



Virtual Project Controls & BIM: The site application to a collaborative Building Information Modeling Process

21th October 2021



Agenda

- 01 Linesight Digital Strategy & Roadmap
- 02 Virtual Project Controls Discussion
- 03 Site records
- 04 Summary
- 05 Questions

Linesight Digital Strategy & Roadmap

Plans, targets, roadmap, future state

Our Experience

VPC & BIM throughout the Project Lifecycle



Single source of truth

- Must Meet all participants needs
- BIM Process
- Digital Cost Analysis
- Virtual Site integration
- Software & Hardware Development
- Learning Materials
- Training
- Common data environments
- ISO 19650
- Digital Twin Development
- Digital Record keeping
- EIR standards - client consultancy services
- Site Mobile Applications
- Models to site



Common Data Environment

- Why use a common data environment?

One source of truth

Accessible to all parties

Controlled submissions

Stage and Gateway structured

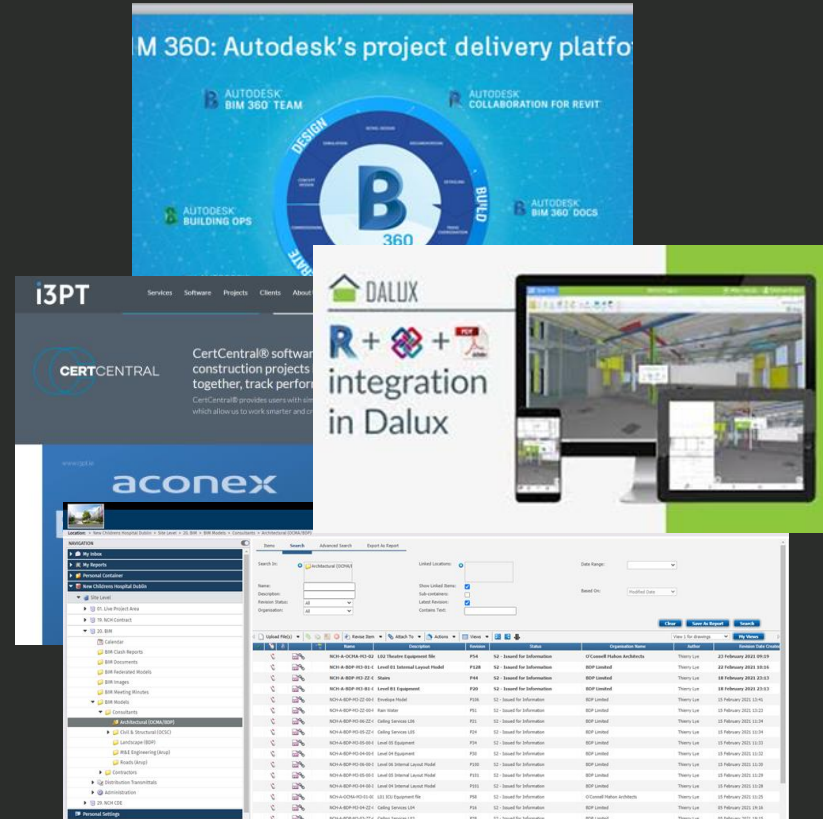
- What does it do?

Cloud-based system.

Fosters Collaborative working

Acts as a Data repository

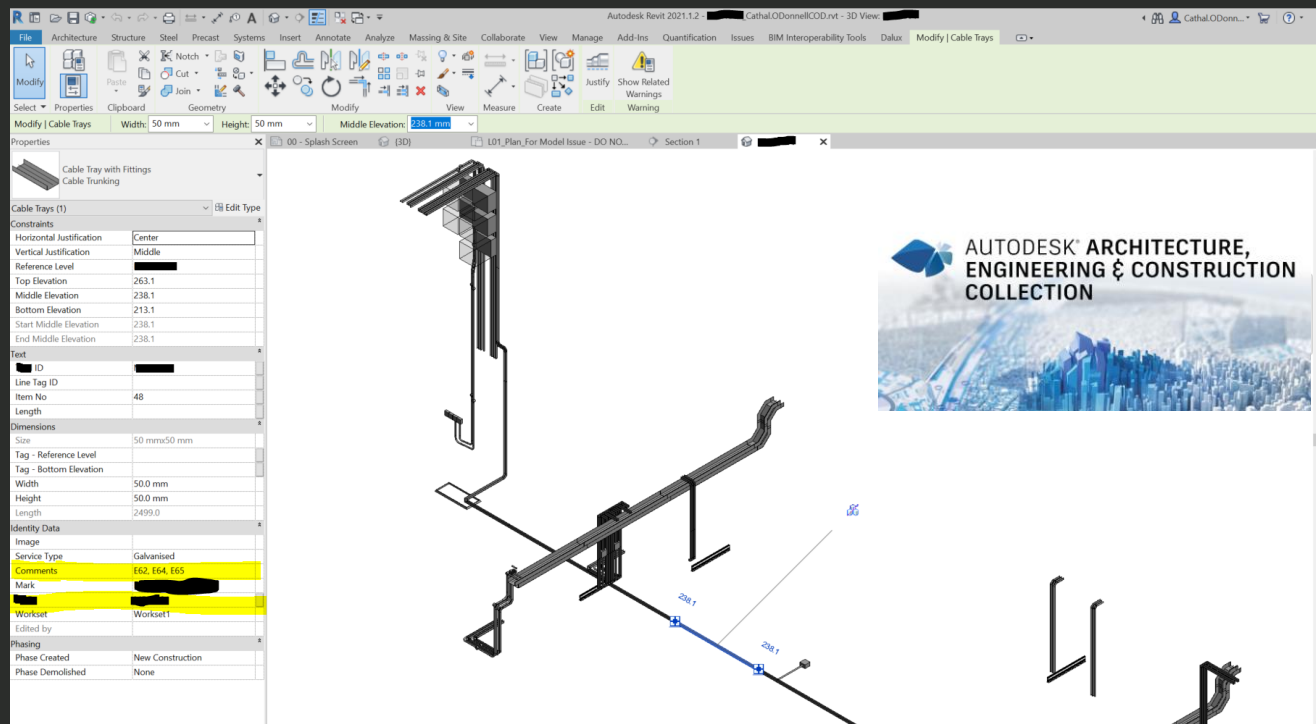
Source of data for FM



Revit workflow

Native model QSID / QS Coding Input

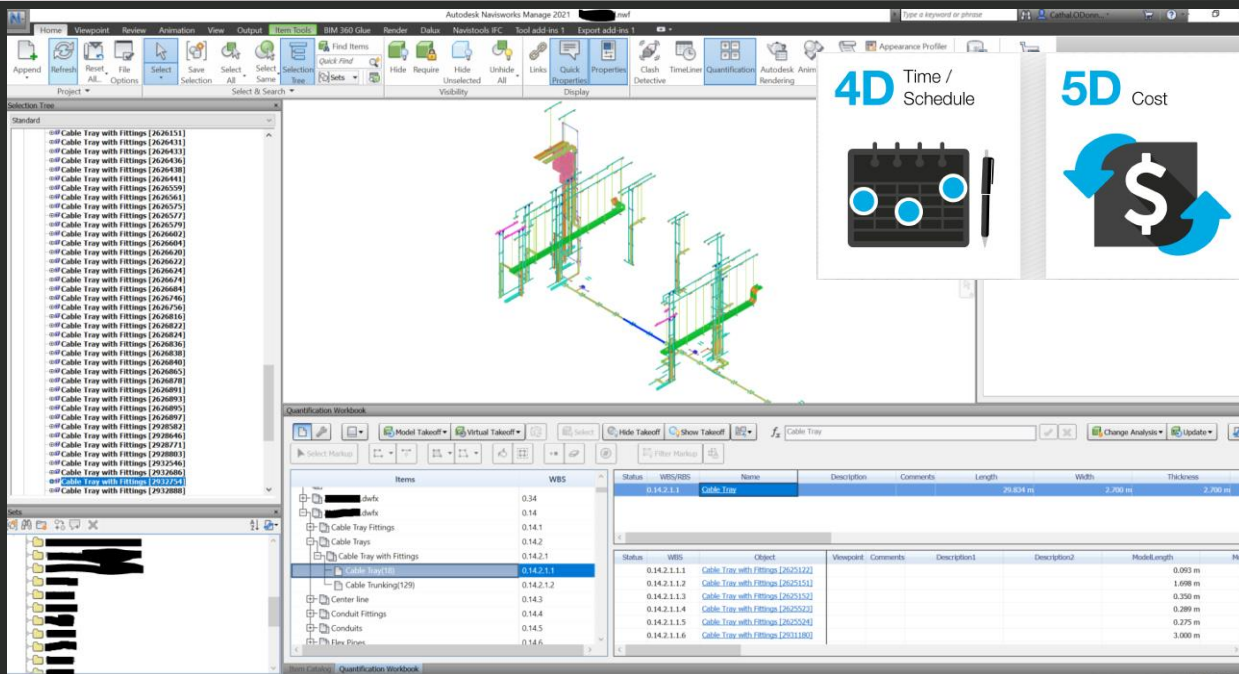
- Contractors & Designers use Uniclass to code elements
- Quantity surveyors / estimators use Cost codes to organise & measure elements
- Collaborative design stage access to native format models allows early input to suite Linesight's / client's needs



Model checks

Data, Co-ordination & Quantities

- Mutable model measurement tools for cross checking quantities
 1. Revit (Schedules)
 2. Navisworks (Quantification)
 3. iTwo-CostX (Quantities & Costs)
- Confidence in measure using models with 2D output from models for backup and detail / spec

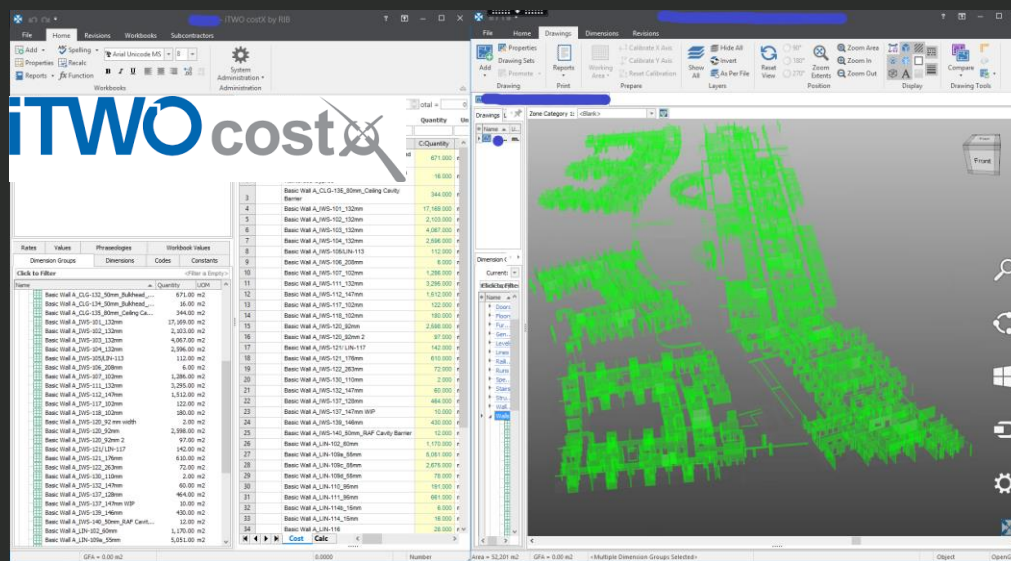


The screenshot displays the Autodesk Navisworks Manage 2011 interface. The main window shows a 3D model of a cable tray system with various components highlighted in green and yellow. The interface includes a ribbon menu at the top with options like Append, Refresh, Reset, File, Options, Select, Save, Select All, Selection, Selection Tree, Hide, Require, Hide Unselected, Unhide All, Links, Quick Properties, Properties, Clash, Timeline, Quantification, Autodesk Anim, and Appearance Profiler. On the right side, there are two panels: '4D Time / Schedule' with a calendar icon and '5D Cost' with a dollar sign icon and circular arrows. Below the 3D model, the 'Quantification Workbook' is open, showing a tree view of items and a table of quantification data.

Items	WBS	Status	WBS/RIS	Name	Description	Comments	Length	WBS	Thickness
0.14.2.1.1	0.14.2.1.1	0.14.2.1.1	0.14.2.1.1	Cable Tray			20,824 m	2,200 m	2,200 m
0.14.2.1.1.1	0.14.2.1.1.1	0.14.2.1.1.1	0.14.2.1.1.1	Cable Tray with Fittings					0.093 m
0.14.2.1.1.2	0.14.2.1.1.2	0.14.2.1.1.2	0.14.2.1.1.2	Cable Tray with Fittings					1.098 m
0.14.2.1.1.3	0.14.2.1.1.3	0.14.2.1.1.3	0.14.2.1.1.3	Cable Tray with Fittings					0.390 m
0.14.2.1.1.4	0.14.2.1.1.4	0.14.2.1.1.4	0.14.2.1.1.4	Cable Tray with Fittings					0.289 m
0.14.2.1.1.5	0.14.2.1.1.5	0.14.2.1.1.5	0.14.2.1.1.5	Cable Tray with Fittings					0.275 m
0.14.2.1.1.6	0.14.2.1.1.6	0.14.2.1.1.6	0.14.2.1.1.6	Cable Tray with Fittings					3.000 m

Model Measurement

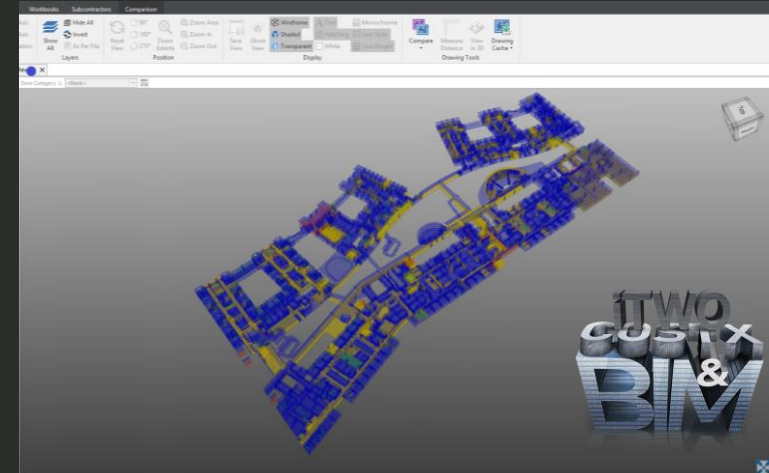
Quantity extraction with Applied Rates



The screenshot displays the iTWO costX software interface. On the left, a 3D model of a building structure is shown in green. On the right, a detailed quantity schedule table is visible, listing various construction elements and their corresponding quantities and costs.

Item	Quantity	Cost
Basic Wall A_C1G-13L_30mm_Calky Cavity	344.000 m2	18.000
Basic Wall A_W95-107_132mm	17.568.000 m2	2.523.000
Basic Wall A_W95-102_132mm	6.967.000 m2	2.056.000
Basic Wall A_W95-104_132mm	112.000 m2	6.897.000
Basic Wall A_W95-106_132mm	112.000 m2	6.897.000
Basic Wall A_W95-108(Lin-17)	142.000 m2	11.200.000
Basic Wall A_W95-102_200mm	1.298.000 m2	8.000
Basic Wall A_W95-107_102mm	1.298.000 m2	8.000
Basic Wall A_W95-111_132mm	3.296.000 m2	12.000
Basic Wall A_W95-112_147mm	1.612.000 m2	12.000
Basic Wall A_W95-117_132mm	122.000 m2	12.000
Basic Wall A_W95-116_132mm	190.000 m2	12.000
Basic Wall A_W95-102_200mm	2.868.000 m2	12.000
Basic Wall A_W95-120_30mm-2	37.000 m2	3.000
Basic Wall A_W95-121(Lin-17)	142.000 m2	11.200.000
Basic Wall A_W95-121_116mm	610.000 m2	6.000
Basic Wall A_W95-122_283mm	72.000 m2	7.000
Basic Wall A_W95-130_110mm	2.000 m2	2.000
Basic Wall A_W95-132_147mm	462.000 m2	4.000
Basic Wall A_W95-137_130mm	484.000 m2	4.000
Basic Wall A_W95-137_147mm WSP	10.000 m2	10.000
Basic Wall A_W95-138_146mm	420.000 m2	4.000
Basic Wall A_W95-142_30mm_BAF Cavity Barrier	12.000 m2	12.000
Basic Wall A_Lin-102_80mm	1.170.000 m2	1.170.000
Basic Wall A_Lin-106_35mm	5.000 m2	5.000
Basic Wall A_Lin-106_55mm	2.075.000 m2	2.075.000
Basic Wall A_Lin-106_55mm	79.000 m2	79.000
Basic Wall A_Lin-110_200mm	192.000 m2	192.000
Basic Wall A_Lin-111_35mm	461.000 m2	4.000
Basic Wall A_Lin-114_15mm	6.000 m2	6.000
Basic Wall A_Lin-114_15mm	162.000 m2	162.000
Basic Wall A_Lin-116	28.000 m2	28.000

- Dynamic Model Revision comparison used to track design & construction changes throughout project lifecycle



The screenshot displays the iTWO costX software interface. On the left, a 3D model of a building structure is shown in blue and yellow. On the right, a detailed quantity schedule table is visible, listing various construction elements and their corresponding quantities and costs.

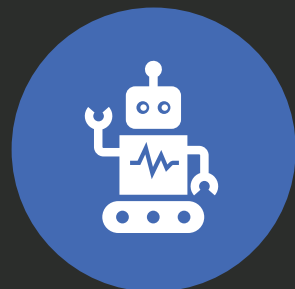
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Basic Wall A_Lin-114_15mm	6.000 m2	6.000
Basic Wall A_Lin-114_15mm	162.000 m2	162.000
Basic Wall A_Lin-116	28.000 m2	28.000

- Model quantity extraction via element classification or pre-coded QSID's for quicker structured information driven by predefined rates

Virtual Project Controls Discussion

Project data collation





1

**Data
Centralisation**

Improve data storage | increase usage

2

Project Platform

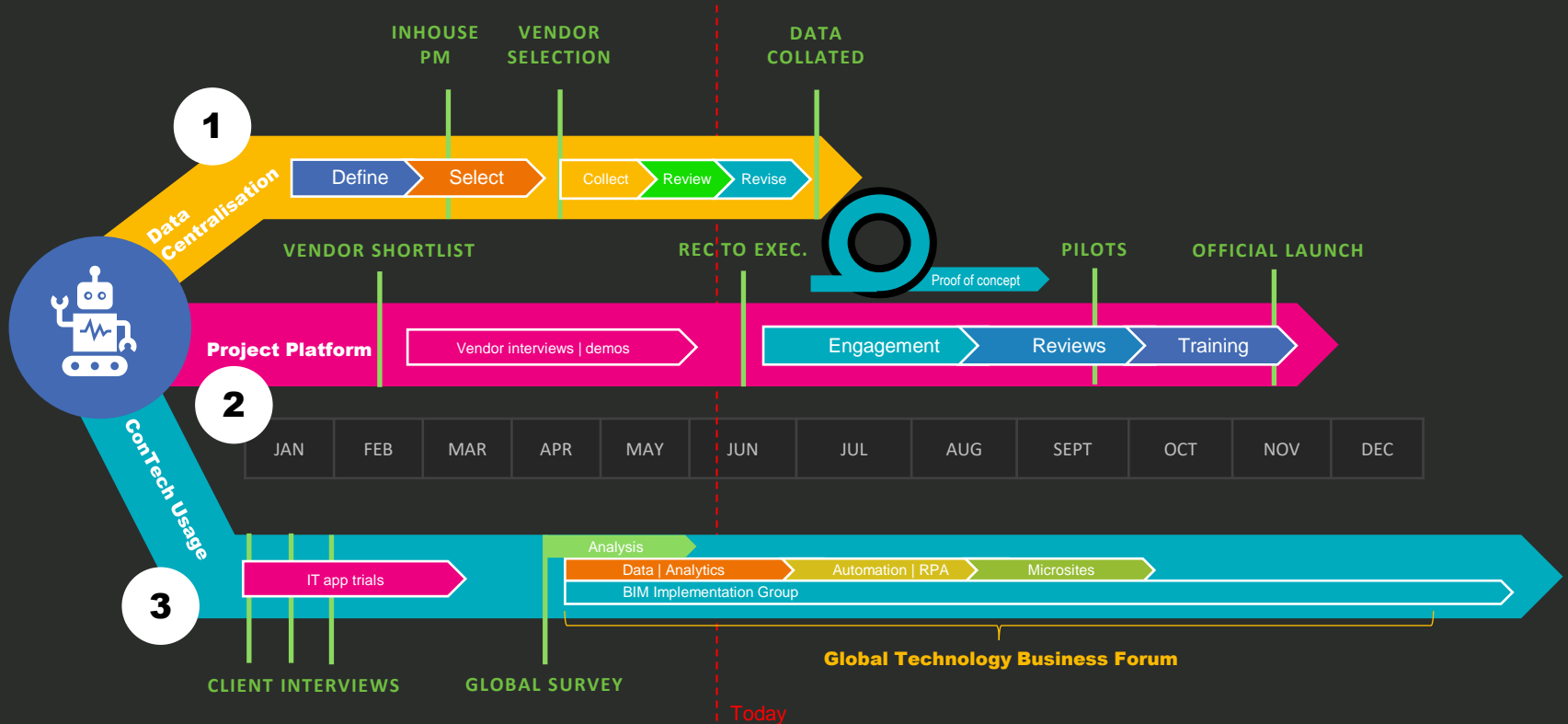
Improve consistency + standardisation

3

ConTech Usage

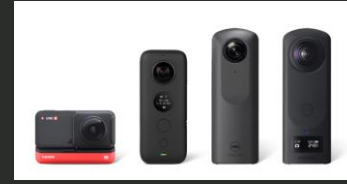
Increase adoption levels; identify new

Digitization : 2021 Plan

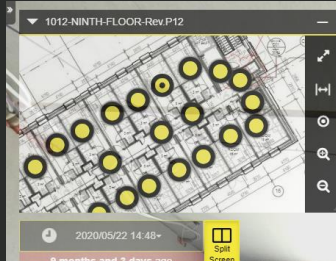


Site records

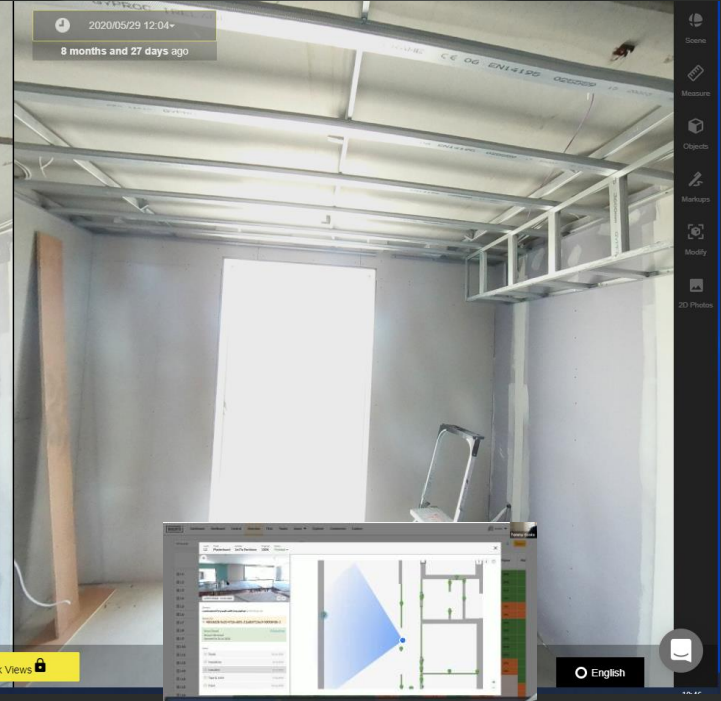
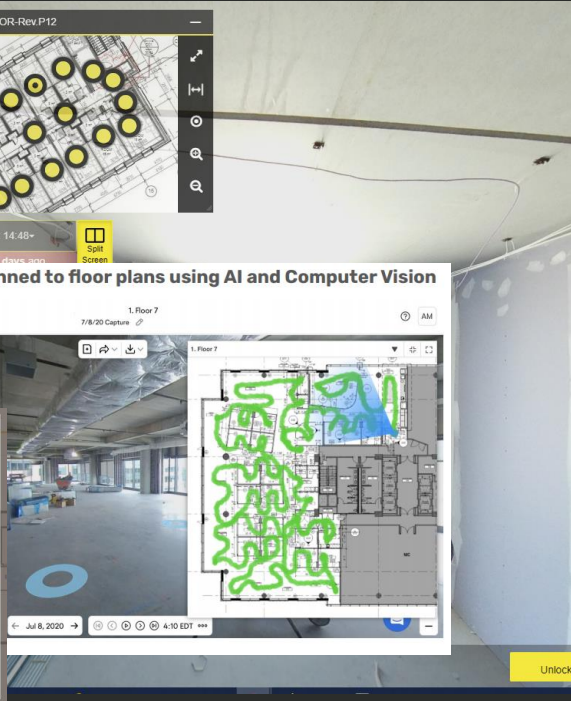
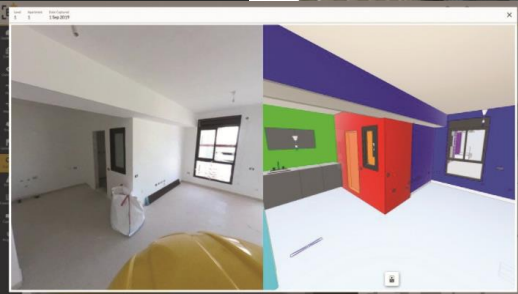
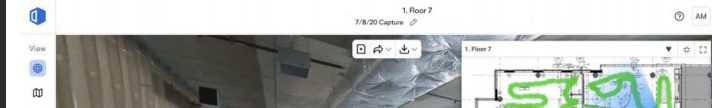
360 Site Progress Photos



- HoloBuilder
- **Open Space**
- Buildots



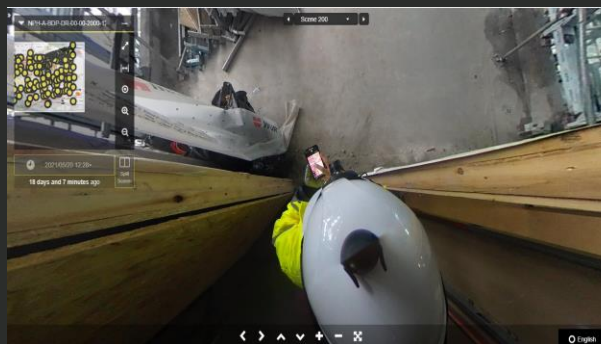
360 Photos Automatically Pinned to floor plans using AI and Computer Vision



Our Experience II

Digitisation in Digital Site Inspections

- Currently engaged during the post contract cost support for a government organisation
- Proposed utilising new methodizes of cost support on the project
- Implemented several new technologies for digital site inspections:
 - Insta 360 Camera – Virtual Inspections
 - Mixed and augmented reality (MR/AR)
 - Model vs Site progress



Our Experience II

Digitization: Digital Site Inspection



HoloBuilder App



360° Camera



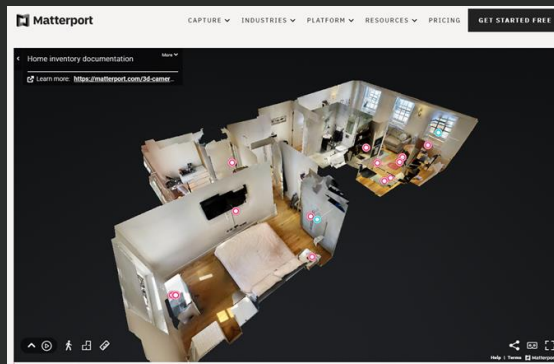
Picking up the actual



- How do we collect it?

Lots of different technology is now been used to record complex tasks

- Point clouds
- Photogrammetry
- Lidar scanning
- 360° photos & video progress
- AR VR & Mixed reality overlays



- Who can access and contribute the material?

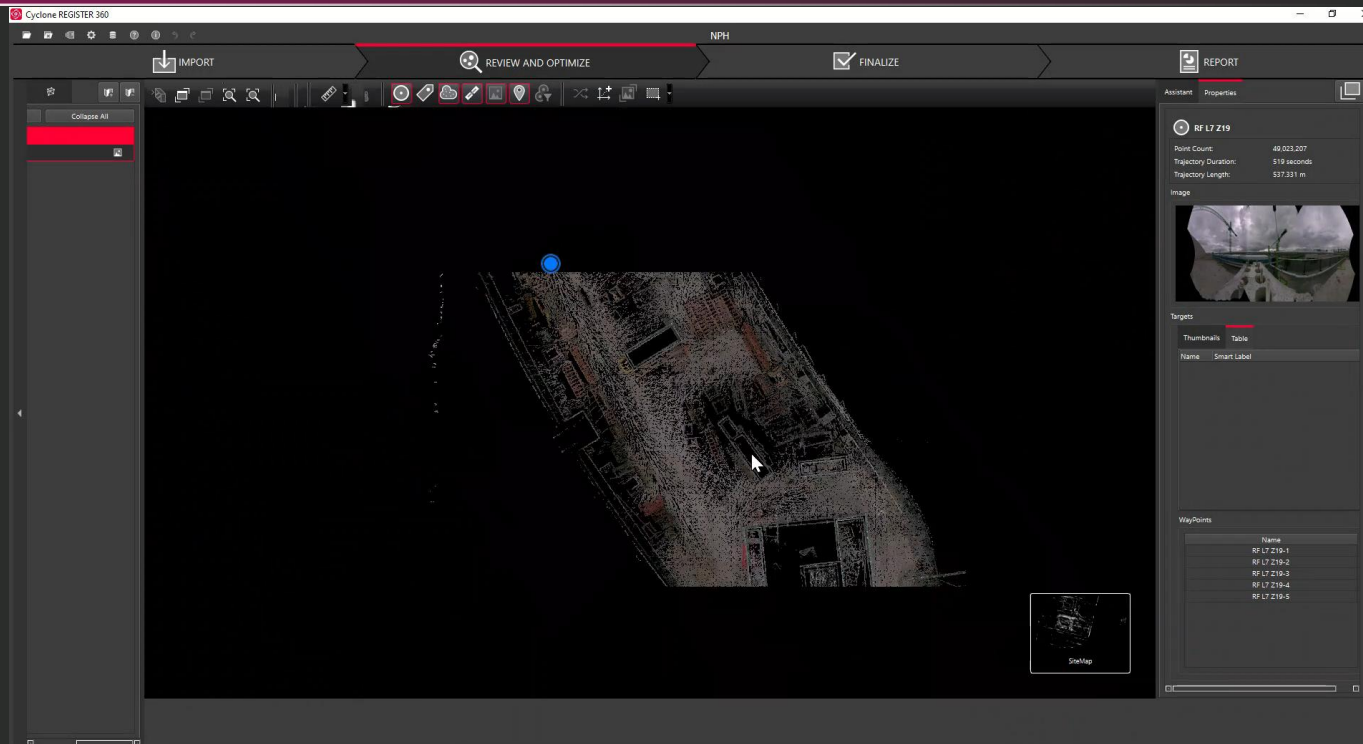
In the main this is left to the contractor but it should not solei lie with them.

Recordors are needed to be maintained by the receiver of the asset.

Our Experience II

Use case: Point cloud Surveys (BLK2Go Scanner)

- Point cloud was used on a live project to assess the effectiveness of site validation for PM & CM services within Linesight & for our Clients



Our Experience II

Specific examples



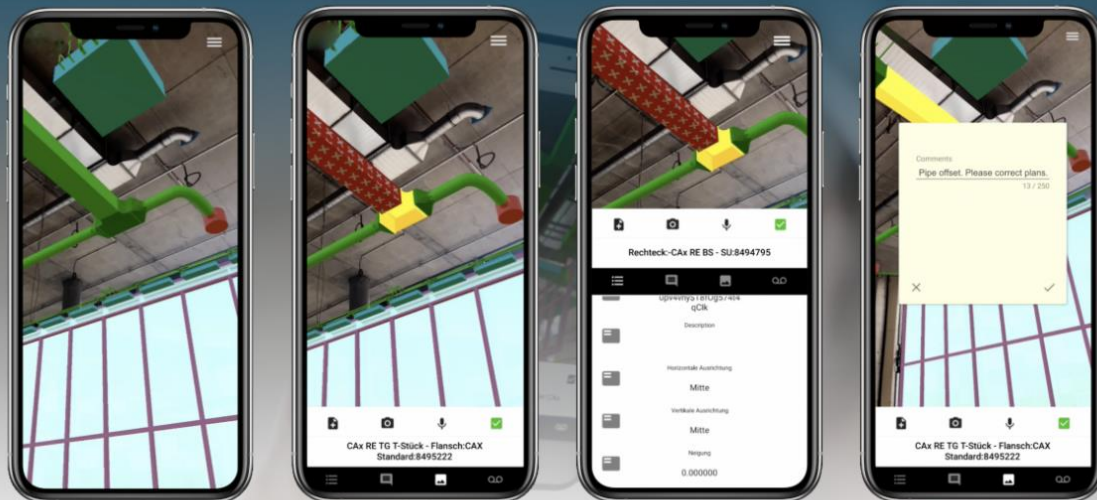
 Matterport™



Our Experience II

Specific examples

GAMMA AR



Our Experience II

Digitisation in Digital Site Inspections



Compliance with the digital plan

- Is there a need for Contractor and client to double up on the collection of data.

The parties collect records for differing purposes one for compliance and the other for use.

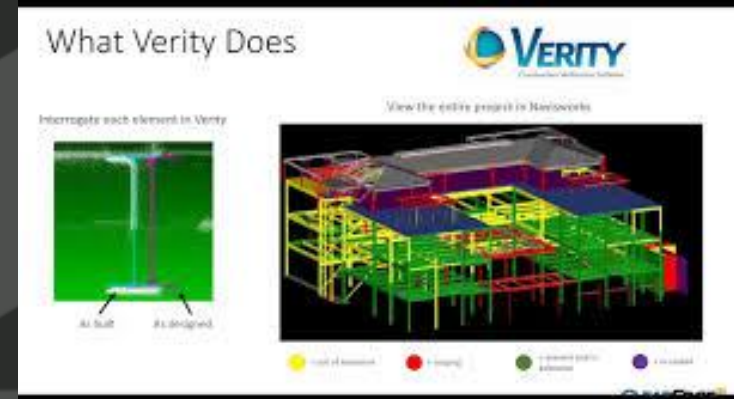
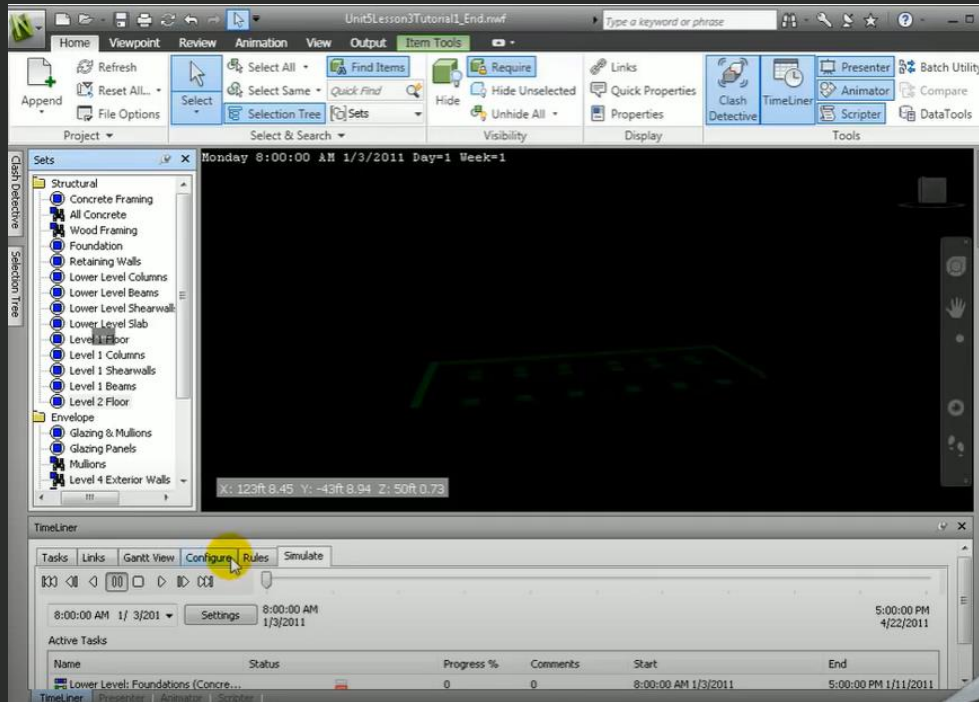
For the contractor the issue is to deliver and prove the quality of the deliverable

For the Client the issue is this what I asked for and what I expected



Reporting

Program & Model linking & why



If you can't see it, you can't count it

- Show and tell

Effective reporting using the BIM is a requirement as lots of data needs a structured output to make sense.

- How do we prove the concept of the benefits of using the BIM Process

Running data analysis on mutable projects based on common properties can yield great insights and compare traditional workflows to the new systems

- Is the model to be used as the Proof going forward
A combination approach is required



Digital Twin's

- The digital Twin and who will use it ?

For the user of the facility but built on by the AEC team

- Why do we need a model at all when we have a CDE?

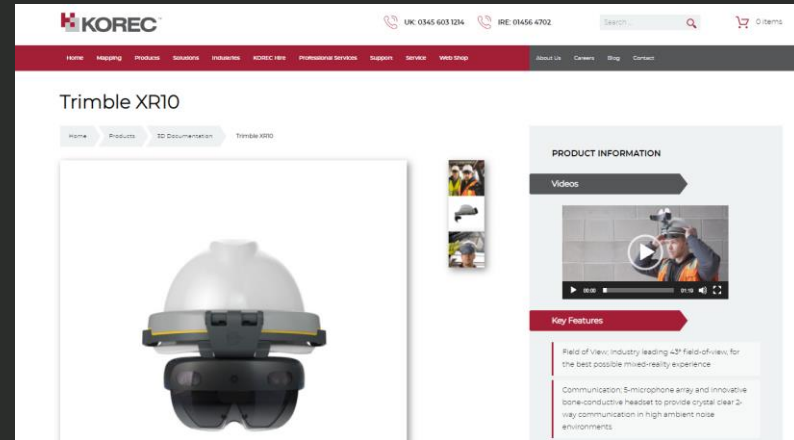
The information needs a container and making that container an actual representation on the object makes it visible to all.

- How do members view the output without expensive software

The CDE needs a simple access viewer for all to use.

- How do we design the system to make it accessible to all (what do you really need)

Front end viewer to linked data within the BIM Process



The Assets

- What role have the industry suppliers

As they come to the table late this leads to the most important data been cobbled together at the end.

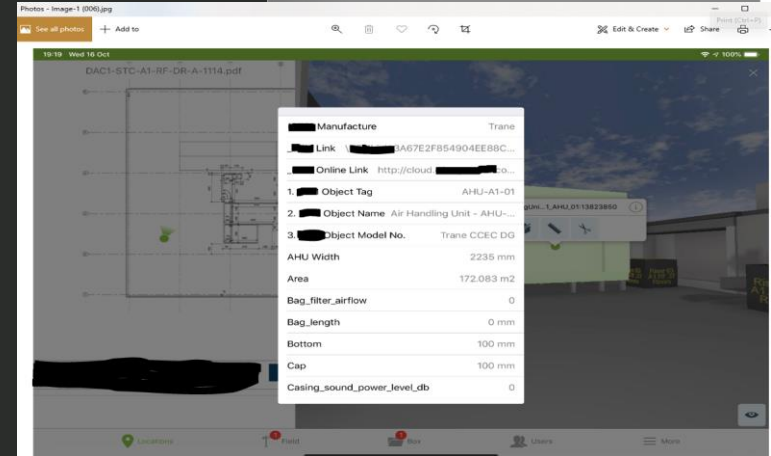
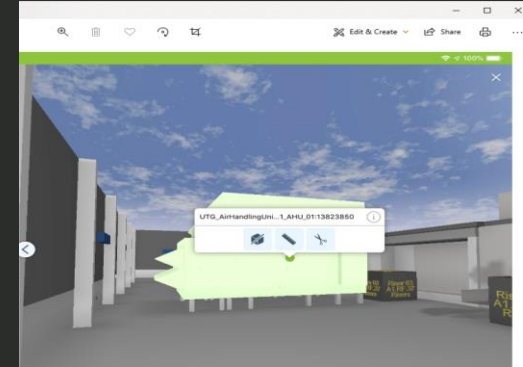
Would it be better to engage with stage 5 detail in the Digital pre-construction design?

- Do they understand what is needed by who and why?

AEC workflows are Often not a main consideration of manufactures & suppliers. Repeat business is though.

- How accurate do we want our digital twin?

Accurate from the start or spend time at the end, it's up to you



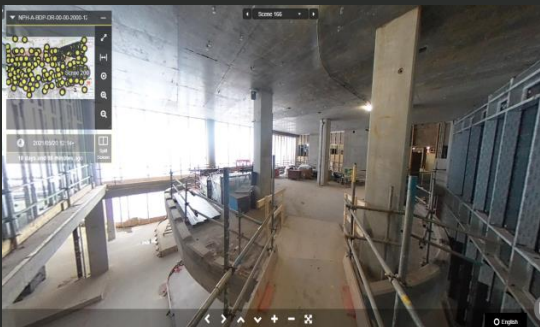
Summary

Our Experience II

Digitisation in Digital Site Inspections

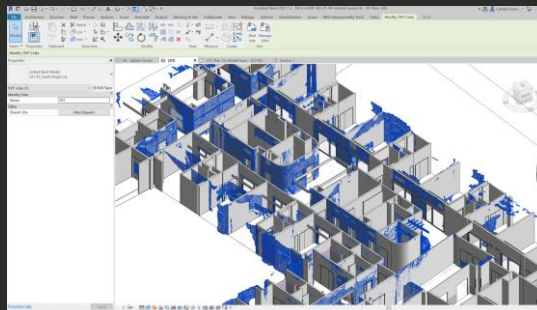
360° Camera's
(HoloBuilder)

Virtual Inspections to maintain full
audit trail during the works



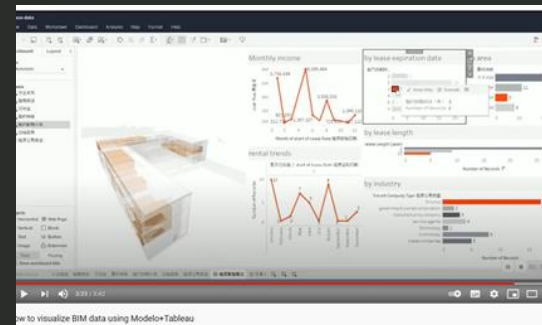
Lidar & Point cloud Model checking
(Autodesk)

Installed v Designed conditions for
progress reports and valuations



Dashboard Report's
(iTwo-CostX to Tableau & Power BI)

Cost & progress reports linked to
BIM viewer to show key deliverables
are met



Questions?

Thank you