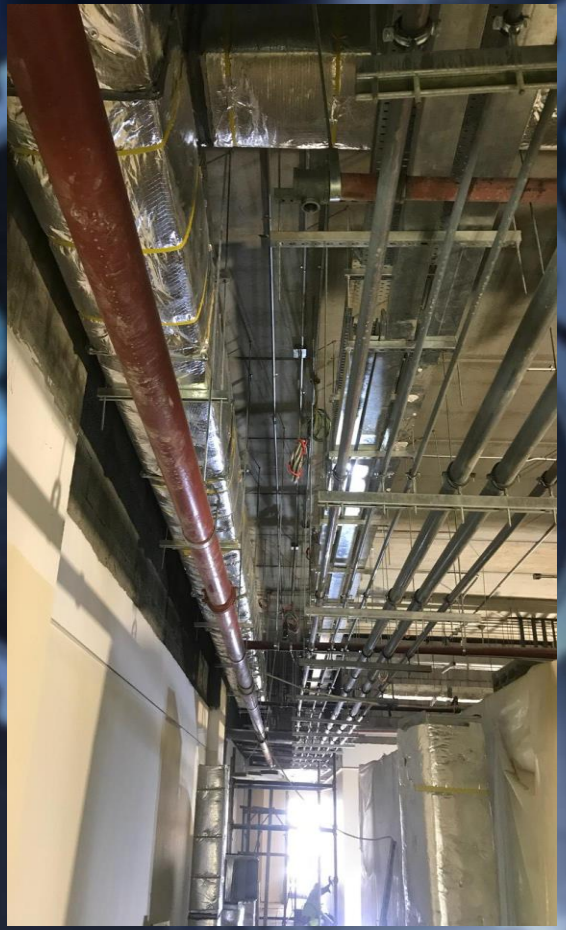
Avoid MEP clashes for Revit

ENGINEERING

Clash Resolution
VIP Main Kitchens



REVIT MODEL

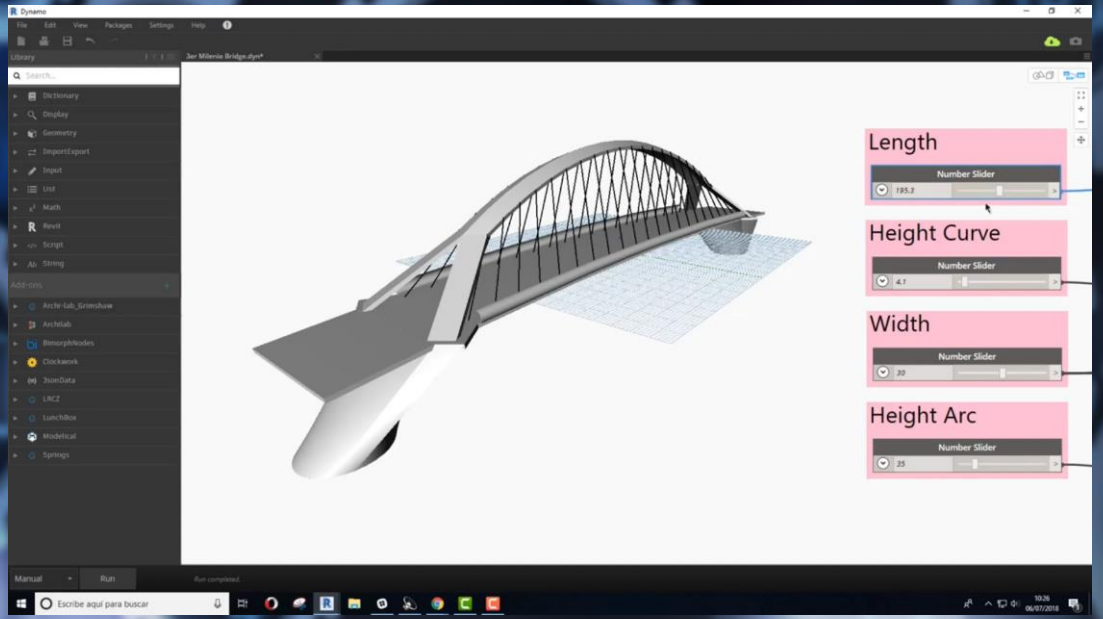


SITE

ENGINEERING

Dynamo & Generative Design

- Dynamo is an open-source visual programming language for Revit, by creating lines of codes and algorithm will automate a serial modeling actions which can significantly save modeling time
- Dynamo on the other hand, and by defining specific design criteria, will allow for generating several engineering design options in a click. This will allow for Design optimization & Value Engineering in a very short period when compared to traditional ways.



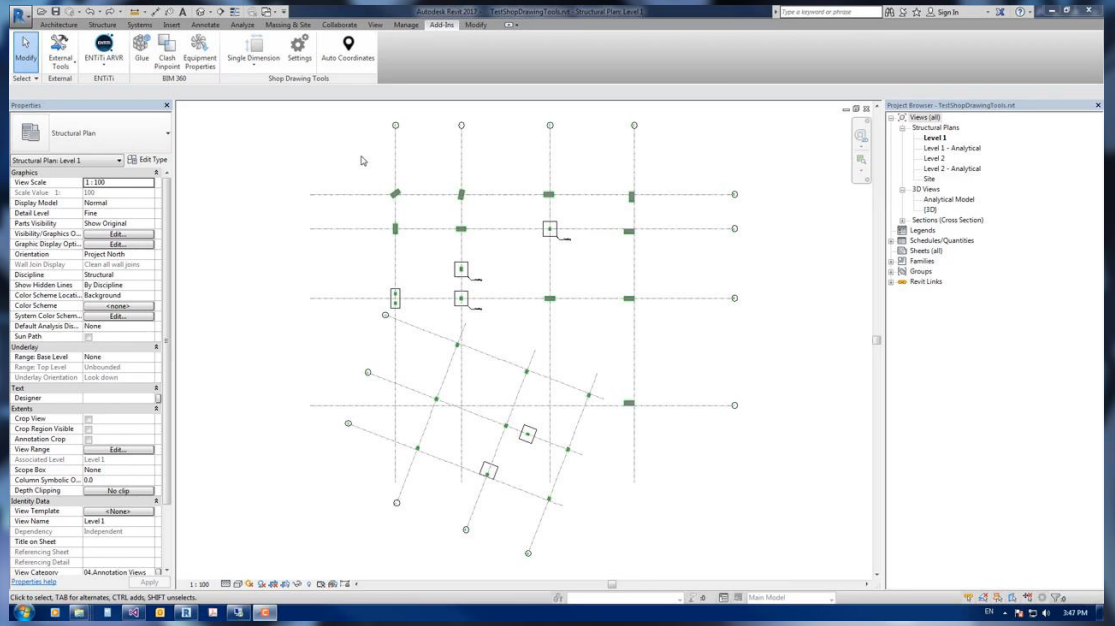
ENGINEERING

Modeling Automation

- Automating several modelling and annotating activities in shop drawings production, will potentially increase the efficiency in the production process.

❑ Example of the Revit tools:

- Auto Hangers and support
- Auto dimensions
- Auto Annotation



Quantity Survey

Automated Visual Quantity Takeoffs

Auto Generate Coded BOQ

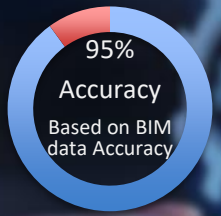
Smart Payment Certificate

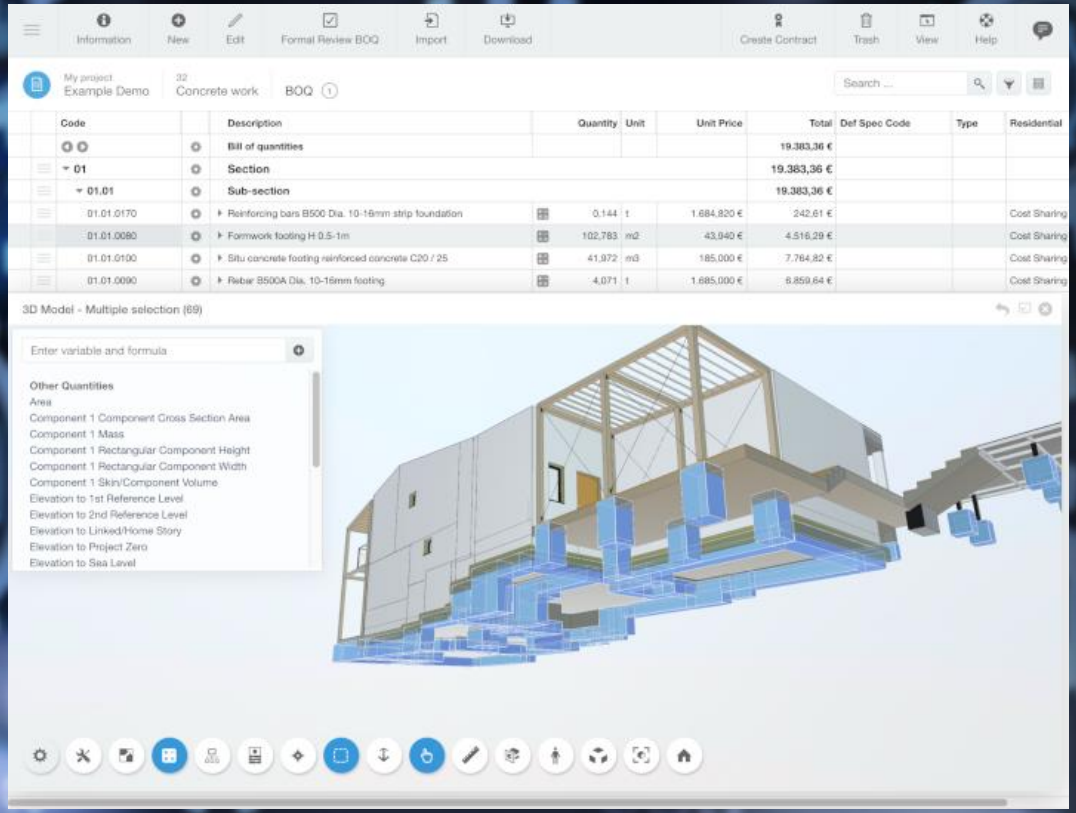
Quantity Survey

Automated Visual QTO

Auto Generate Coded BOQ

- By uploading the BIM models to a powerful Quantity take off tools, QS team will be able to do QTO automatically and they can visualize any of the project component
- QS team will be able to auto generate BOQ including cost with accurate quantities in one click





WALL QUANTITIES EXTRACT FROM BIM M

Quantity Survey

Automated Visual Quantity Takeoffs

KAUST
300 Villas

BIM MODEL

COST OF BLOCK WORKS BY AL BAWANI CODE

BLOCK WALL AREA

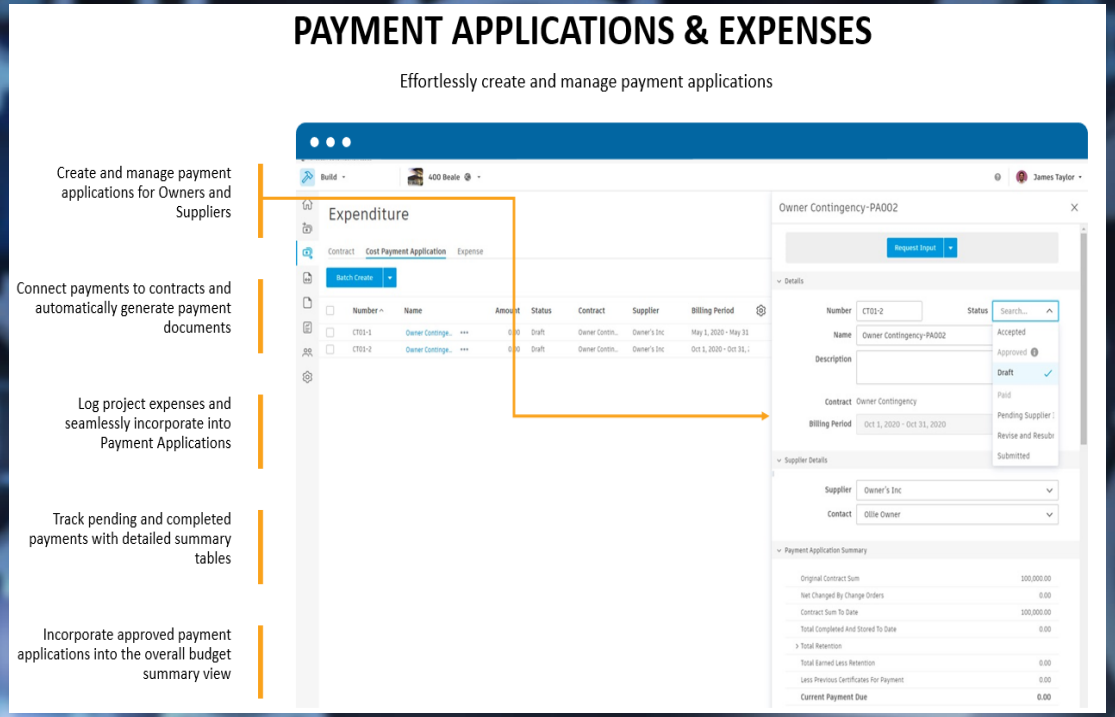
<3-Wall Schedule>

A	B	C	D	E
Type	Area	Function	Keynote	Cost
1	38 m²	Interior	042211	77.00
1*	18 m²	Interior	042211	77.00
2	283 m²	Interior	042211	105.00
3	37 m²	Interior	042211	121.00
3*	70 m²	Interior	042211	121.00
4	16 m²	Interior	042211	154.00
4*	18 m²	Interior	042211	154.00
5	50 m²	Interior	042211	143.00
6	27 m²	Interior	042211	193.00
7	212 m²	Exterior	042211	209.00
7*	14 m²	Exterior	042211	209.00
8	102 m²	Exterior	042211	116.00
8*	9 m²	Exterior	042211	116.00
9	229 m²	Exterior	042211	94.00
10	22 m²	Exterior	042211	193.00
10*	3 m²	Exterior	042211	193.00
12	9 m²	Exterior	042211	
Grand total: 286	1157 m²			

Quantity Survey

Smart Payment Certificate

- QS team will use the power of the smart platform, to identify the installed material at site by applying certain parameter to the BIM model, the fixed component will be extracted with the accurate quantity and to be attached with the payment certificate.
- This will lead to speed up the payment process while all site installations are reverted to the BIM models and visually presented

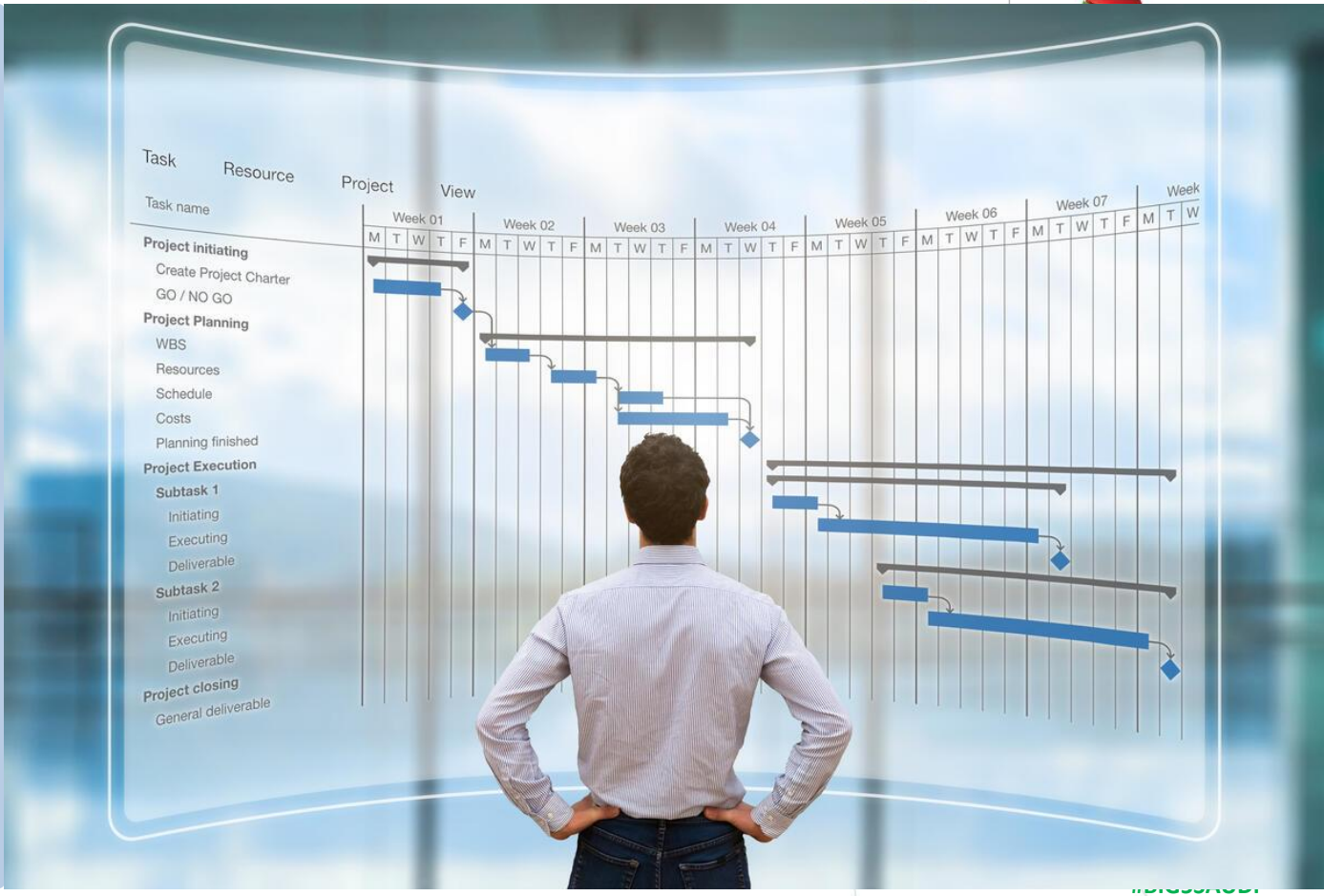


PLANNING

Scheduling & Planning

Construction Simulation

Planned VS Actual

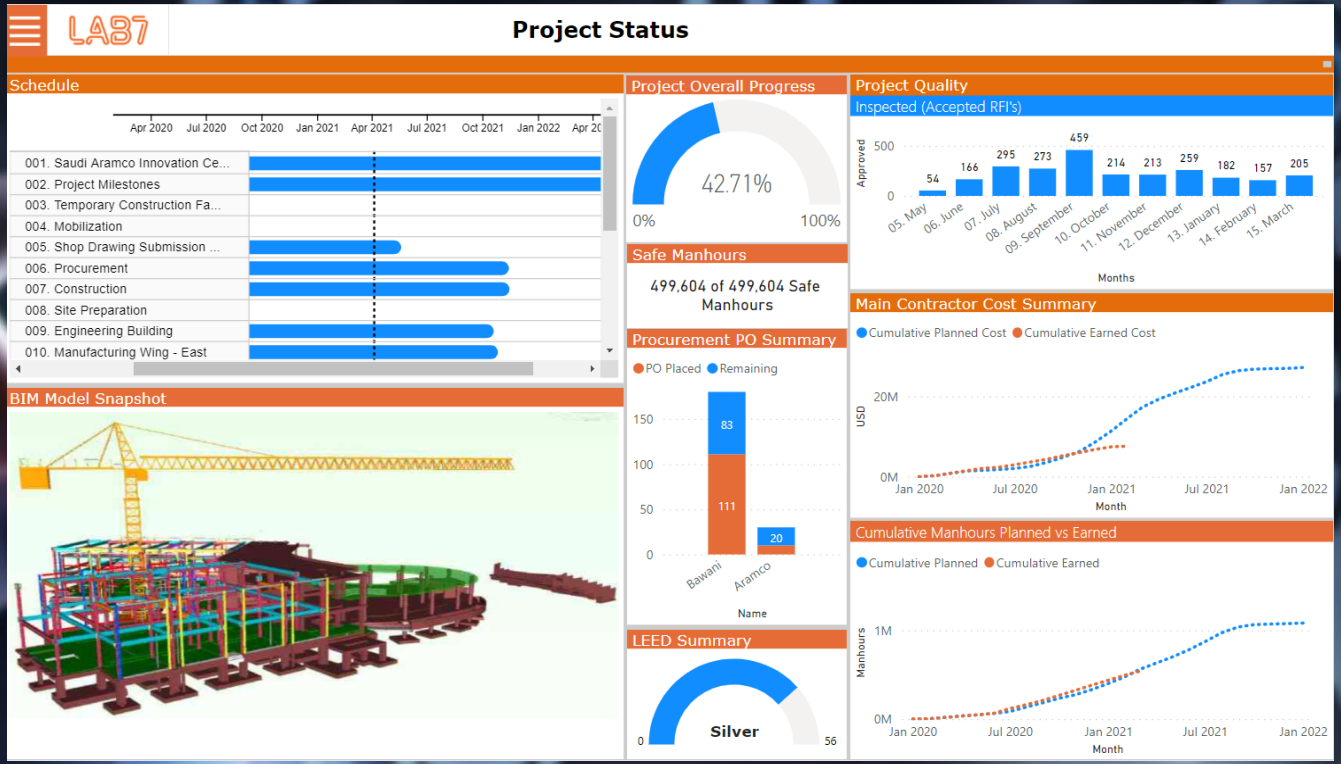


PLANNING

Scheduling & Planning

By uploading the BIM models to AI platforms, the planning activities will be connected to the BIM model elements,

- Planning team will use the power of BIM model visualization for better planning
- The AI can provide many planning strategies in no time.
- Can easily export the schedule from the platform and imported back to Primavera



PLANNING

Construction Simulation

Planned VS Actual

Creating 4D construction simulation will become faster & Dynamic

The AI platform will provide multiple construction options for optimized planning schedule.

By connecting the BIM models to the planning schedule, the planning team will be able to:

- Easily provide detailed 4D task reports
- Planned VS Actual
- Look ahead analysis
- Resource monitoring

COSTING

Cost Management

Change Orders

Tendering & Bedding Process

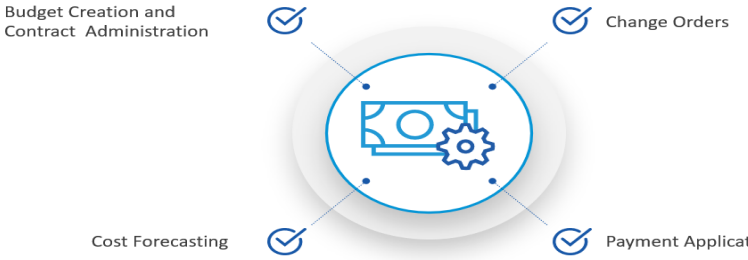
COSTING

Cost Management
Change Orders

- Assigning the cost information to the BIM models and share it on Cost management platform.
- Enable cost and finance team to manage project budget, track change orders & track all payments and payment requests

Connected Cost Management

Centralize and manage construction costs on one platform



CHANGE ORDERS

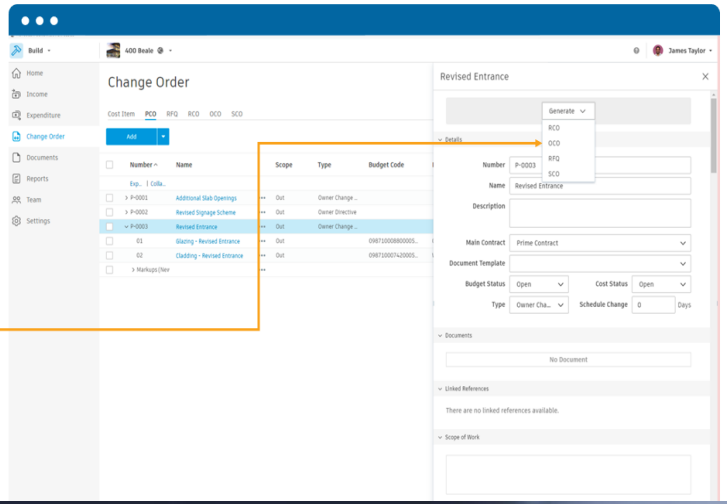
Create clear accountability and streamline the change order workflows

Understand the origin of the change order by linking or create a PCO from an RFI

Keep the budget balanced and connect PCOs to the budget

Create and send Owner or Supplier Change orders

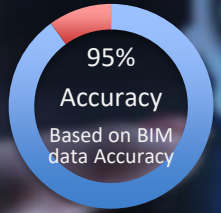
Customize workflow rules for Change Orders approvals

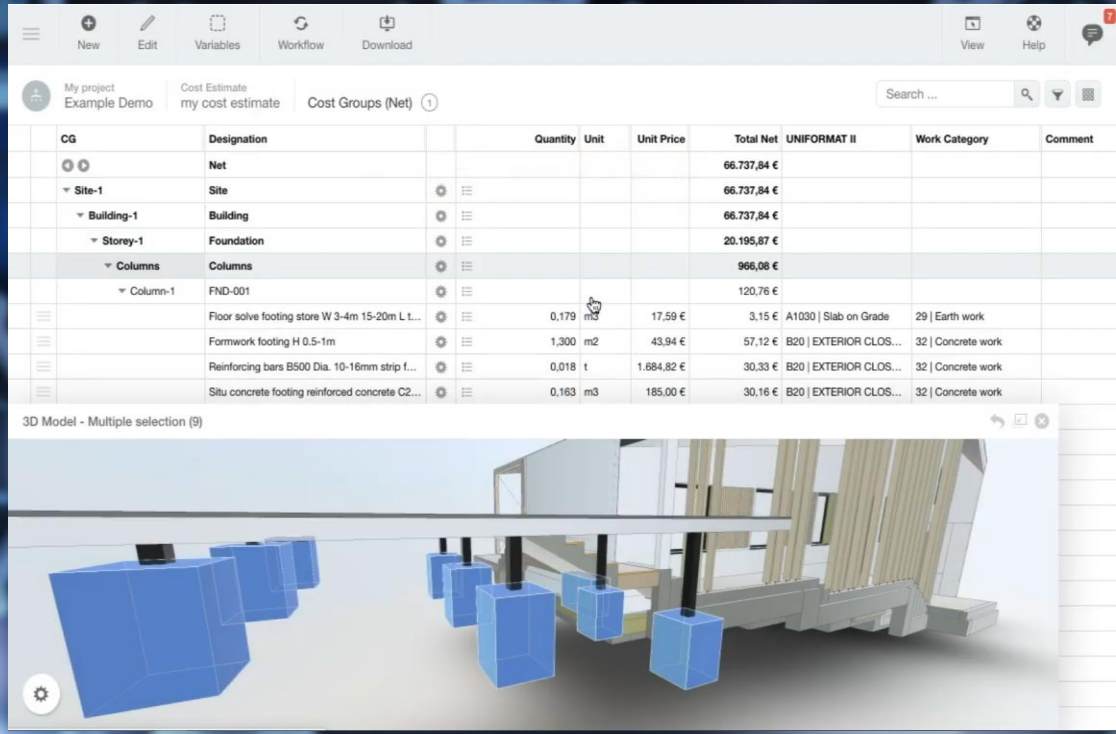


COSTING

Tendering & Bidding Process

- Tendering process with all bidders can be over the models, and the bidders will be able to include their corresponding rates in the models. This will allow Automated bid evaluation and cost comparison





PROCURMANT

Automated MTO & QTO

Auto Linking Materials With Project Schedule

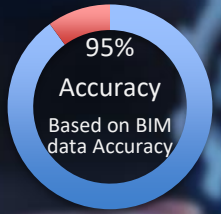
PROCUREMENT

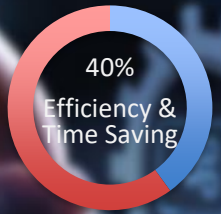
Automated MTO & QTO

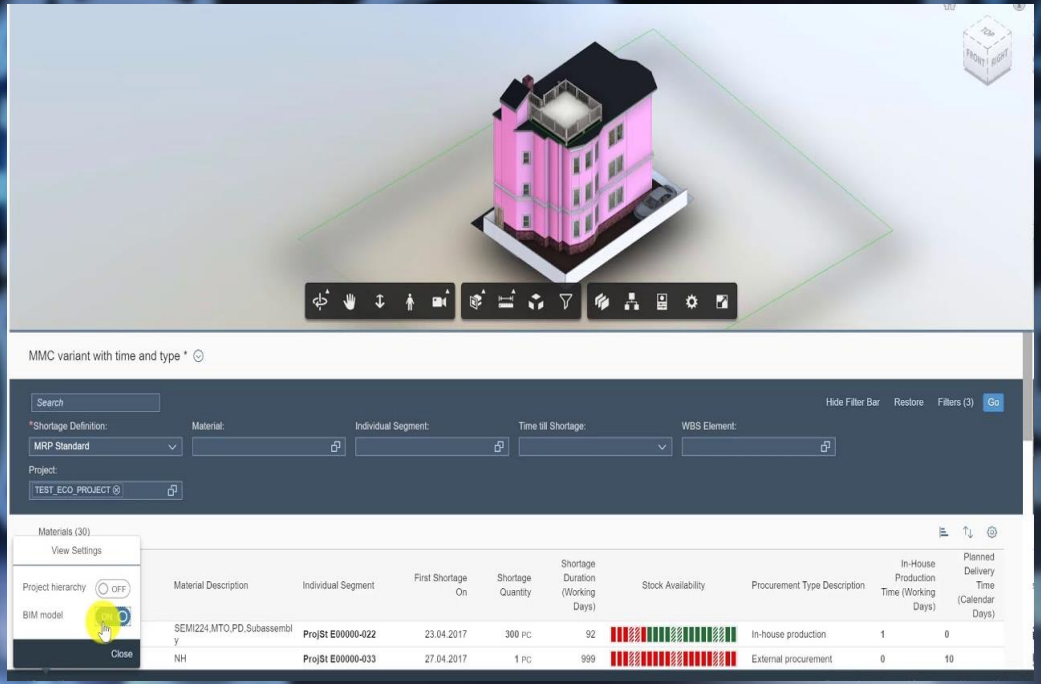
Auto Linking Materials With Project Schedule

By uploading the BIM models to a powerful Quantity take off platform, Procurement team will have access to the autogenerated BOQ linked with the BIM model

- Material tracking list can be customized and auto generated, MTO will be created.
- All materials will be linked to the project schedule
- Better tracking of Material delivery to site and actual accurate quantities







CONSTRUCTION

3D Laser Scan

Augmented Reality ‘’AR’’

Virtual Reality ‘’VR’’

BIM CAVE

CONSTRUCTION

3D Laser Scan

- Site team can capture the as-built
- Exported as 3D point cloud
- Superimposed to the design BIM models to track any site changes
- Used for renovation projects by capturing the existing building
- Drone Laser scan can be used for large

CONSTRUCTION

3D Laser Scan

Sample of 3D Scan Showing the Difference between the as Built & Model

Comparing the design model with the as-built at construction site

As Per BIM Model No Opening → 3D Points Cloud with Opening

CONSTRUCTION

Augmented Reality ‘‘AR’’

- This technology will bring the 3D BIM models to the actual site, by uploading the BIM models to the I Pad and walk through the site, the team will see all design elements and can detect any required penetrations through the walls.

- Site team will have a complete vision for coordination specially for MEP utilities

CONSTRUCTION

Virtual Reality ‘‘VR’’

- This technology is a very powerful collaboration tool, by doing a walk through the BIM models, review the design, check clashes & reporting design issues.
- Can be linked with the online meetings.
- Doing a full demonstration to the client by walking inside the project, this also can be done before project award for excellent marketing.

KAUST

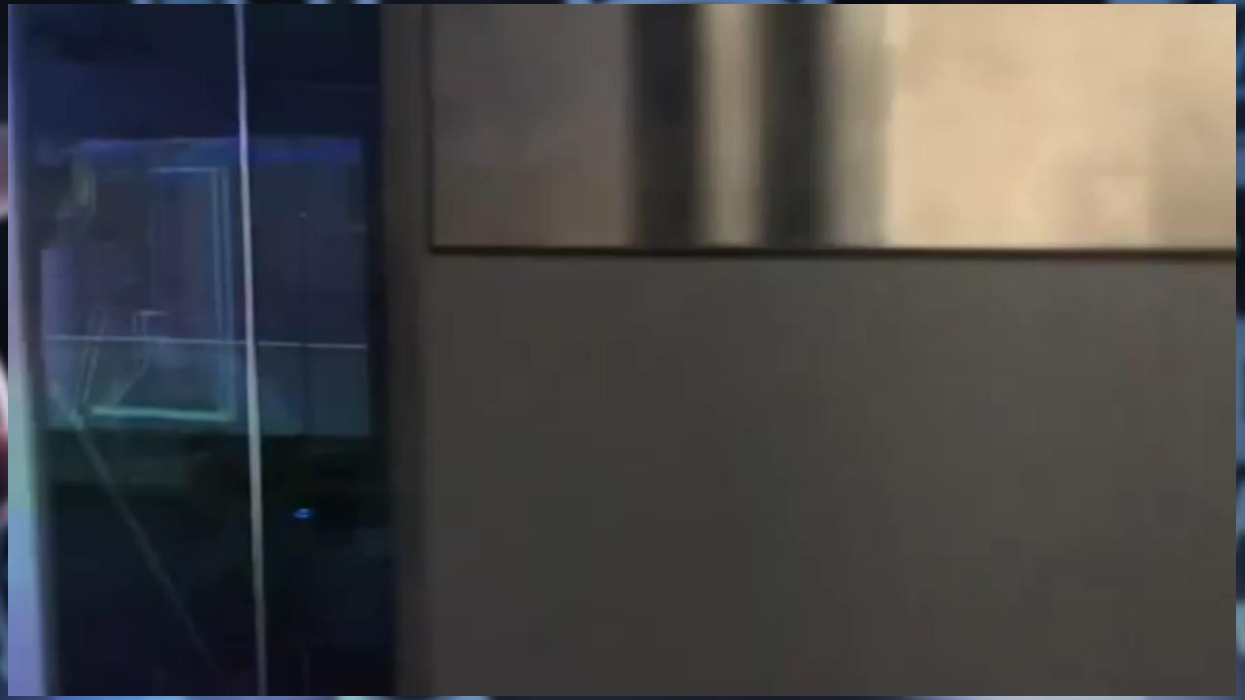
OLAYAN HOSPITAL

COASTAL VILLAGE

CONSTRUCTION

BIM CAVE

- This technology enables projects to be realized in an immersive, interactive and collaborative virtual environment.
- Rapid identification of any project issues or complications
- Capability to deliver interactive public engagement and consultation sessions



Challenges

- **Staff Competency that leads to Cultural or Technical Resistance.**
- **Financial related issues.**
- **Data Management.**
- **Lack of alignment.**


WHAT'S
NEXT
?

THANK YOU

INDUSTRY Talks

Talks Architecture & Design

Talks Concrete

Talks Facilities Management

Talks HVAC R

Talks Project Management

Talks Technology

Talks Facades & Glass