TANTEK4D

THE USE OF 4D BIM FOR PRE-CONSTRUCTION PLANNING

Presenter Introduction

- **Name:** Tamara Barahona
- **Role:** BIM Coordinator

Role and responsibilities

- Create and Coordinate 3D models using a variety of BIM software
- Provide BIM support to clients, engineers and technicians when necessary
- Assisting clients implement digital technologies within their project teams
- Assisting our company to work towards BIM Level 2 accreditation
- Assist BIM/VDC Managers with R&D into new innovative digital technologies within the AECO sector

Previous BIM related Projects

- Hanover Quay Commercial Development – Dublin, Ireland
- 2420 Amsterdam Ave. – Hotel and Office Building - New York
- Vivante Newport Center – Assisted Living Building - Newport Beach, CA
- Grady Center for Advanced Surgical Services (CASS) – Atlanta, Georgia

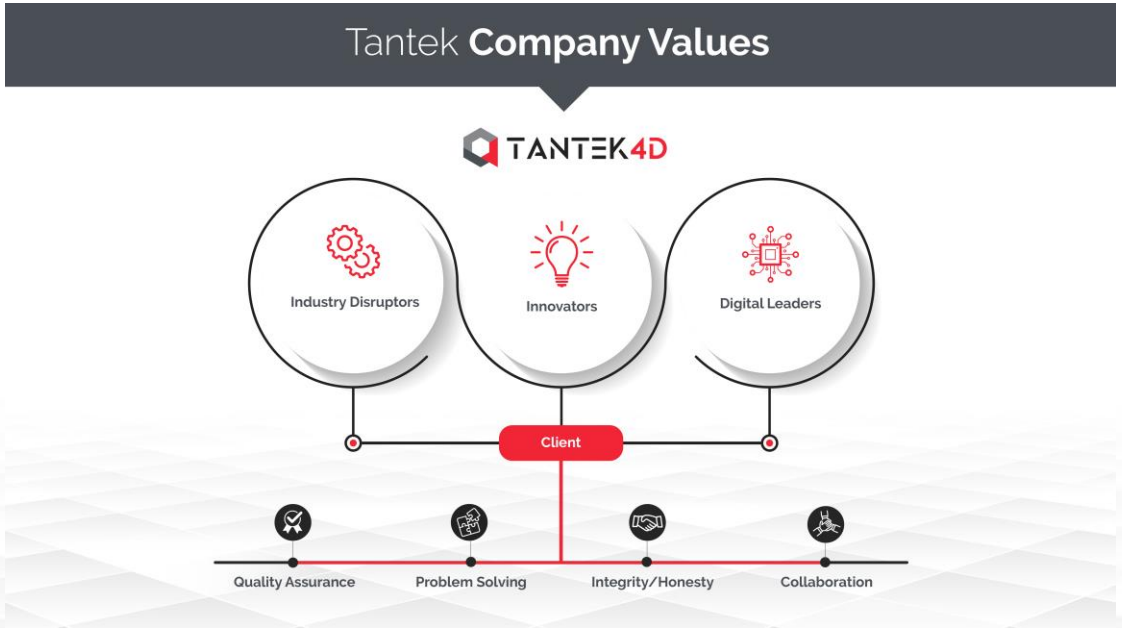
Introduction to TANTEK4D:

Tantek4D carries out an expansive range of digital services within the Architectural, Engineering, Construction, and Operations (AECO) industry, throughout Ireland, the UK and Europe. Our company is focused on assisting clients with digital technology solutions from design conception through to project completion.

Why TANTEK 4D:

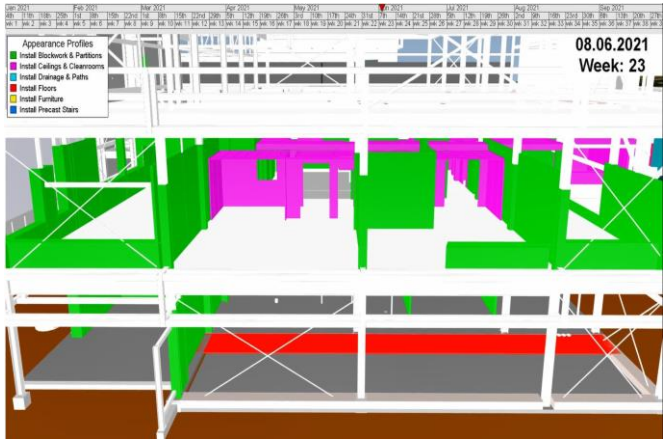
- We utilise the most innovative technologies and software's on the market
- We are Digital leaders in the AECO industry
- We serve many sectors including residential, industrial, civil engineering, education, pharmaceutical, rail and road infrastructure, oil and gas
- We continuously promote employees to develop new skills and provide continuous training throughout their career path

TANTEK 4D Values:



TANTEK4D Services:

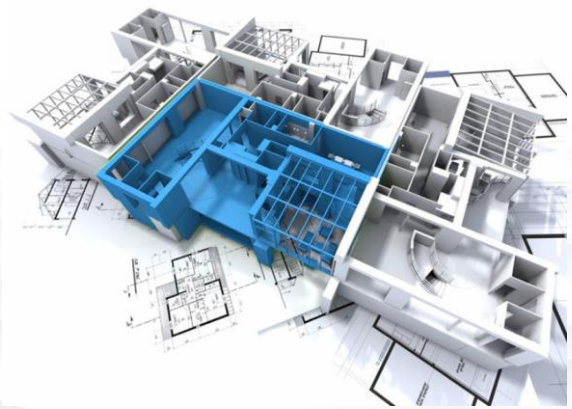
4D BIM/Virtual Planning



3D Laser Scanning/Verification

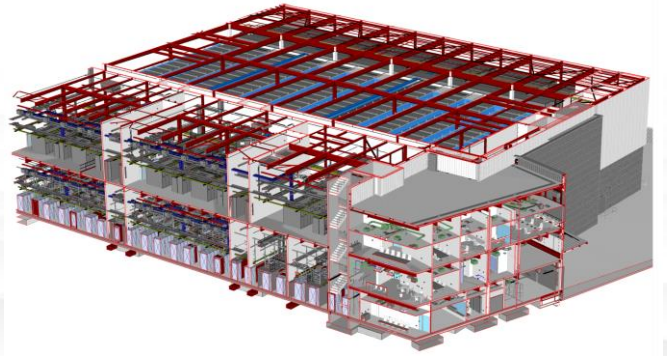
Digital Strategy Consulting

Master Facility Digital Twin



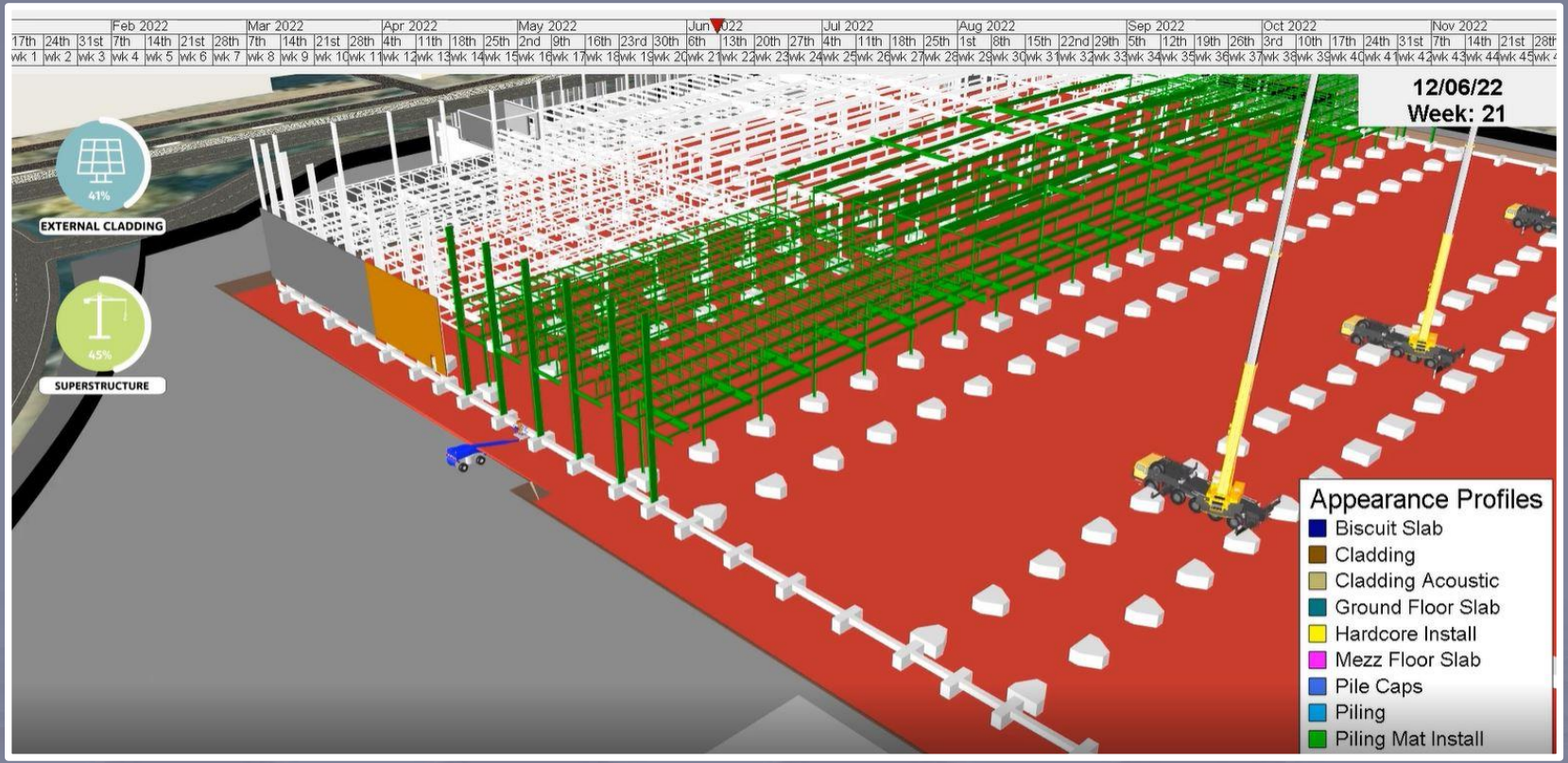
3D Digital Animations

BIM Co-ordination



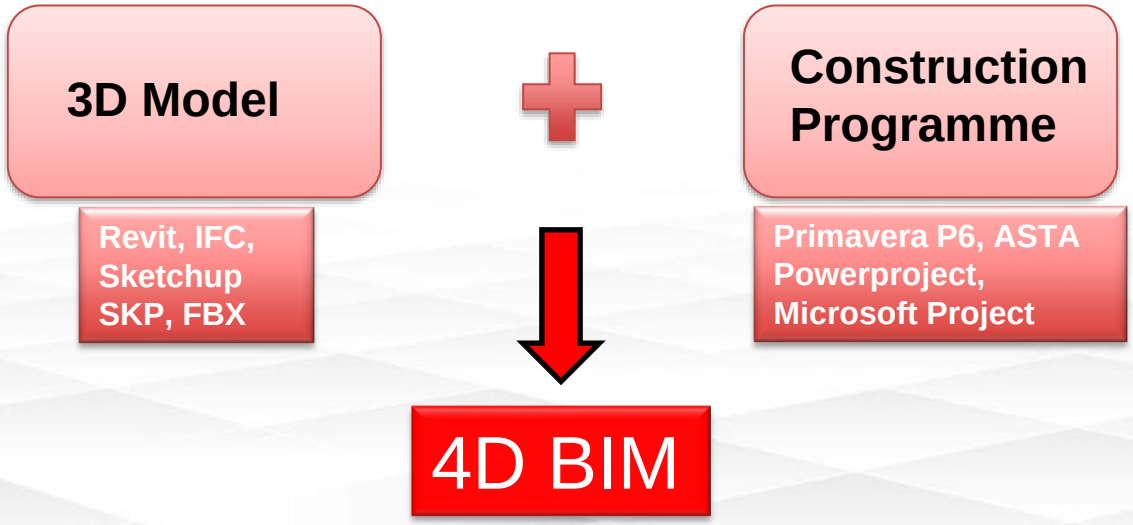
TANTEK4D Clients:

INTRODUCTION TO 4D BIM



What is 4D BIM?

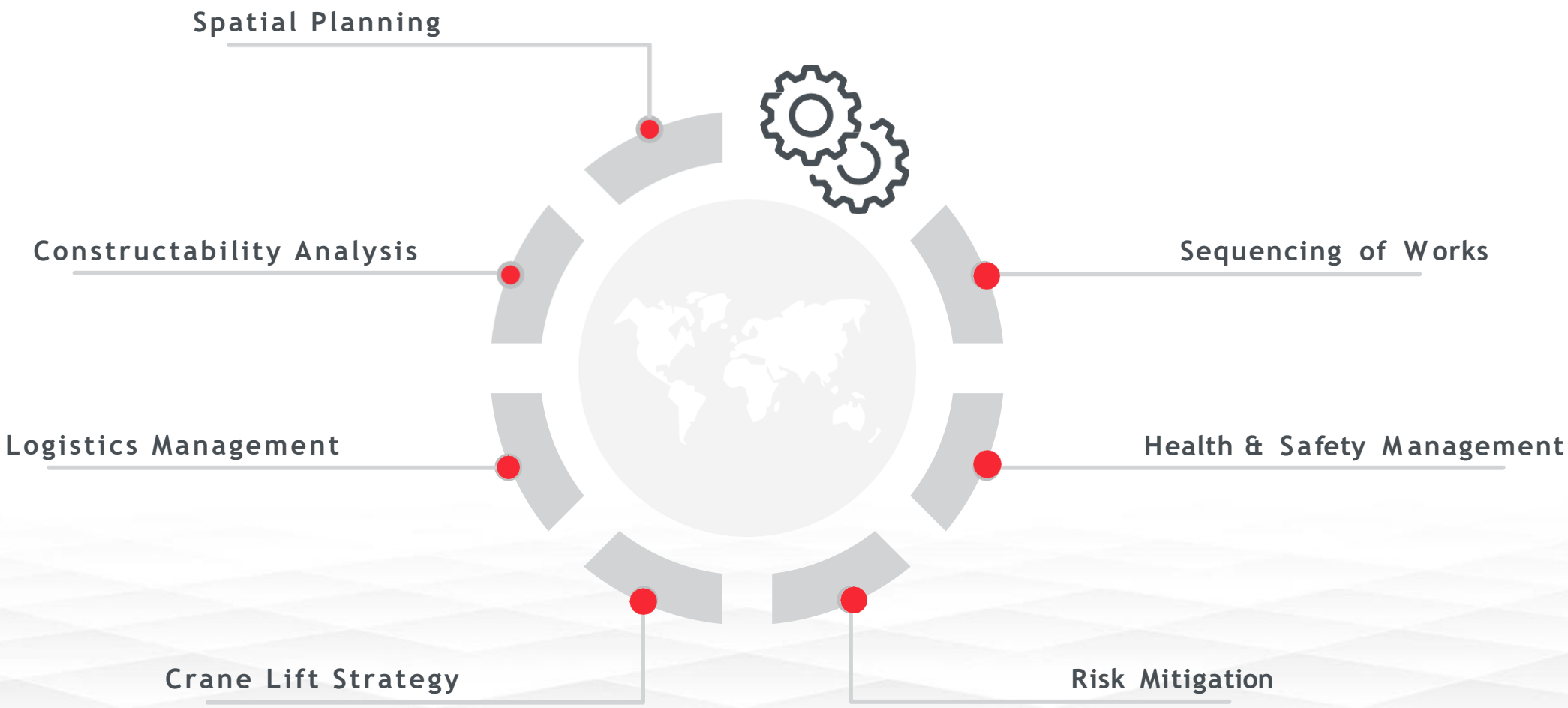
- Is the addition of a fourth dimension, TIME, to a 3D model.
- Consists of linking the construction tasks/activities of works (from Gantt chart generated in different software such as Primavera) to the 3D model.
- There are many software's that can be used for 4D BIM including – Synchro (Bentley Software), ASTA Powerproject BIM or Autodesk Navisworks.



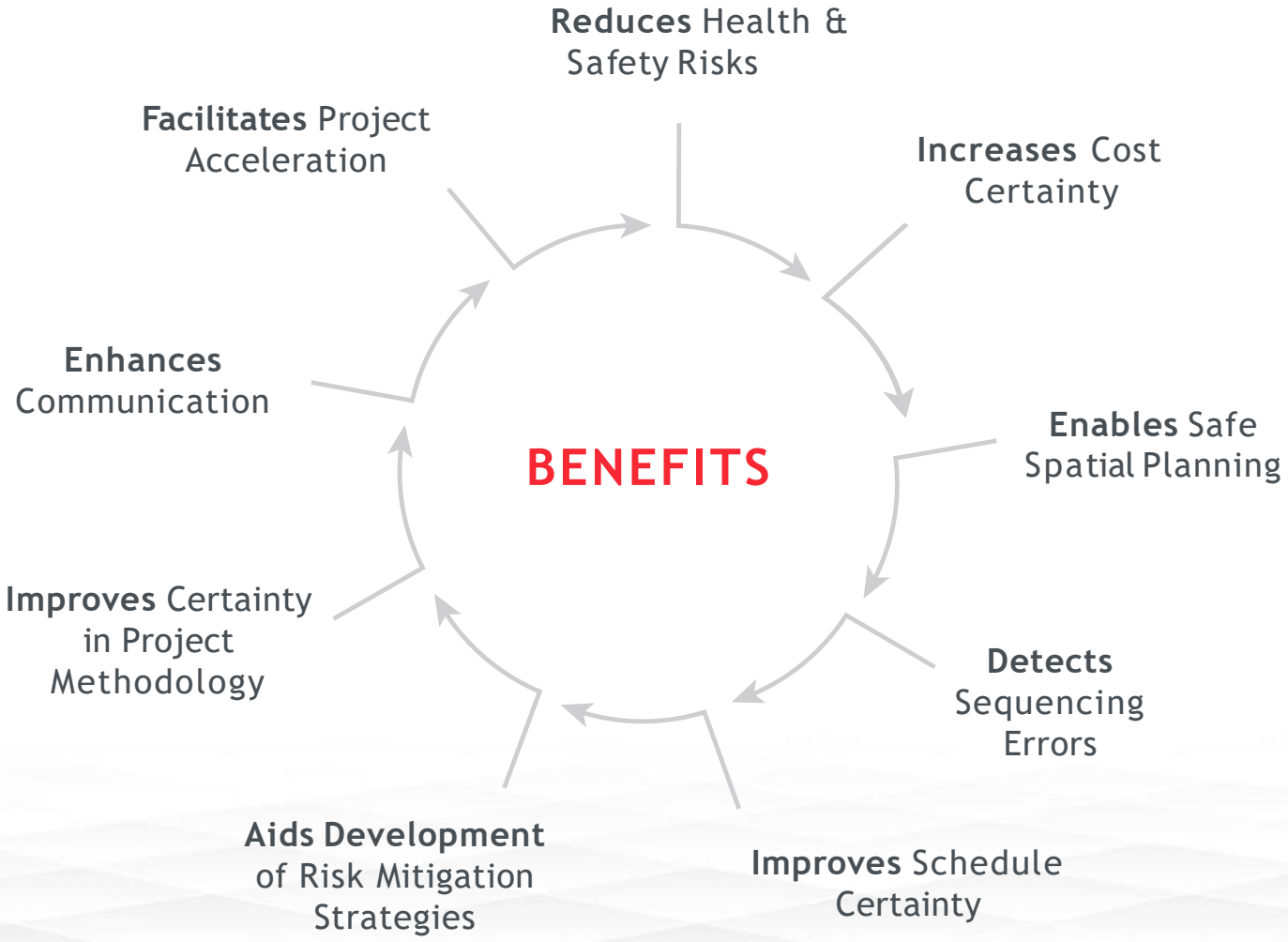
Why 4D BIM?

- It helps to improve planning techniques and visualise construction methodologies
- Helps clients understand complex projects through digital rehearsals of the construction build
- Construction programmes can often cause confusion or misinterpretation as it is impossible for the planner or construction team to visualise every single task or activity. This is where 4D BIM flourish's through digitising the planning process and producing robust project schedules.

Specific Applications of 4D BIM:



Benefits of 4D BIM:



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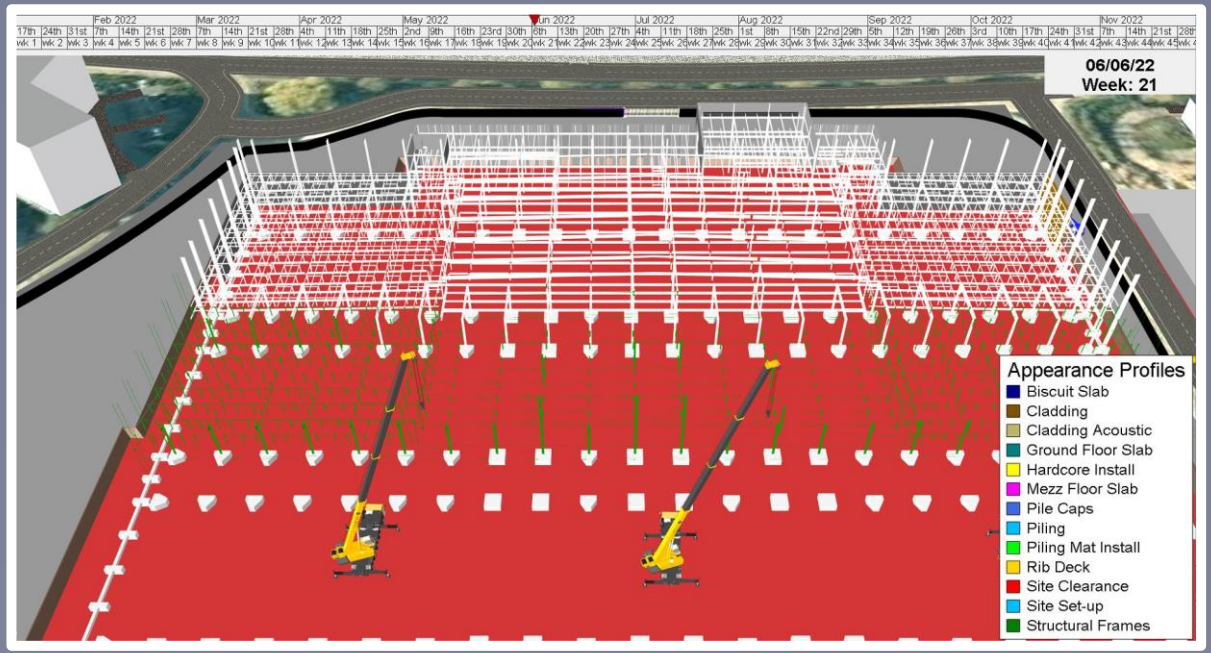
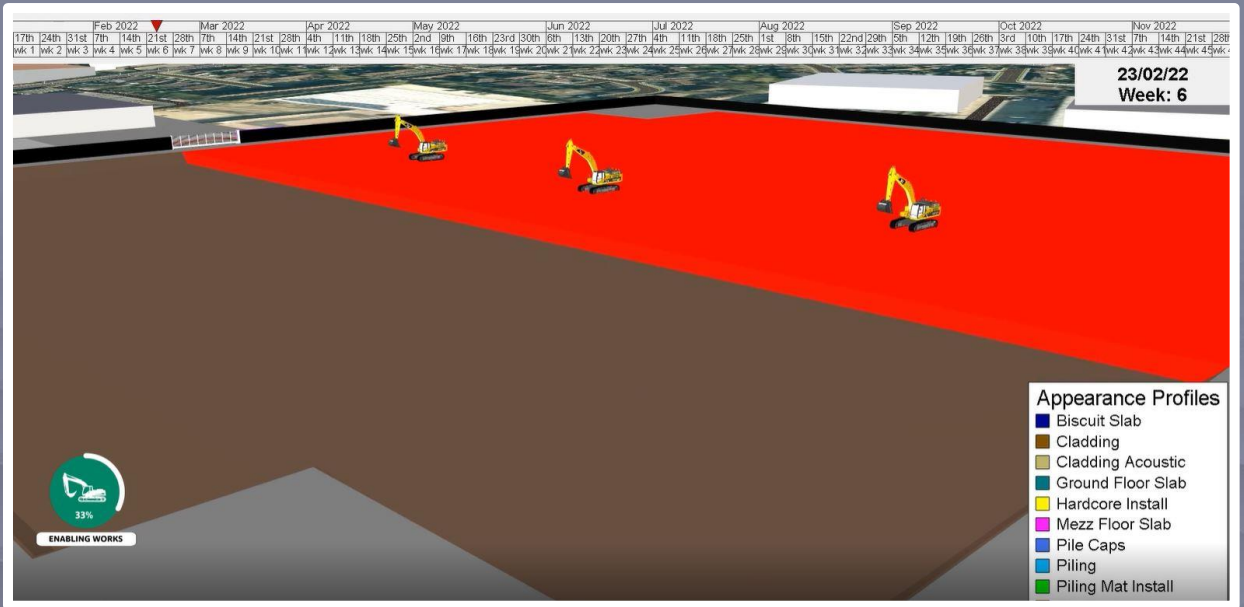
THE USE OF 4D BIM FOR PRE-CONSTRUCTION PLANNING





Using 4D BIM for Pre-Construction Planning:

Traditional Pre-Construction Planning Method:

Before a projects starts on site, project teams get together and put a plan in place for the project. The teams will discuss the project scope, schedule, construction methodologies, resources, budget, health & safety and associated risks. The traditional way of doing this is to review the project 3D models (if available), 2D drawings and associated information in order to understand what they are actually trying to build. The project team will have the model and schedule open and the discussion will take place on the best way to build the project. Misinterpretation starts straight away as the only way someone can explain their methodology is via PDFs and slides.

Digital Pre-Construction Planning Method - 4D BIM:

4D BIM is being used for pre-construction planning in various industries across the AECO sectors. More and more companies are seeing the benefits it entails, including:

- Gives the client, stakeholders and project teams a clear understanding of construction methodologies by digitally rehearsing the project build through a 4D simulation
- Improves certainty in project methodologies
- Improves communication with project teams
- Allows project teams to digitally rehearse site logistics, sequencing, and spatial planning of work groups

4D BIM for Pre-Construction Logistics Planning:

The main purpose of Pre-Construction Logistics Planning is to ensure the successful movement of people and materials around site during the construction as workspace is generally difficult to plan and manage, particularly on congested city centre projects. To alleviate this, 4D BIM can be used to visualise and optimise a number of space-related concerns on projects such as vehicle access/egress routes, storage area layouts, flow of site personnel and the safe operation and movement of construction plant.

4D BIM BENEFITS →

- Improves coordination for the delivery of components & materials on-site
- Permits better planning for loading and unloading operations
- Enables the detailed organisation of assembly operations
- Endorses an efficient site configuration regarding location of facilities & equipment
- Promotes 'Right First Time' approach
- Improves decision making regarding conflicts over space and time
- Enables the optimisation of machinery movement

4D BIM for Pre-Construction Health and Safety:

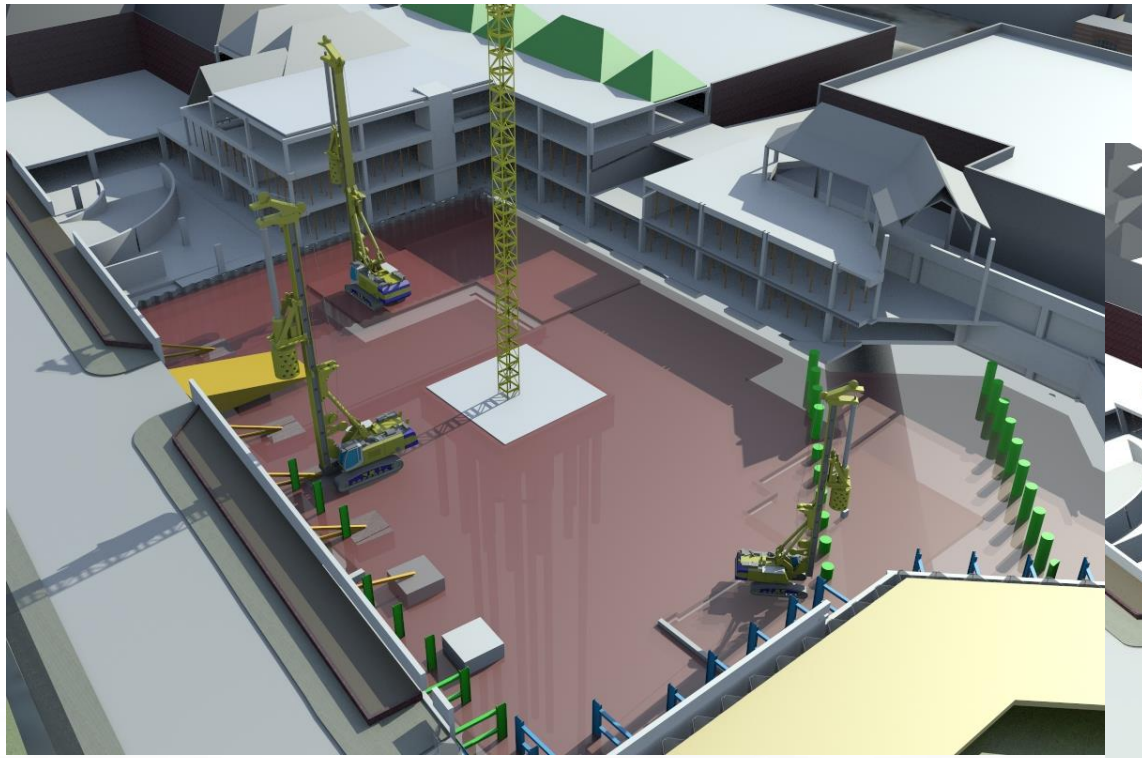
The main purpose of Pre-Construction Health and Safety Planning is to determine the requirements to be followed in order to ensure the safety and welfare of all personnel on site. To aid this, 4D BIM can be used for the continuous monitoring and visualisation of potential safety risks as they evolve on projects.

4D BIM BENEFITS

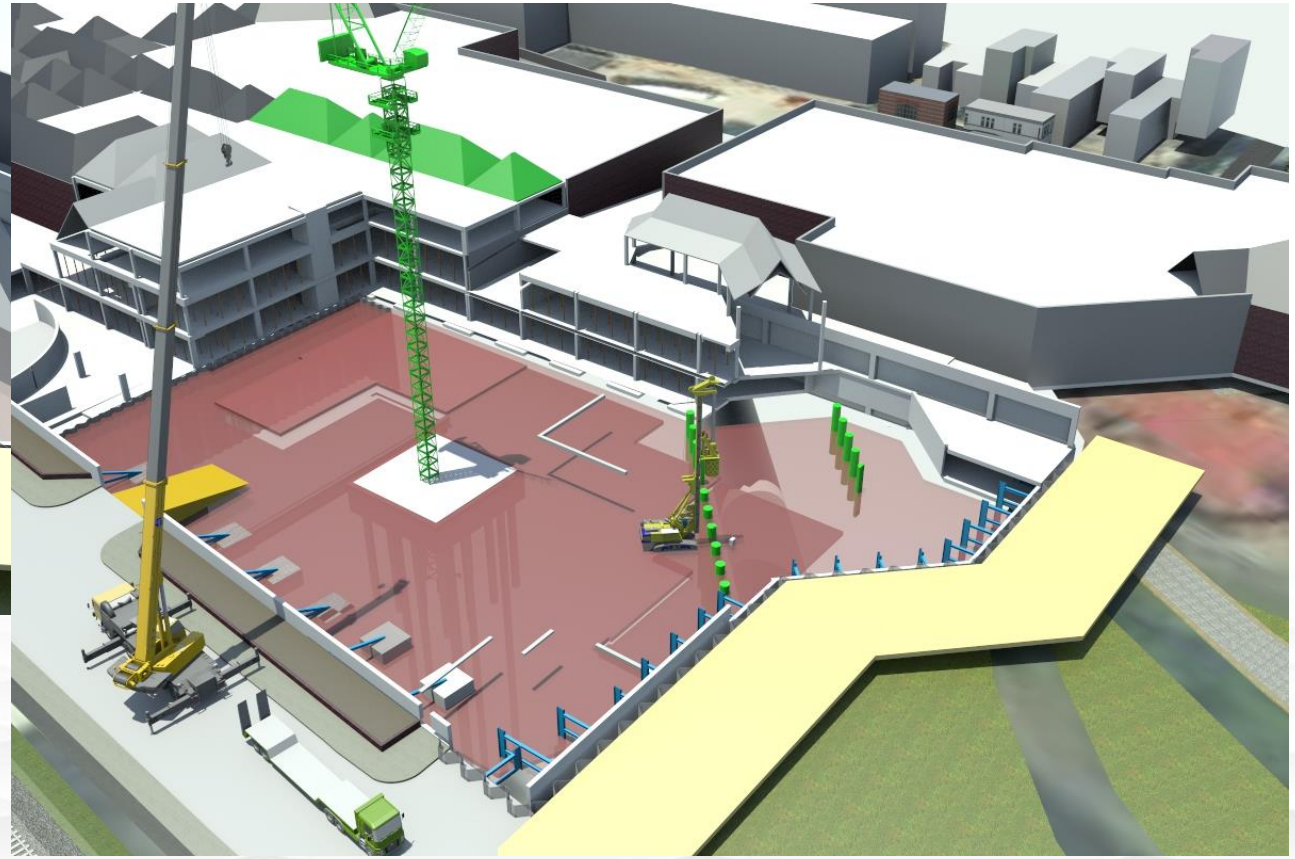
- Enables anticipation of work space clashes over time
- 4D workshops make it easier for the project team to identify & mitigate risks
- Permits the digital illustration of site safety plans and procedures
- Endorses the testing of safety strategies on projects
- Enables the detailed planning of high-risk activities on-site
- Improves the robustness of machinery movement/tracking plans

Project Example – Spatial Planning for Health and Safety:

Spatial Planning of Piling Rig positions during Piling Works



Spatial Planning of Mobile Crane positions during Main Crane erection



4D BIM for Constructability Analysis:

The main purpose of Constructability Analysis is to identify and anticipate possible issues or challenges on the project before it moves on from the design stage to construction stage. Constructability analysis allows design and construction teams to test different design/sequencing alternatives and to identify any time-space conflicts in the 4D model.

Without a digitized constructability analysis, all these issues can cause inaccurate construction sequencing resulting in construction delays, redesigns, and low productivity.

BENEFITS →

- Avoids delays caused by construction sequencing error or omissions
- Reduces rework due to design changes
- Improves productivity as project teams have a robust construction methodology before getting to site
- Reduces administrations and general costs during construction

4D BIM Pre-Construction Planning Workflow:

In order to create a 4D model, your project 3D model and Project Programme need to be linked in the associated 4D software. It is vital that your 4D model is set up correctly from the outset of your project.

Below are some steps involved in the creation of your 4D model:

1. Review your 3D model to ensure that there is an adequate level of detail/information/attributes and that all elements which are included in your programme have a suitable model identity/activity code.

2. Once your review is complete, the 3D model can be imported into the 4D software. It is advised that you import separate individual models for different disciplines e.g. M&E, Architectural, Structural etc.

3. Import your project programme from your scheduling software. The file format of your program will depend on the 4D software that you are using. It is vital when importing your project programme that all your programme information is seamlessly integrated, including task I.D, resources and associated costs.

4. Once the 3D model and project programme are integrated into the 4D software, model elements can then be linked directly to the associated programme tasks in order to produce a 4D timeline.

5. Following completion of the 4D timeline, a video output of the simulation can then be produced. The structure/layout of the video output will depend on the client/project requirements, but generally includes; a timeline bar, 4D simulation window, week no./date tab, and Gantt chart.

Thank You

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