BACKGROUND OF BIM PROJECT EXECUTION & MANAGEMENT

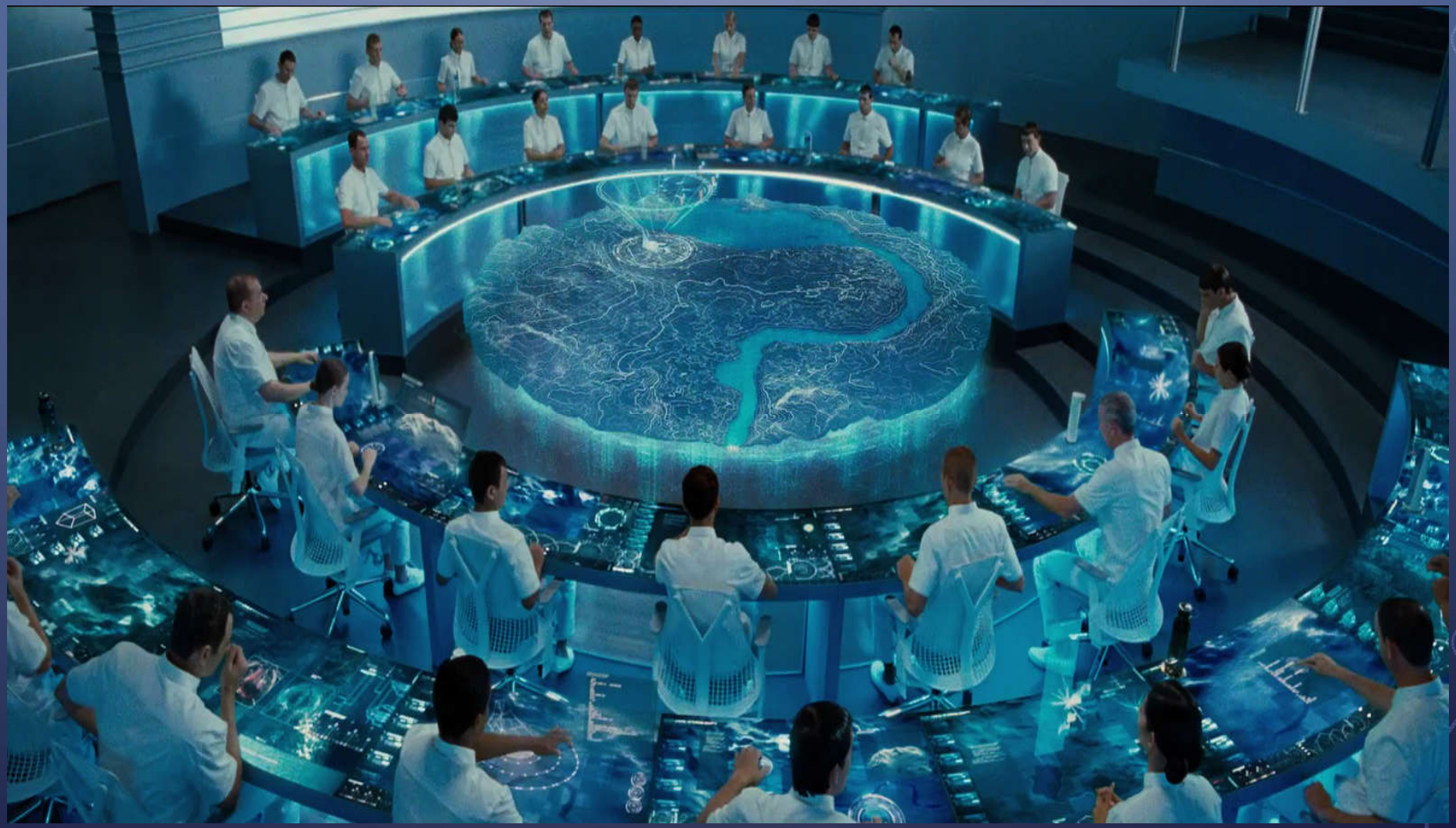
20 May 2019

Destination

Sustainable Building Construction

A road map to the future

REMOTE CONSTRUCTION/ BEYOND IMAGINATION



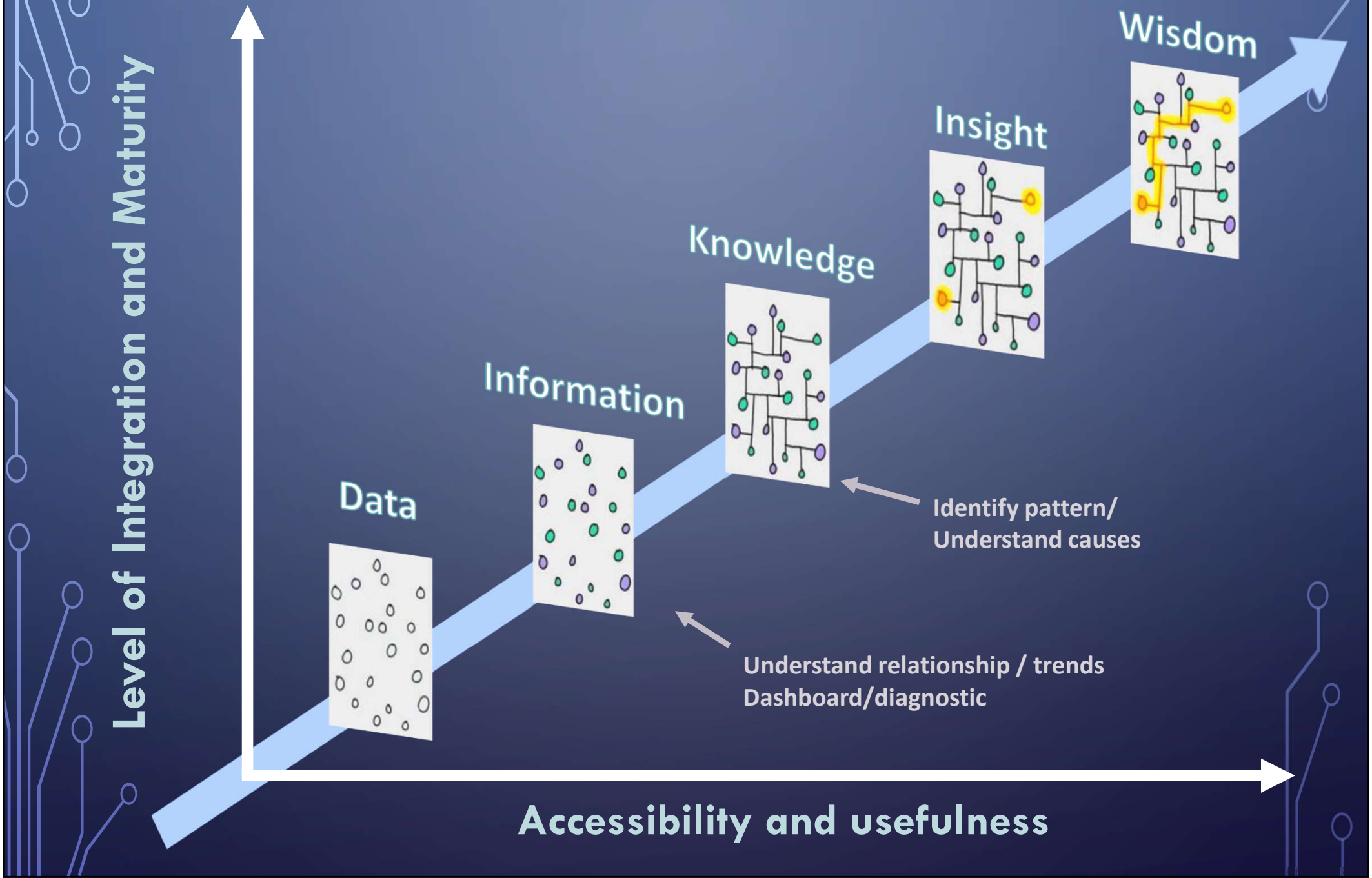
DRIVERS FOR SUSTAINABLE CONSTRUCTION

- **Safety & Wellbeing** — Enhanced safety, health and welfare
- **Quality** — High precision and remarkable workmanship
- **Productivity** — More efficient working, less down time
- **Environment** — Efficient resource use, less waste
- **Revenue** — Breakthrough revenue growth
- **Cost** — Saving materials and labour costs


Mobile Working
Data Insight
Digital Surveying
Internet Of Things
Virtual Reality
Adaptive Manufacturing
Drone Services
DIGITAL CONSTRUCTION
Visualization & Animation
BIM
Building Information Models
Artificial Intelligence
Construction Robotics
Plant & Vehicles Telematics
App Development

UNLEASH THE POWER OF INFORMATION

SUSTAINABLE BUILDING CONSTRUCTION HIERARCHY FRAMEWORK



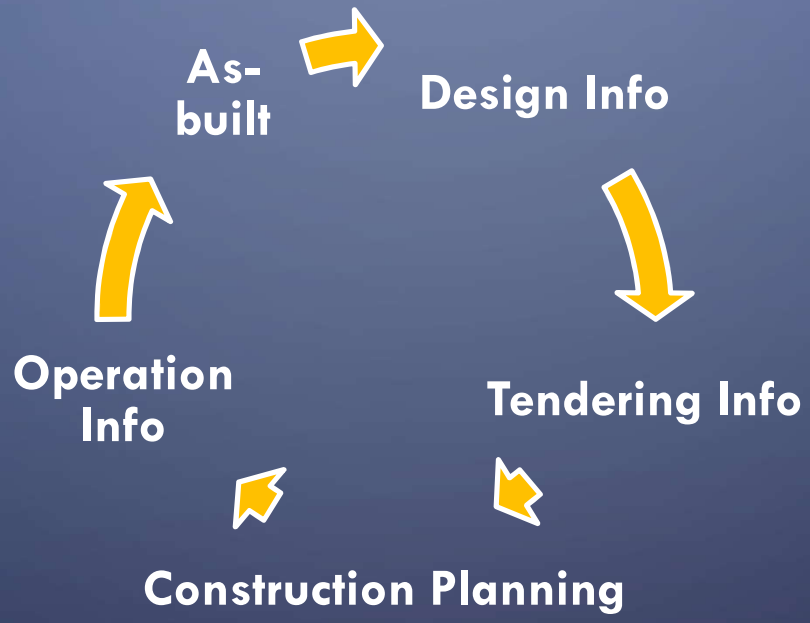
Centralized and integrated
Digitalized
User-friendly
Accessible
Consistent
Fast and flexible
Secured
End-users empowered to be Chief Data Officers (CDO)!

INFORMATION IN CONSTRUCTION

HOW CAN INVISIBLE DATA CHANGE REALITY, AND GENERATE VALUE FOR CONSTRUCTION INDUSTRY?

INFORMATION CONTROL IN CONSTRUCTION

- Target is to deliver the right information to the right people at the right time with zero cost, so that people can respond to external events and make the best decision.

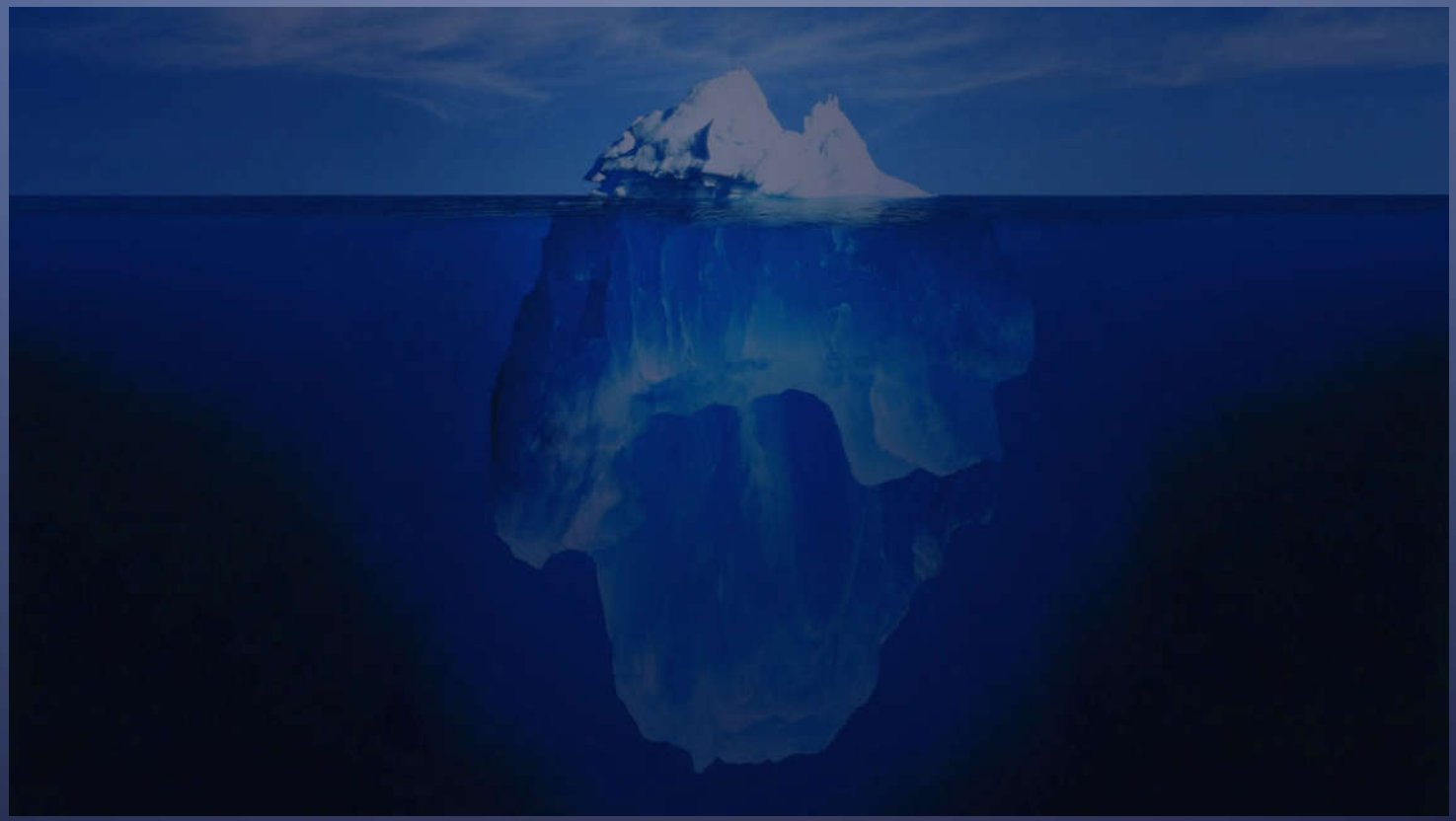


- Set up systems and workflows that instantly collect, store and transform data, and generate a seamless information flow across different parties.

BIM APPLICATIONS

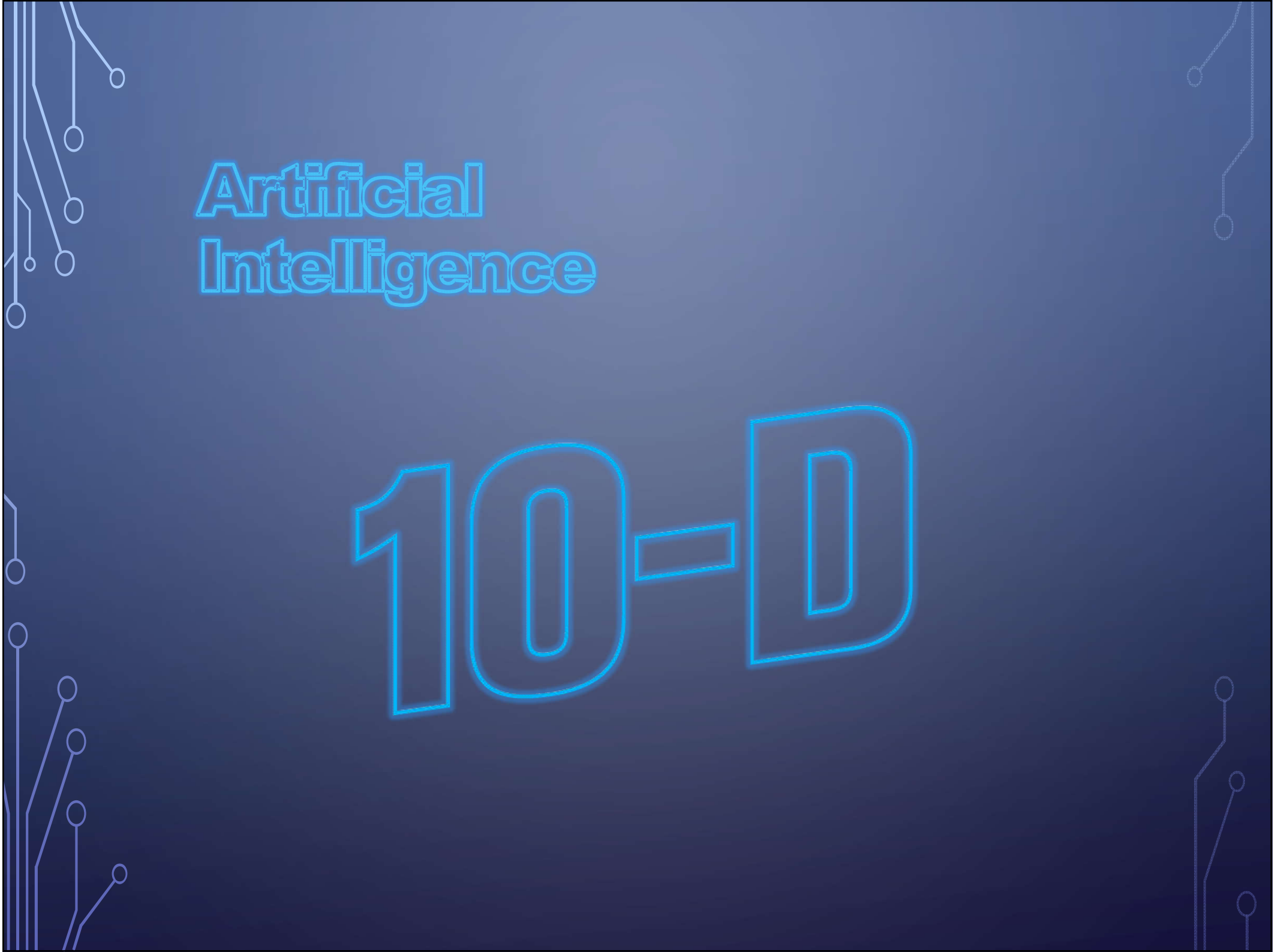
3D => 10-D

10:90



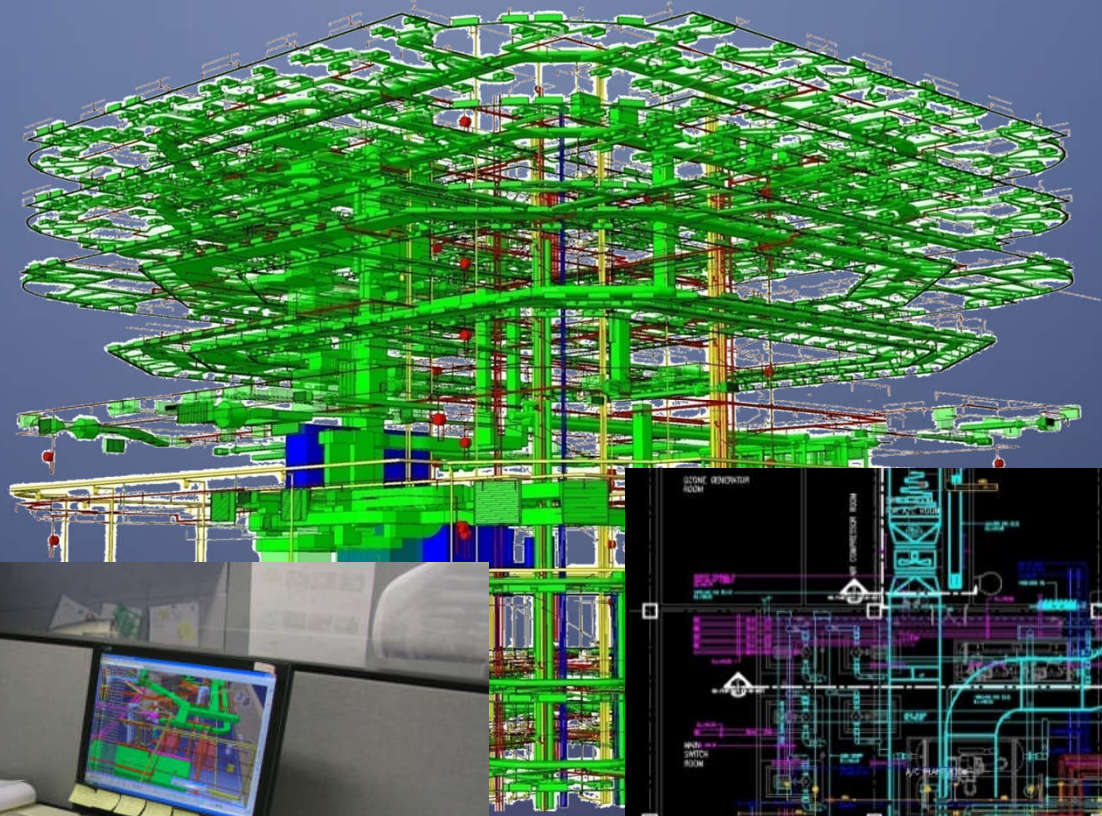
Automation & Robotics

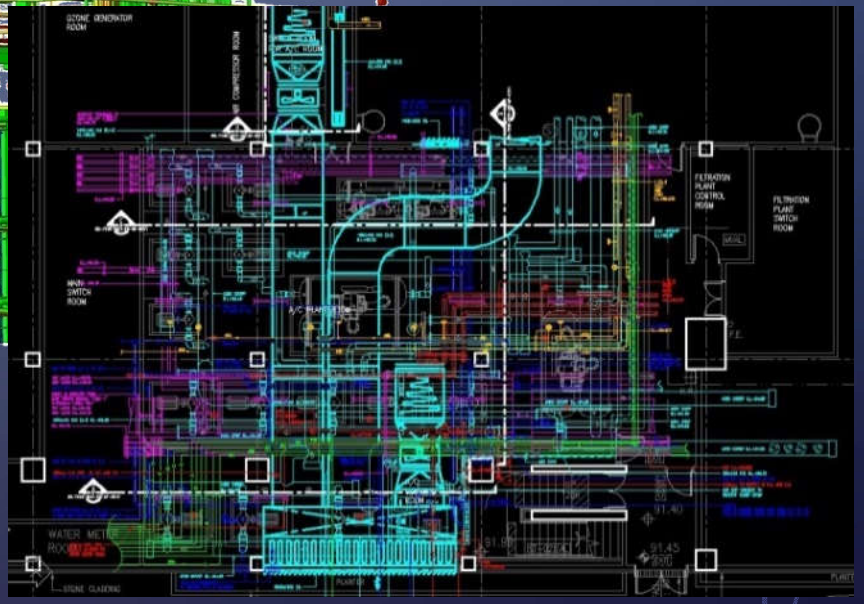
9-D


Artificial
Intelligence
10-D

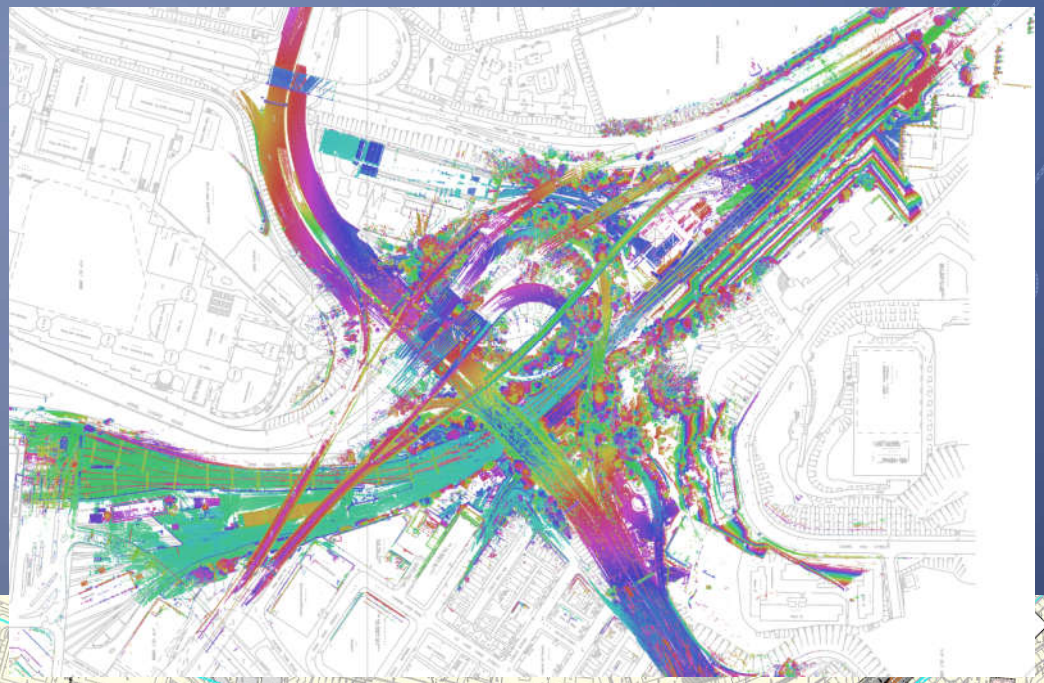
OUR LIFE IS CHANGING…

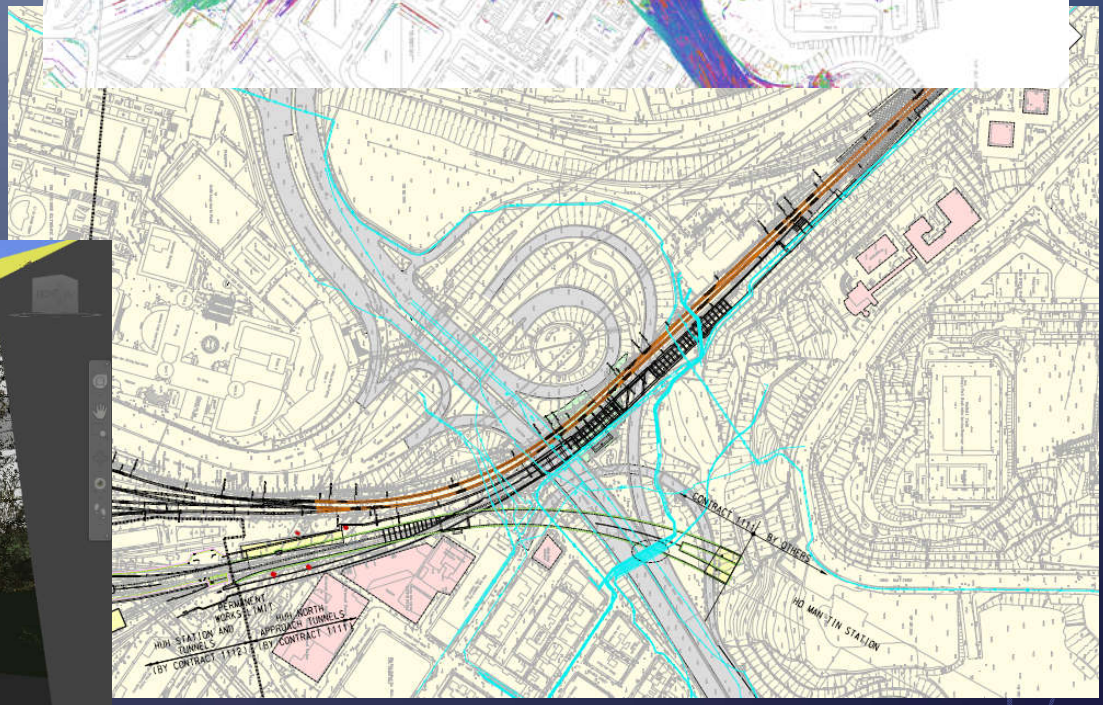
SOME 13 YEARS AGO…



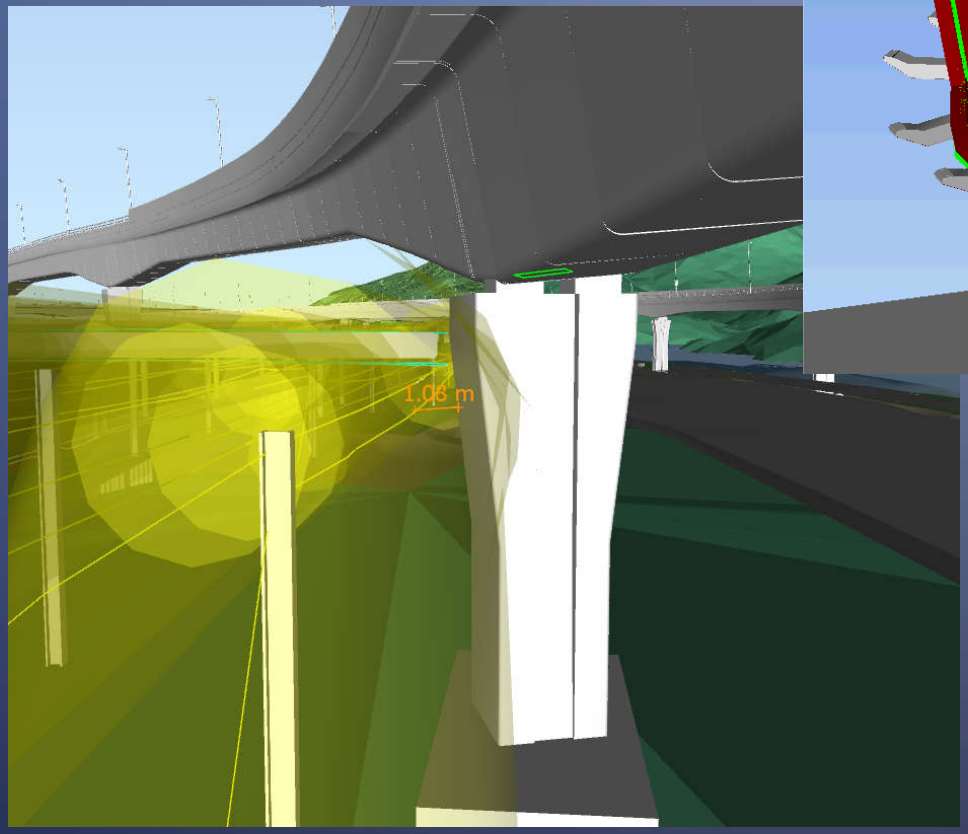


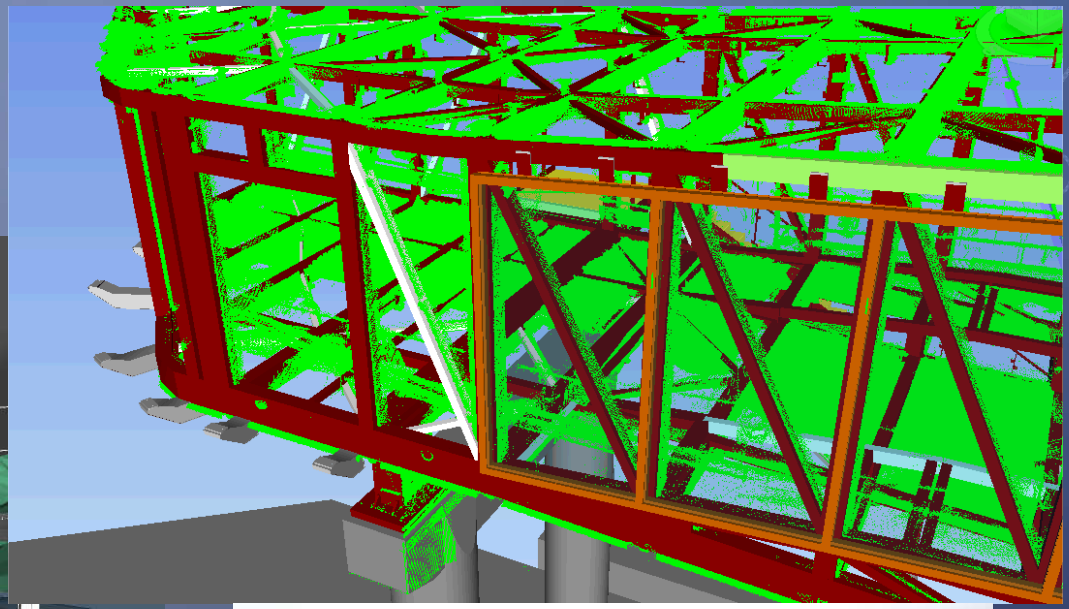
7 YEARS AGO…

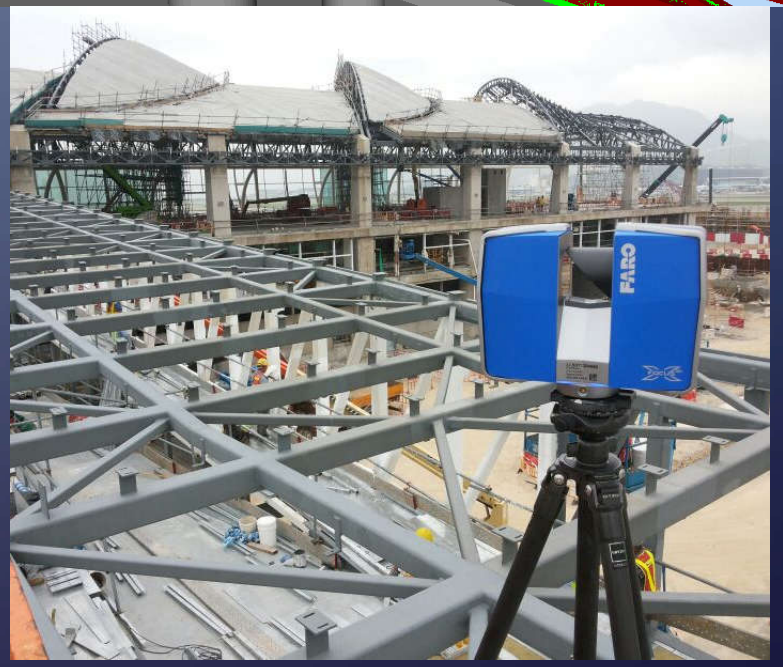



CONTRACT 1111 by OTHERS
HUM STATION AND TUNNELS (BY CONTRACT 1112)
HUM NORTH APPROACH TUNNELS (BY CONTRACT 1111)
HO MAN JIN STATION

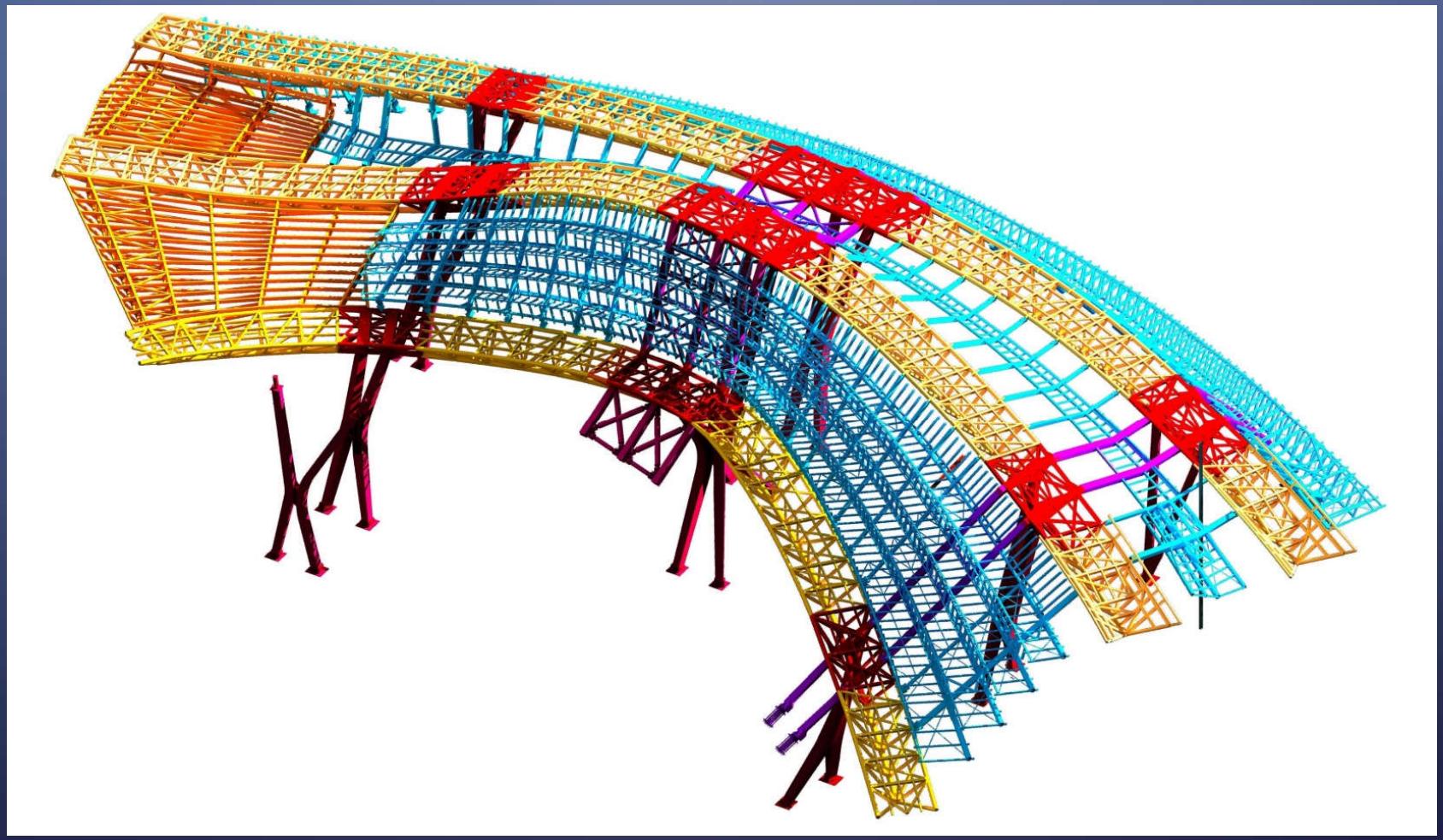
5 YEARS AGO…



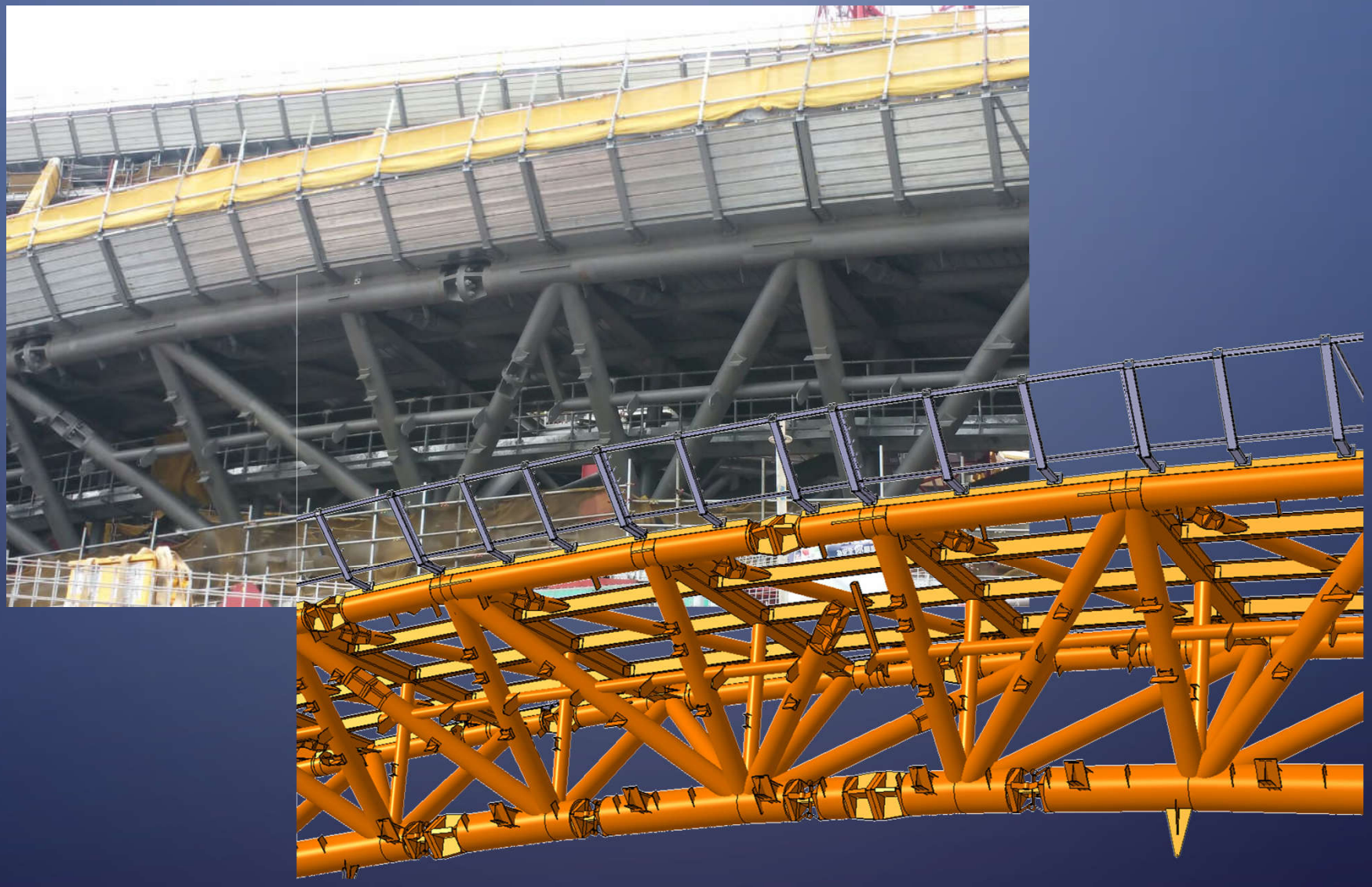


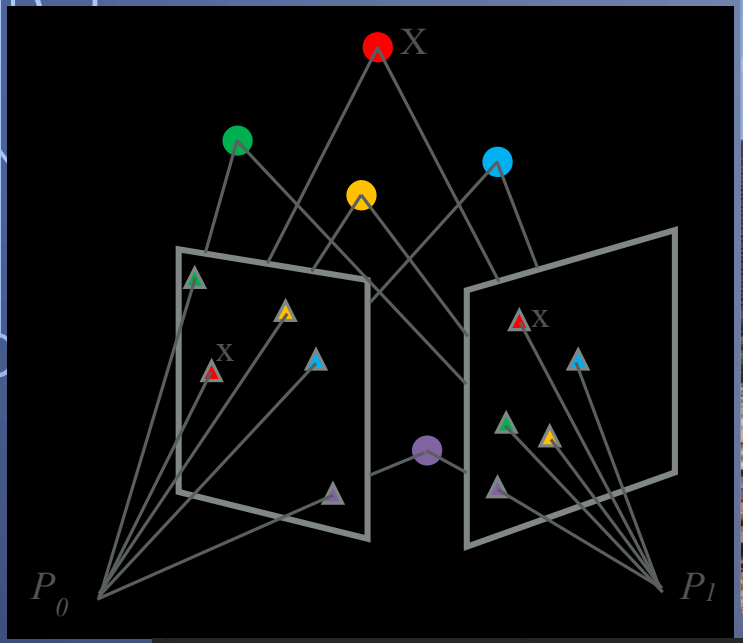


ROOF STEEL STRUCTURE



RECENTLY




X
X
X
P_0
P_1


gammon_151122
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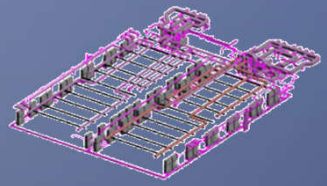
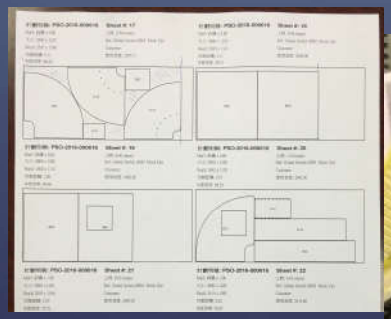
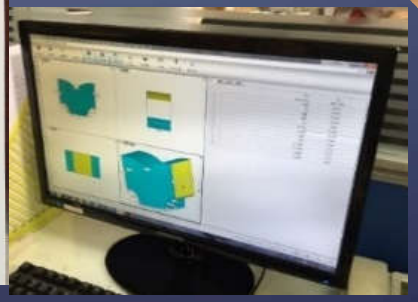
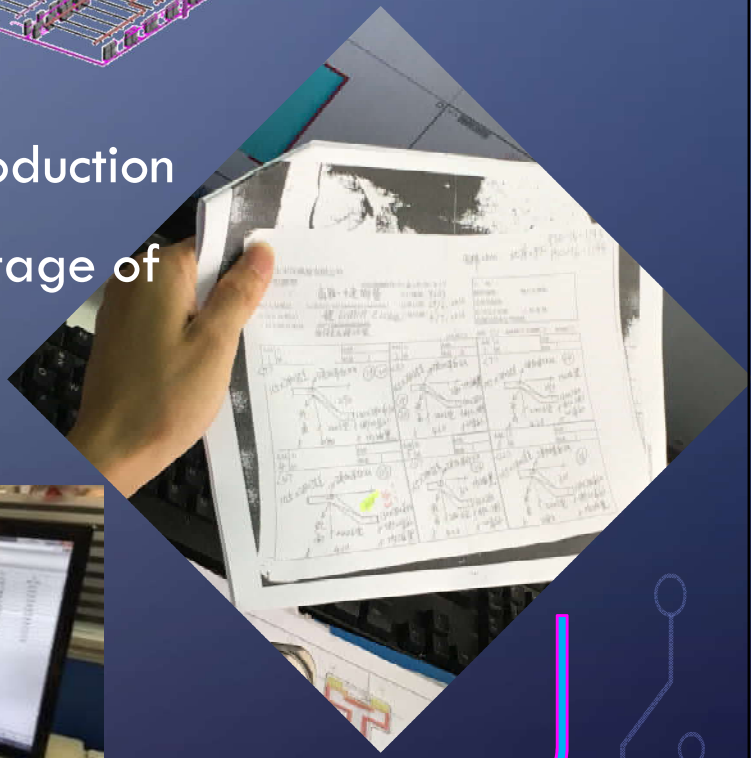
BIM DESIGN FOR MANUFACTURING & ASSEMBLY (DFMA)

- Benefits:
  - DW144 Standard compliance
  - Right design & coordinate before right production
  - Eliminate human error between different stage of manual input & ordering process



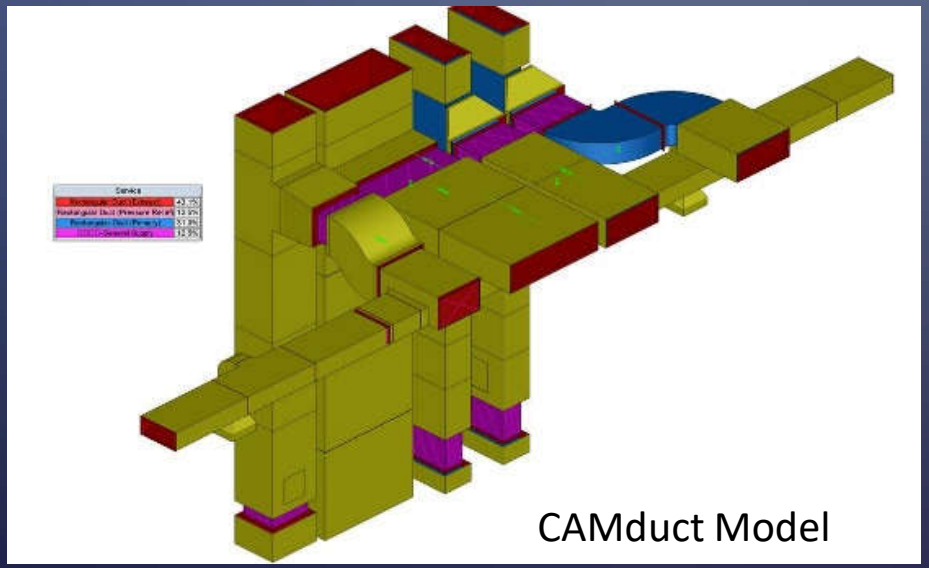




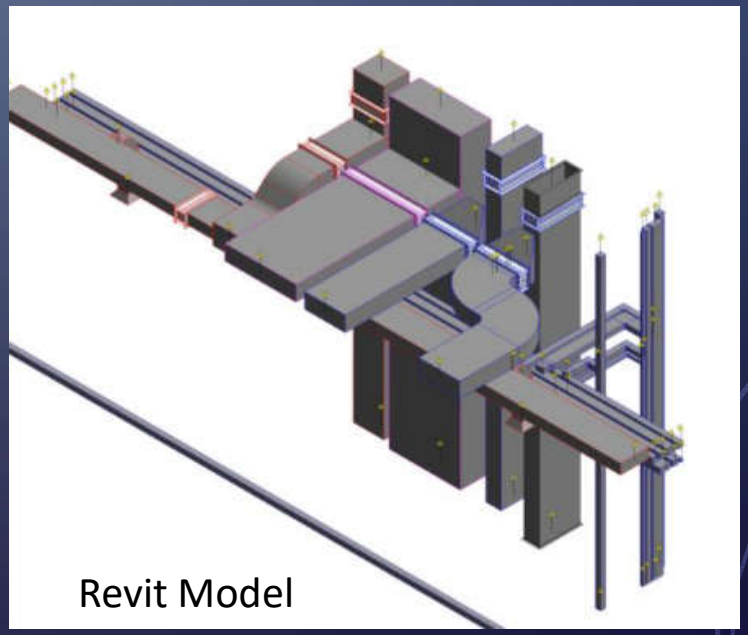


Digital VS Sketch

DFMA - MOCKUP PRACTICE

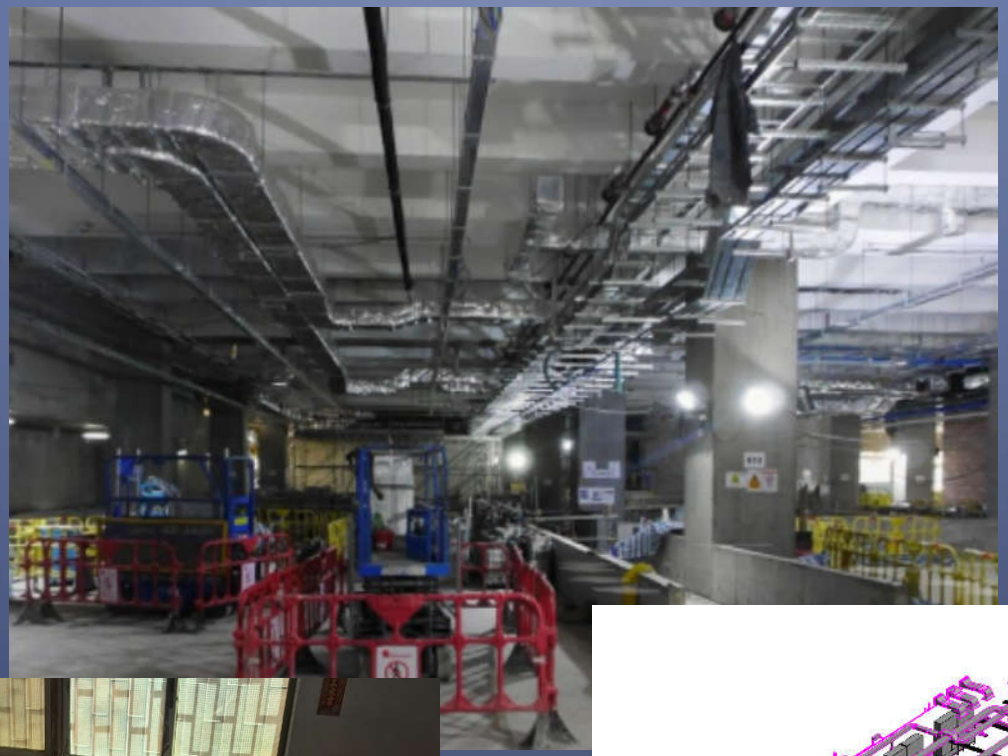


CAMduct Model

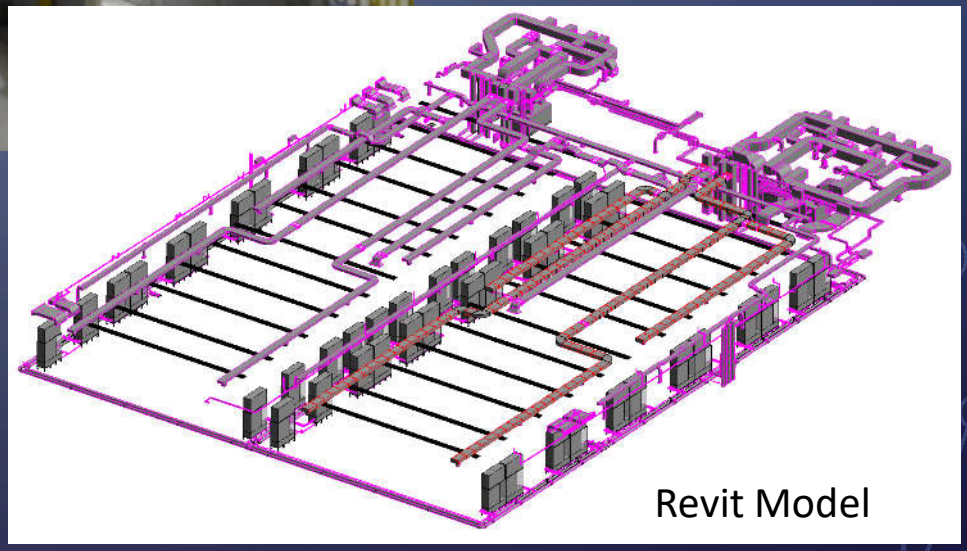


Revit Model

DFMA - REAL PRACTICE



CAMduct to Manufacturing



Revit Model

Design

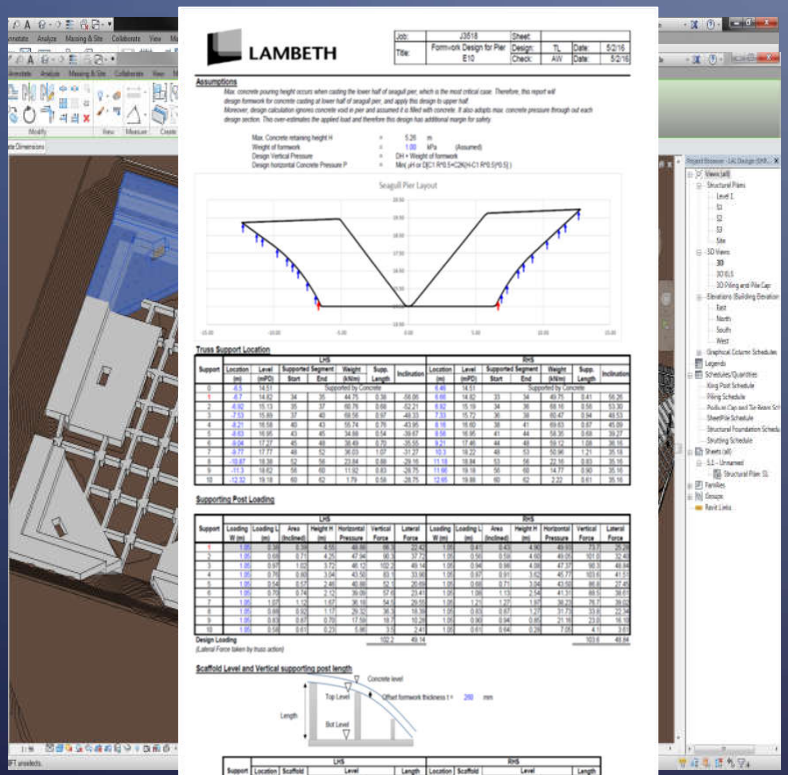
Tendering

Operation

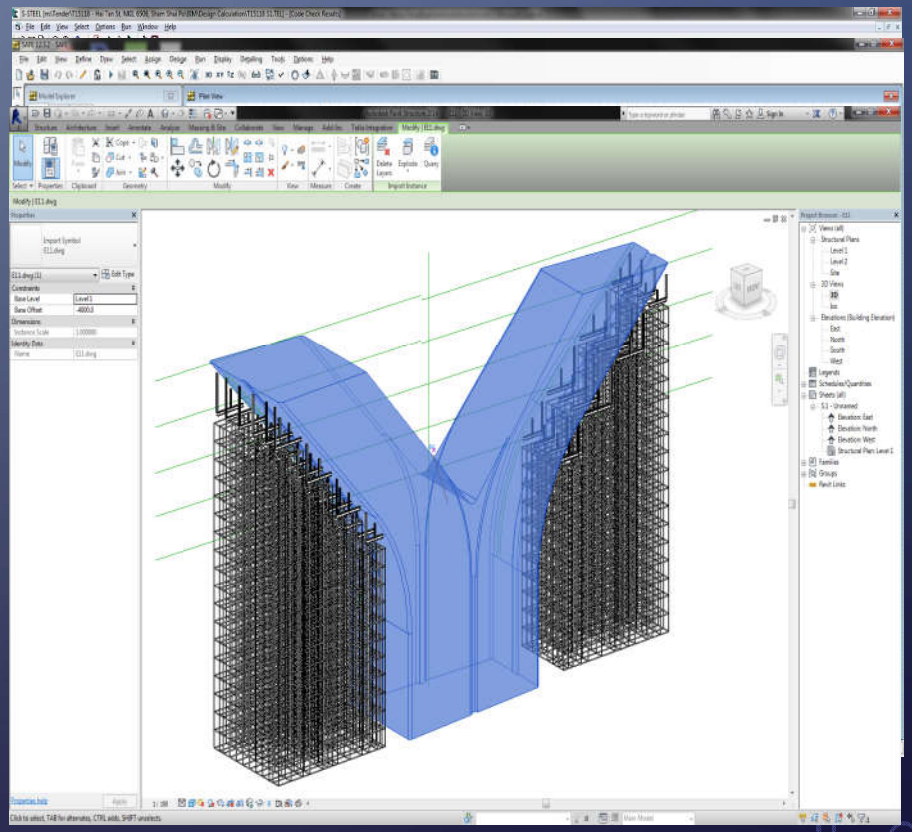
Analytic

STAGE 1 - DESIGN STAGE

- Capture and store design information in BIM
- Synchronize design calculation with BIM, such that BIM model is updated automatically as design calculation is



Information exchange between BIM and design



Design

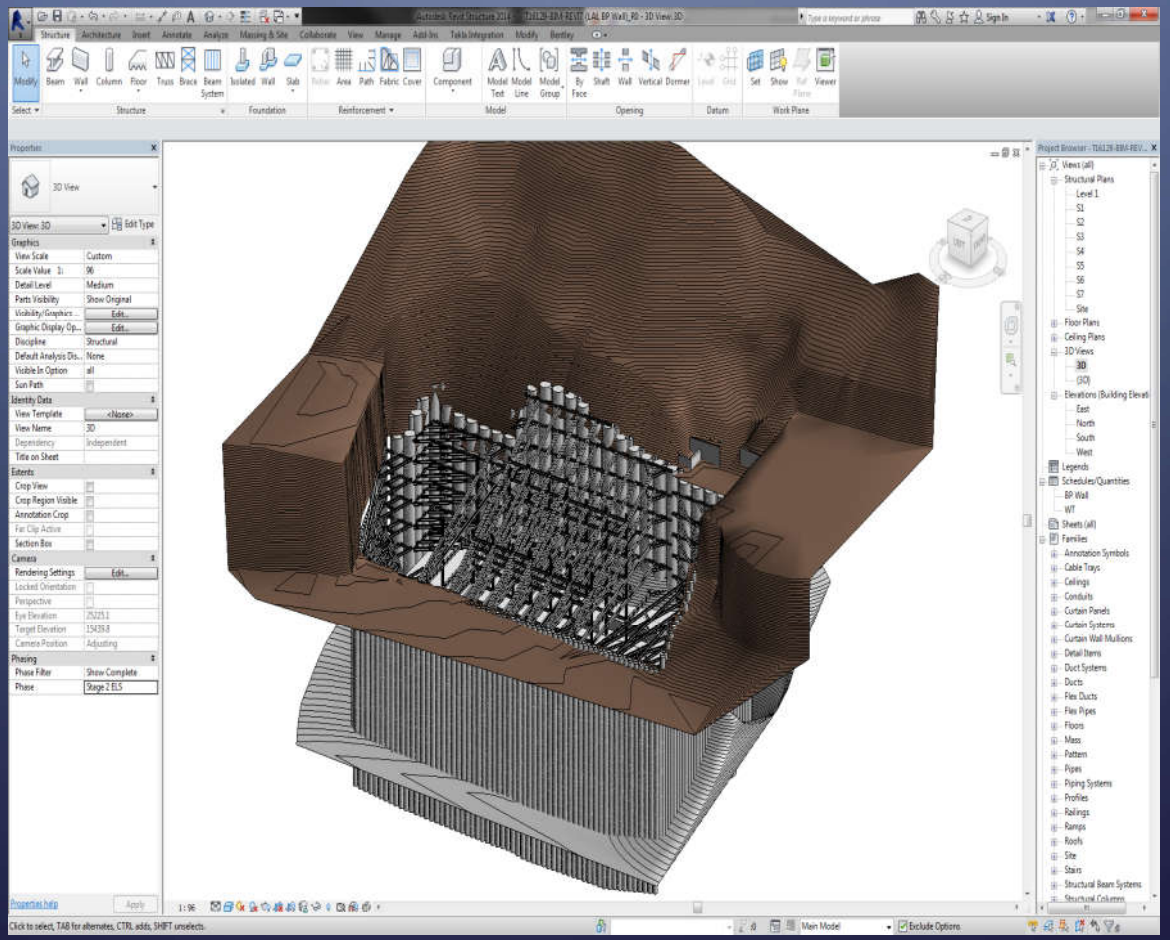
Tendering

Operation

Analytic

STAGE 1 - DESIGN STAGE

- Update model in seconds
- Create updated BIM model for every single tender and project



Design

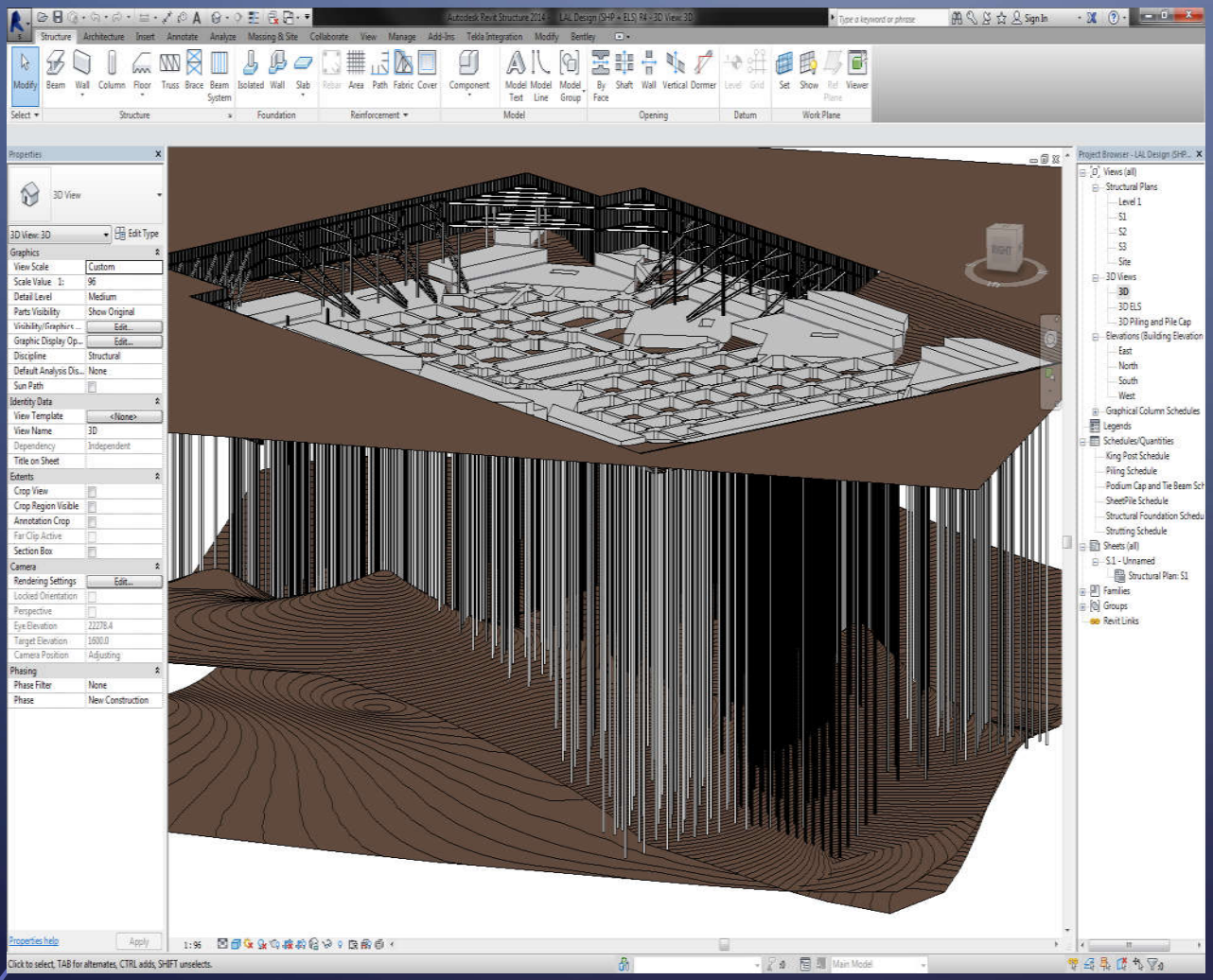
Tendering

Operation

Analytic

STAGE 2 - TENDERING

- Quantity in seconds dealing with complicated geometry



<Structural Column Schedule>

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R9	Piling at +8.05m	None	20000	6140
R9	Piling at +8.05m	None	20000	6140
R9	Piling at +8.05m	None	20000	6140
R9	Piling at +8.05m	None	20000	6140
R9	Piling at +8.05m	None	20000	6140
R9	Piling at +8.05m	None	20000	6140
R15	Piling at +8.05m	None	20000	6140
R15	Piling at +8.05m	None	20000	6140
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R15	Piling at +8.05m	None	20000	6140
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R15	Piling at +8.05m	None	20000	6140
R8	Piling at +8.05m	None	20000	6140
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R13	Piling at +8.05m	None	20000	6140
R13	Piling at +8.05m	None	20000	6140
C34	Piling at +8.05m	None	20000	8050
C34	Piling at +8.05m	None	20000	8050
C34	Piling at +8.05m	None	20000	8050
C34	Piling at +8.05m	None	20000	8050
C21	Piling at +8.05m	None	20000	7415
C21	Piling at +8.05m	None	20000	7415
C21	Piling at +8.05m	None	20000	7415
C21	Piling at +8.05m	None	20000	7415
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C21	Piling at +8.05m	None	20000	7415
C21	Piling at +8.05m	None	20000	7415

Design

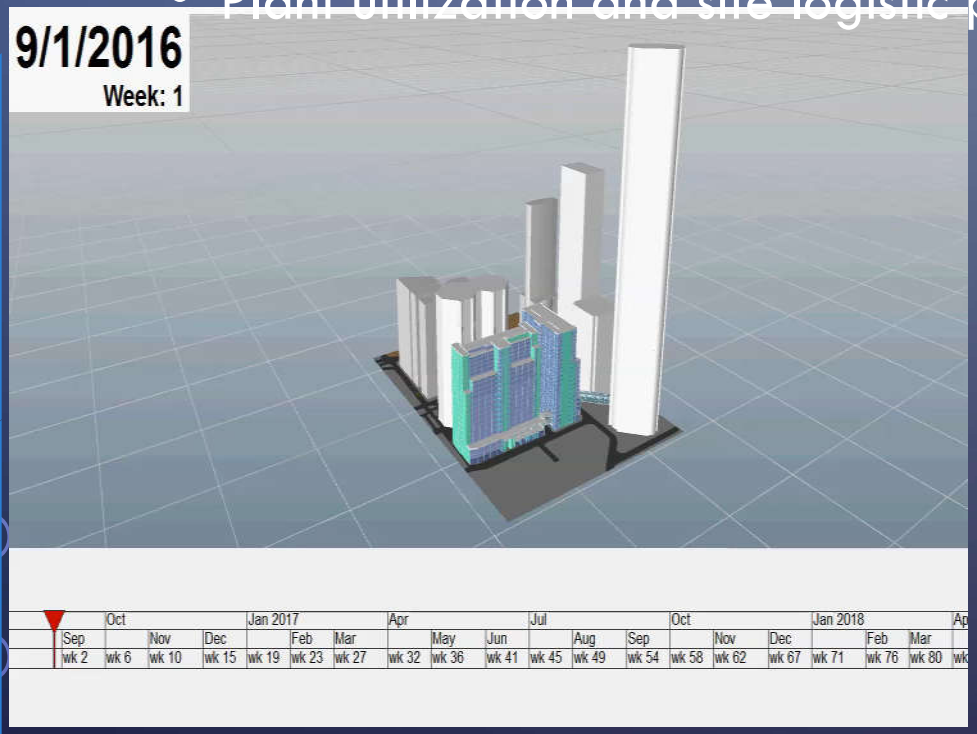
Tendering

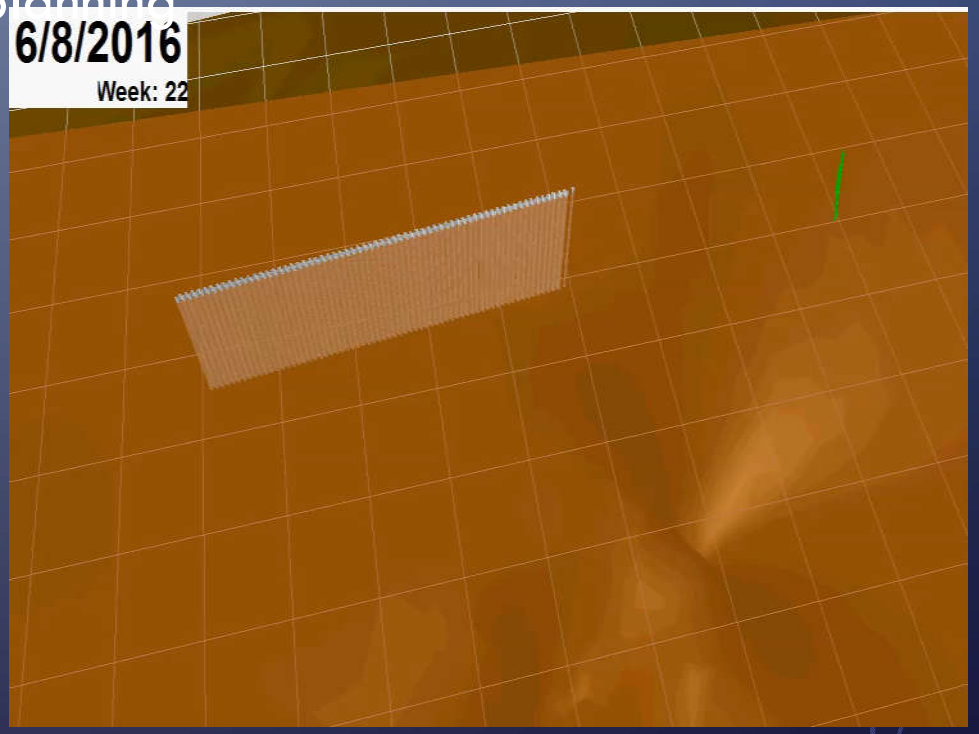
Operation

Analytic

STAGE 2 - TENDERING

- 4D Planning
  - Utilize geometry information in BIM model
  - Add time parameter to inspect the interaction between construction tasks and program
  - Plant utilization and site logistic planning





Design

Tendering

Operation

Analytic

STAGE 3 - CONSTRUCTION

Construction Record

Planning Information

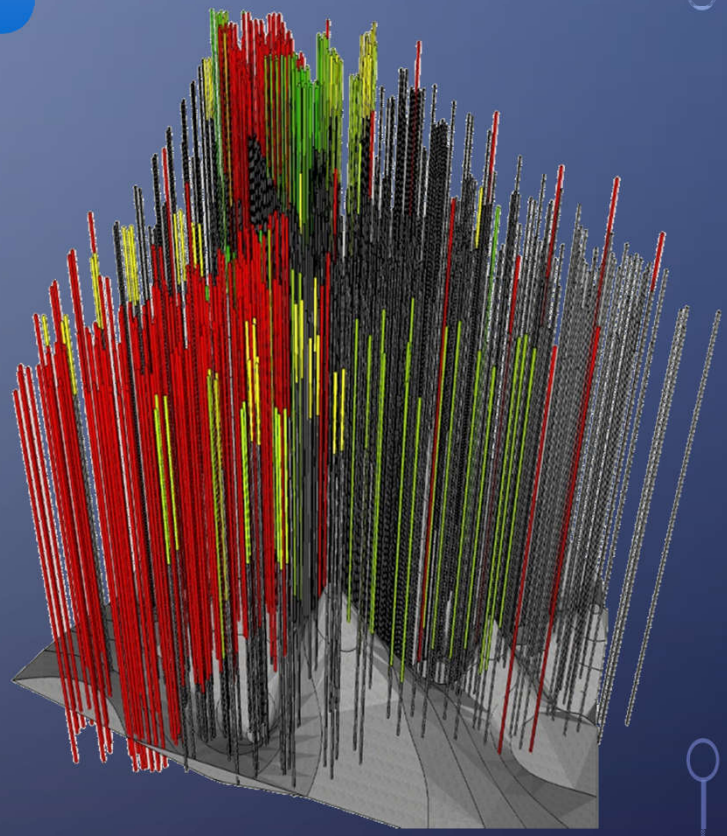
Database

Monitor reality and Compare with planning

React to information Solve problems and improve productivity

Combine reality and virtual world

Understa nd and react



Combine Planning and Reality Information

Design

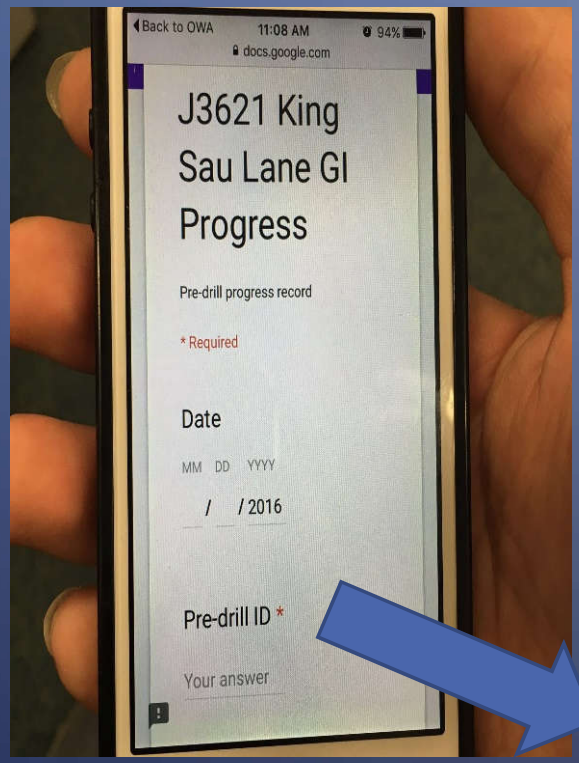
Tendering

Operation

Analytic

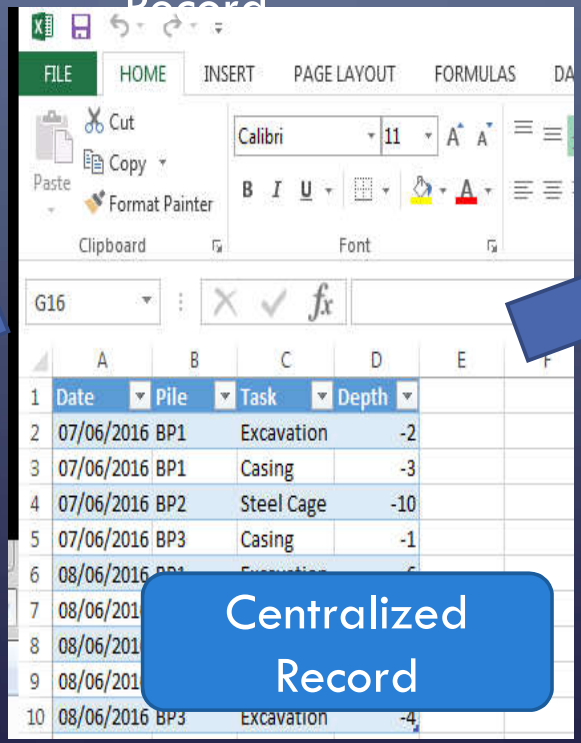
STAGE 3 – CONSTRUCTION DIGITIZING CONSTRUCTION EVENTS

Free Mobile App/IoT

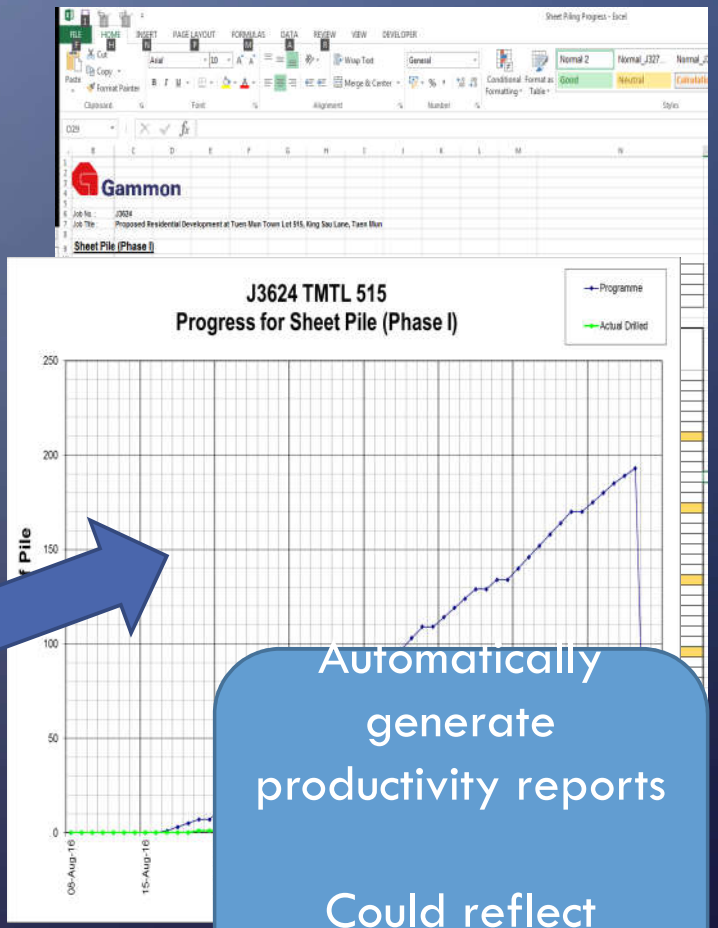


Directly into database

Systematic Excel Construction Record



Centralized Record



Automatically generate productivity reports

Could reflect today's progress after work

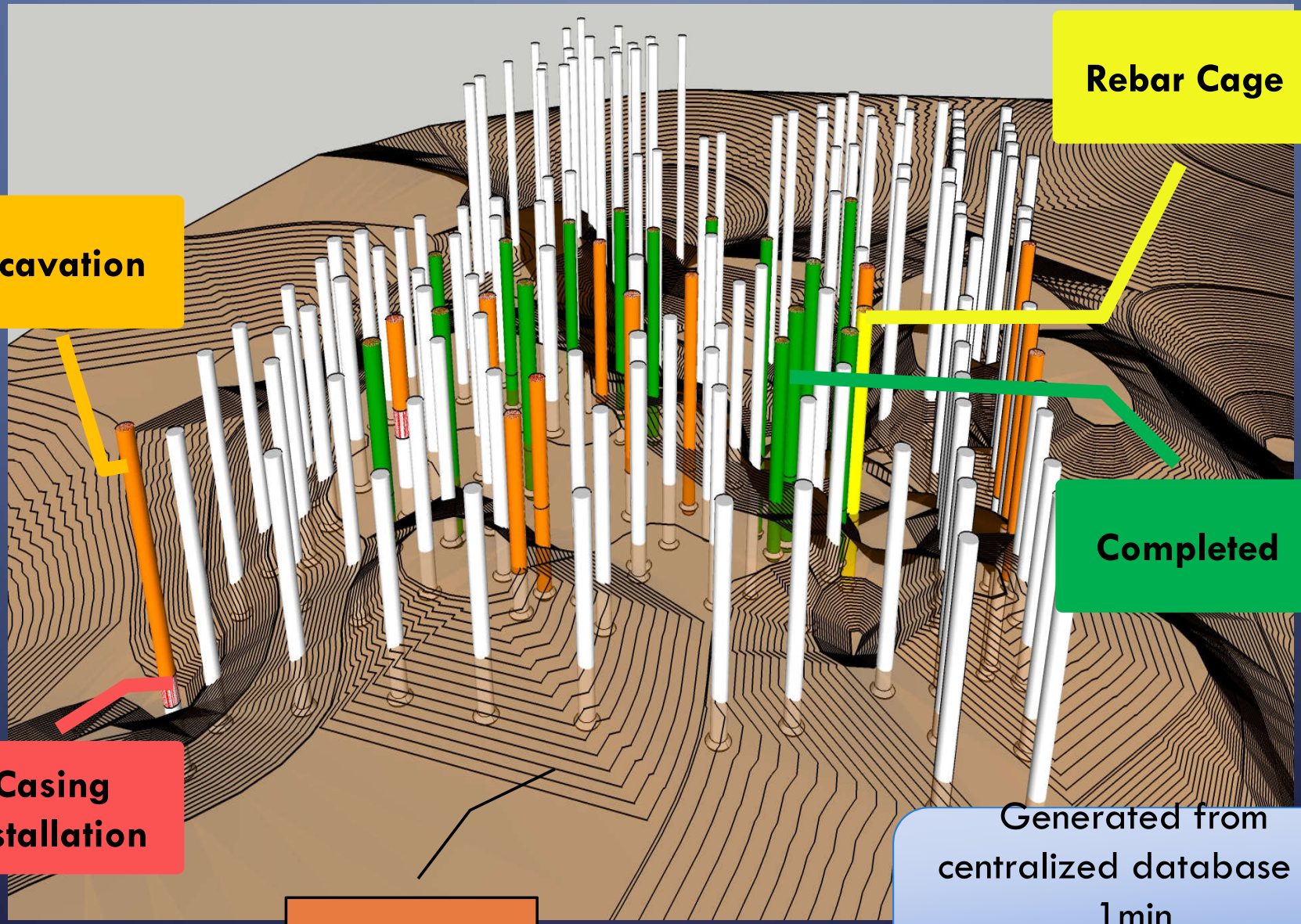
Design

Tendering

Operation

Analytic

STAGE 3 – CONSTRUCTION BIM AS-BUILT PROGRESS



Generated from centralized database in 1min
Could reflect today's work in 3D

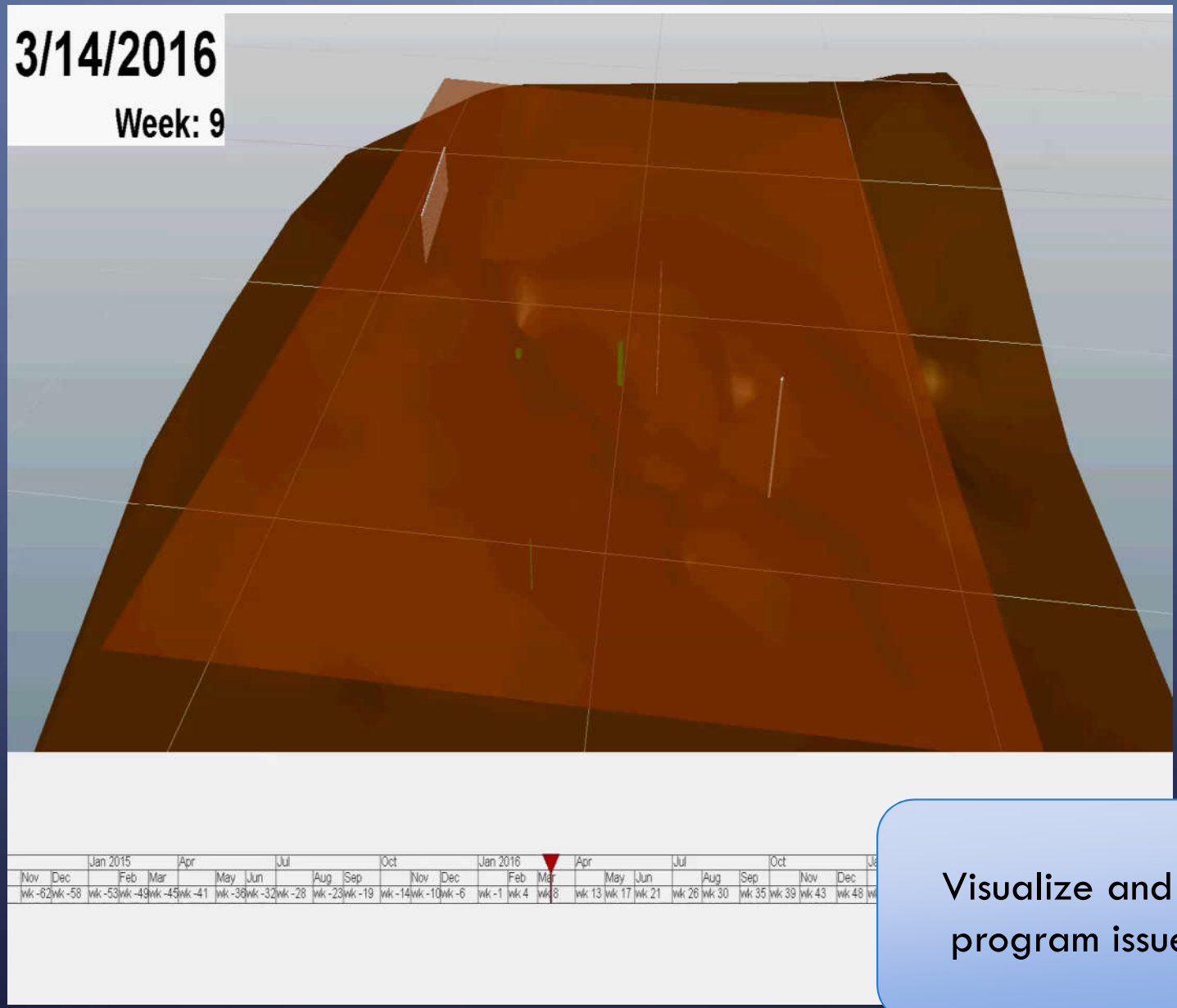
Design

Tendering

Operation

Analytic

STAGE 3 – CONSTRUCTION
4D AS-BUILT PROGRESS



Visualize and identify program issues in 4D

Design

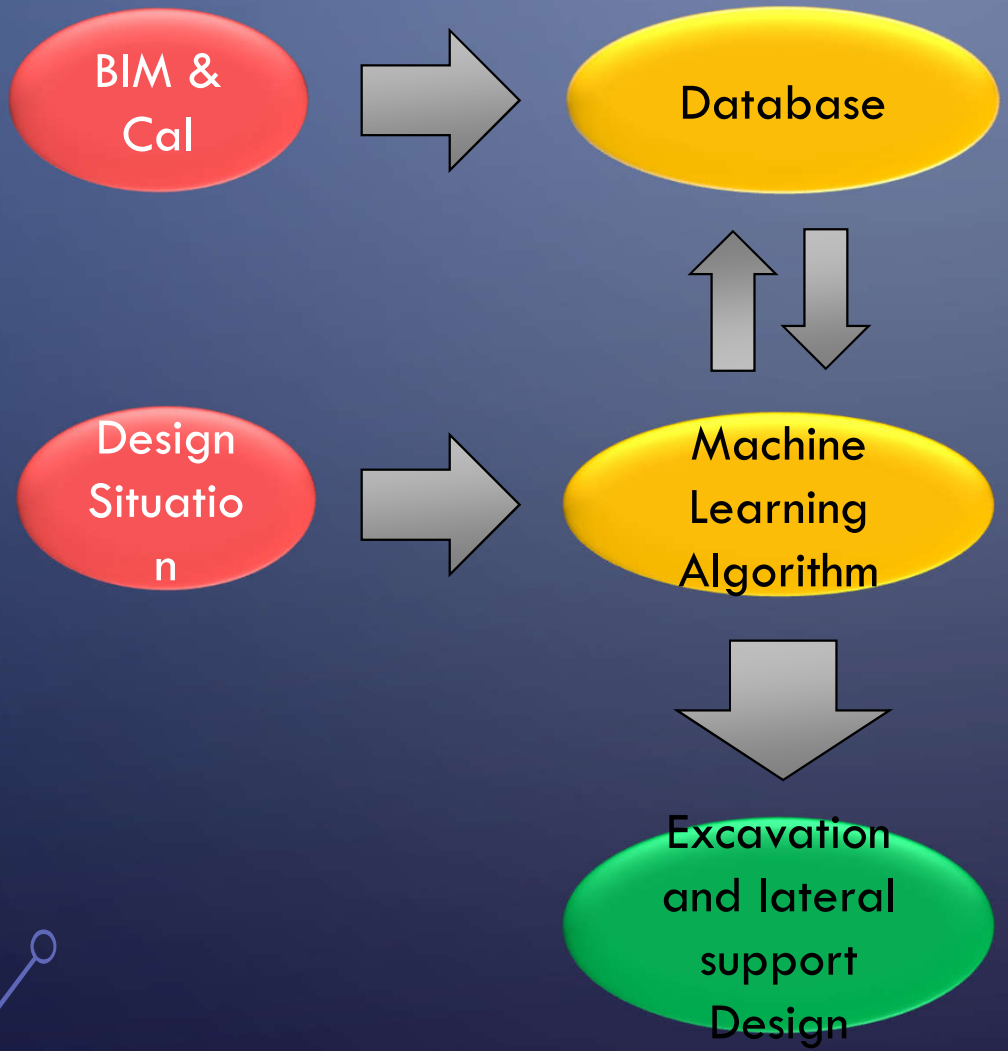
Tendering

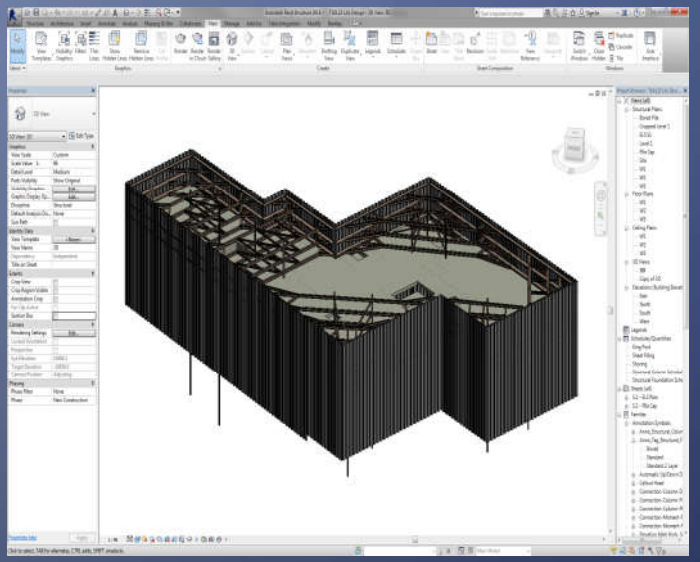
Operation

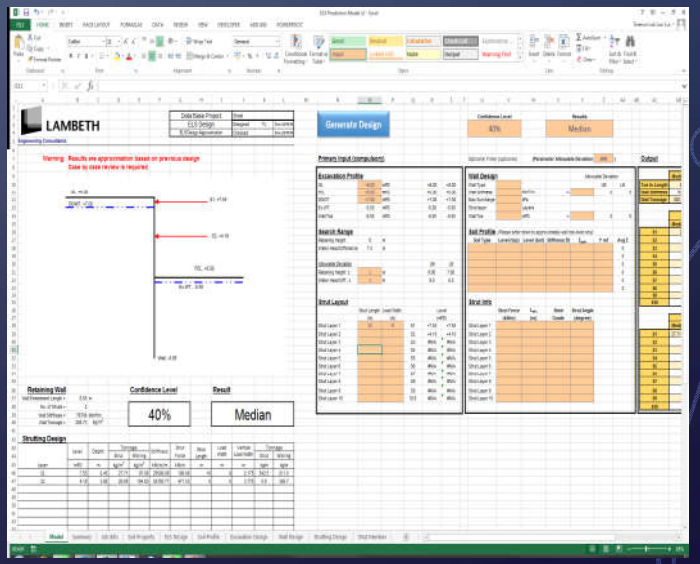
Analytic

STAGE 4 – ADVANCE ANALYTICS

- Based on collected design and as-built data, produce design and evaluate risk.







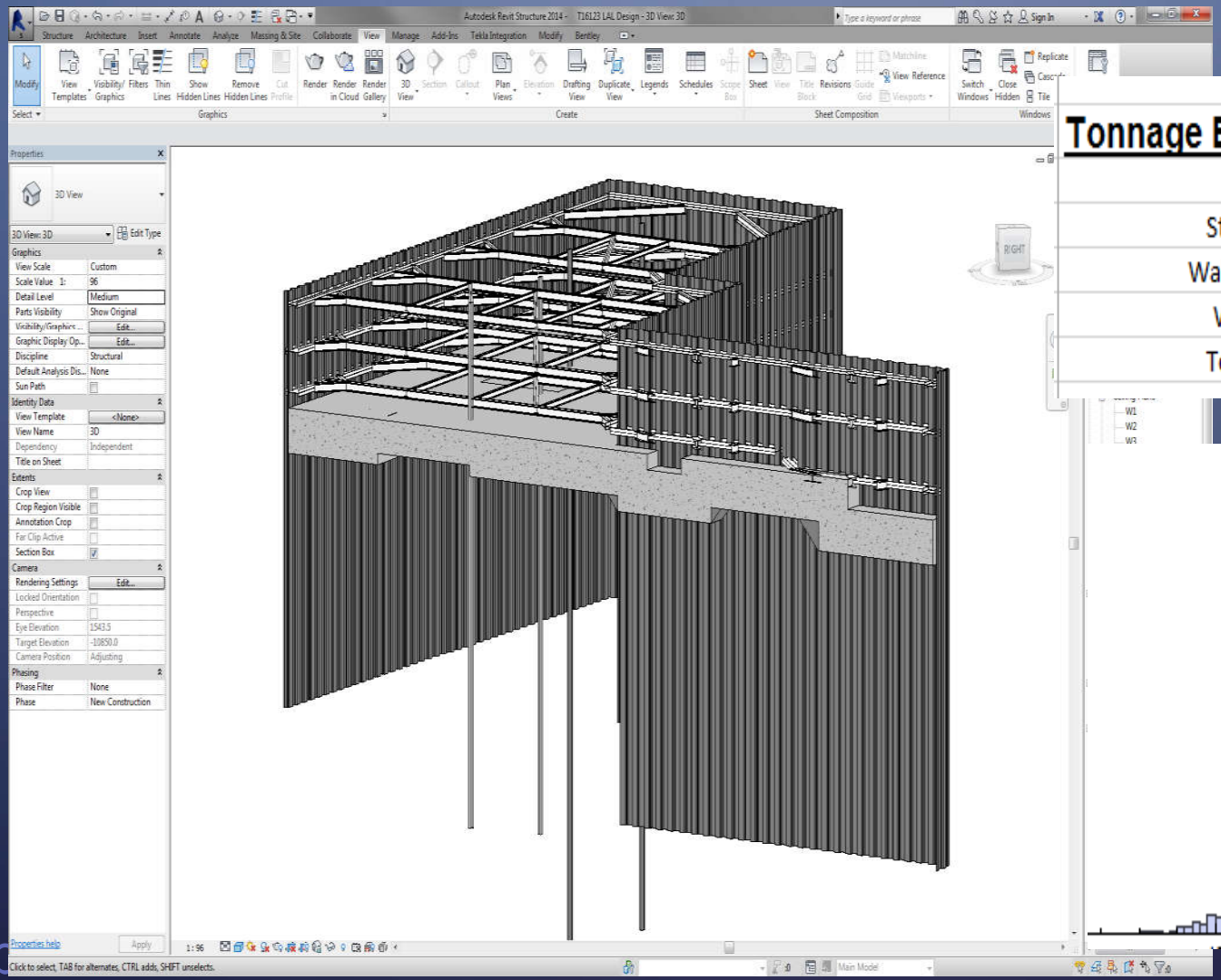
Design

Tendering

Operation

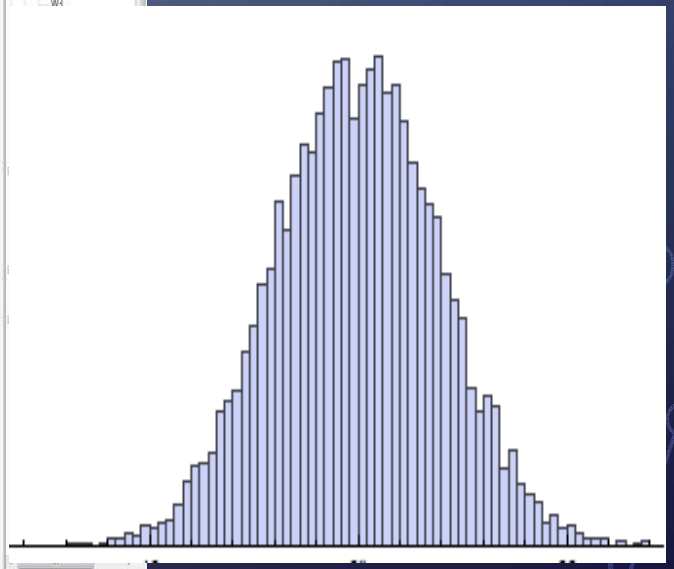
Analytic

STAGE 4 – ADVANCE ANALYTICS



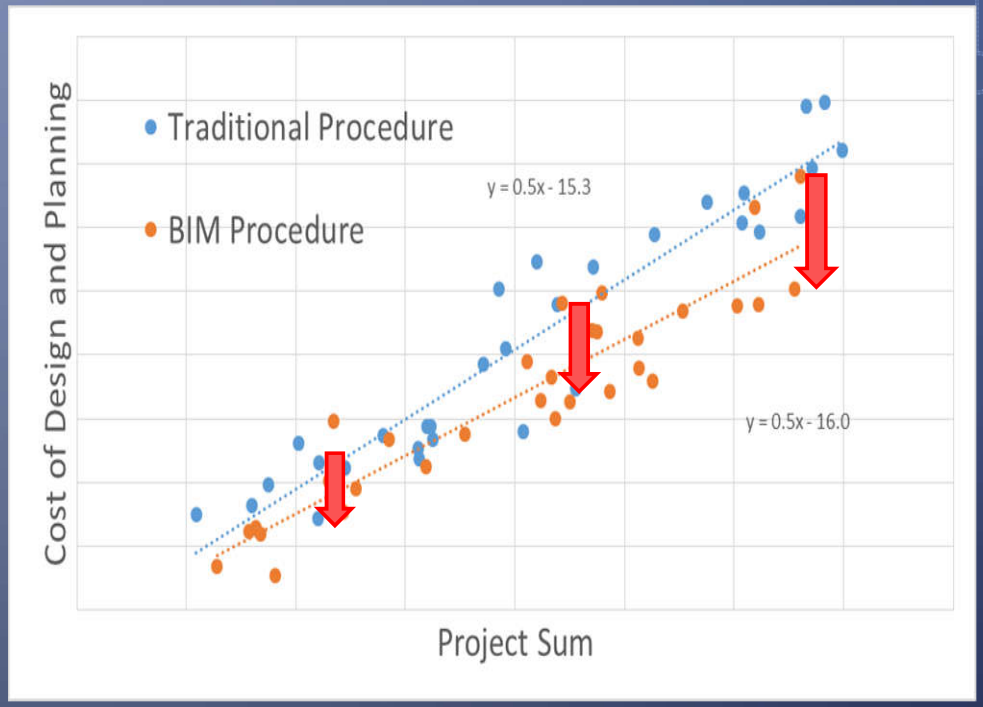
Tonnage Estimation

Strut Tonnage =	602.8	kg/m
Waling Tonnage =	606.7	kg/m
Wall Tonange =	4955.2	kg/m
Total Tonnage =	6164.7	kg/m



BENEFIT OF INFORMATION CONTROL

- Stage 1 Implementation
  - Engineering Design - 10%
  - Tendering - 20%
  - Progress Monitoring - 80%
- Stage 2 Implementation
  - Improve design and planning
  - Improve decision making
- Stage 3 Implementation
  - Better collaboration between internal and external parties



FAILURE OF BIM APPLICATION

- Resource / out-source
- True BIM or just a presentation
- Inappropriate LOD
- BIM adoption / understanding
- BIM culture / promotion

CHALLENGES

- Increase workload and liability
- BIM catalogues not up to standard
- Incompliance with regulations, codes
- Enormous clashes
- Super fast track project – considerable changes
- Industry trade practice / culture
- Too much competition
- Quality is not priority
- Not fully utilizing the power of BIM
- Not in the same pace
- No driving force

SOLUTIONS

- Drivers
- Training of BIM Professionals
- BIM + Digital Integration Project Delivery
- Common Platform for Collaboration
- BIM Quality
- BIM Appreciation and Buy-in
- Systematic Approach – not just a tool
- Cloud Base Technology Framework
- BIM as Core Technology
- BIM standards and requirements

- Remember
- It Always Seems Impossible
- Until It’s Done