

# AI and BIM Enabled Cost and CO2 Estimating – The important first step for Designing the City of Tomorrow



Tolis Chatzisyneon  
CEO at Nomitech



**nomitech**  
New Open Mind Technologies

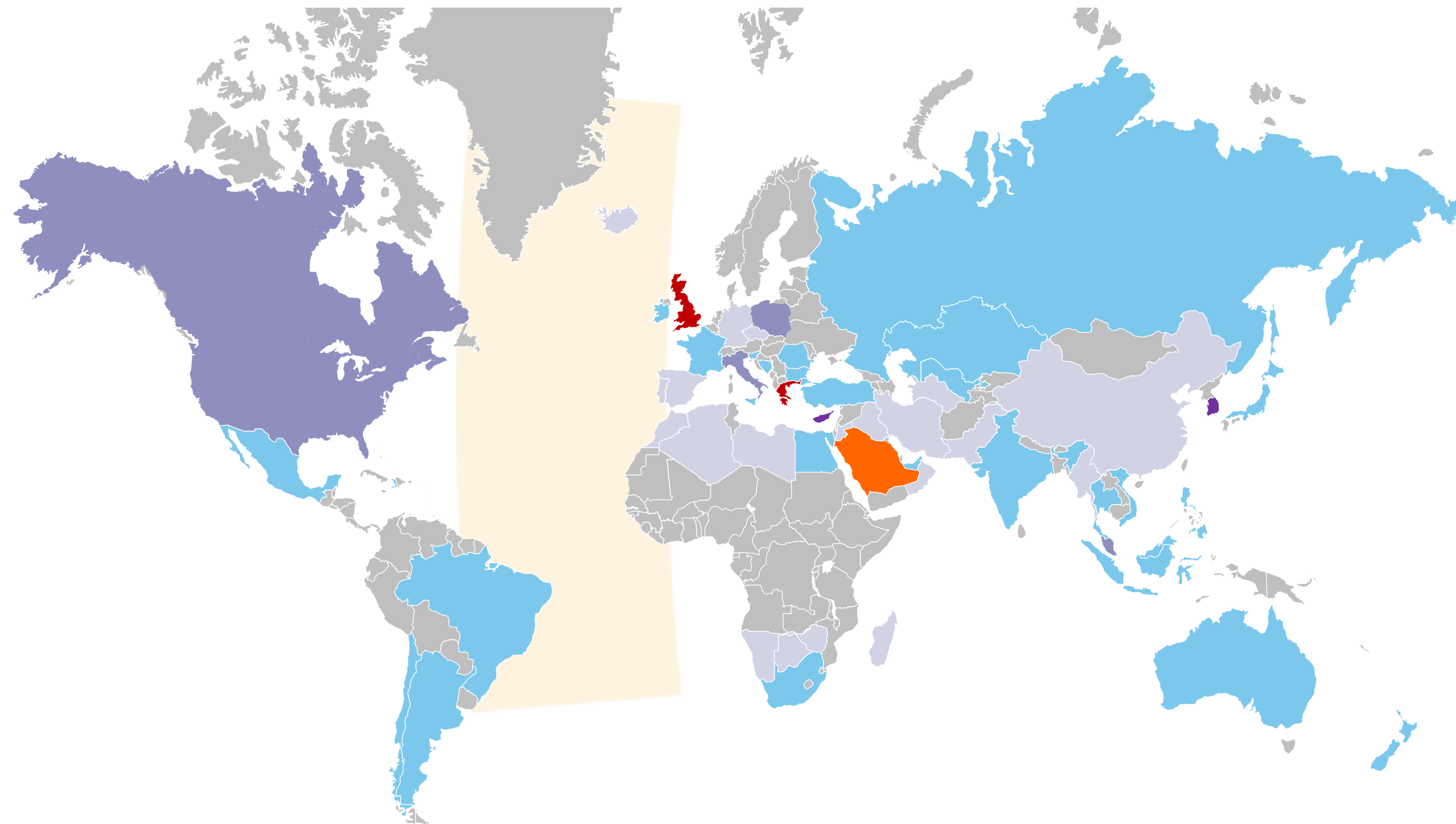
Tolis Chatzisyneon, CEO



**SPEAKER**  
Tolis Chatzisyneon

# Our Presence

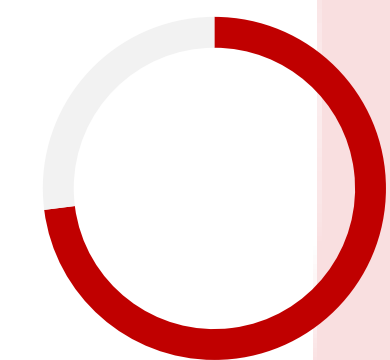
Nomitech operates through a Global Partner Network



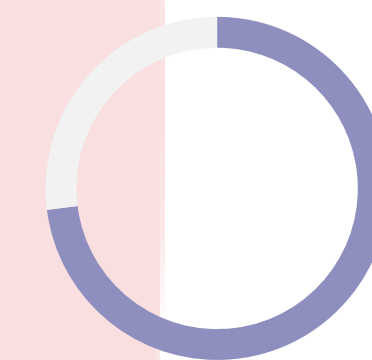
Our Partner network grows rapidly through Nomitech or our strategic partners

Nomitech is incorporated in the UK and Greece and licensed in KSA

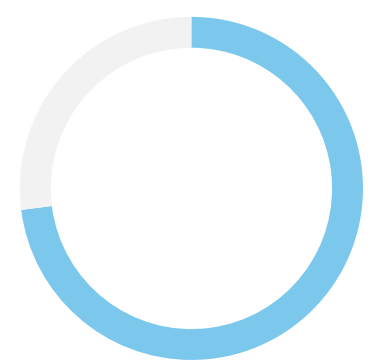
## Coverage Type



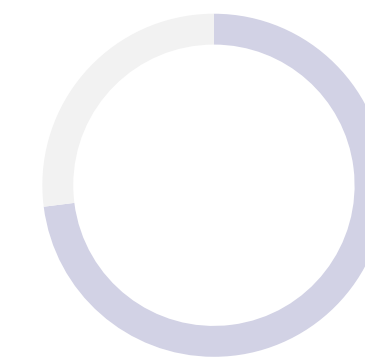
Company  
Incorporation



Strategic  
Partner or VAD  
Base



Nomitech  
Partner



Partner  
under VAD



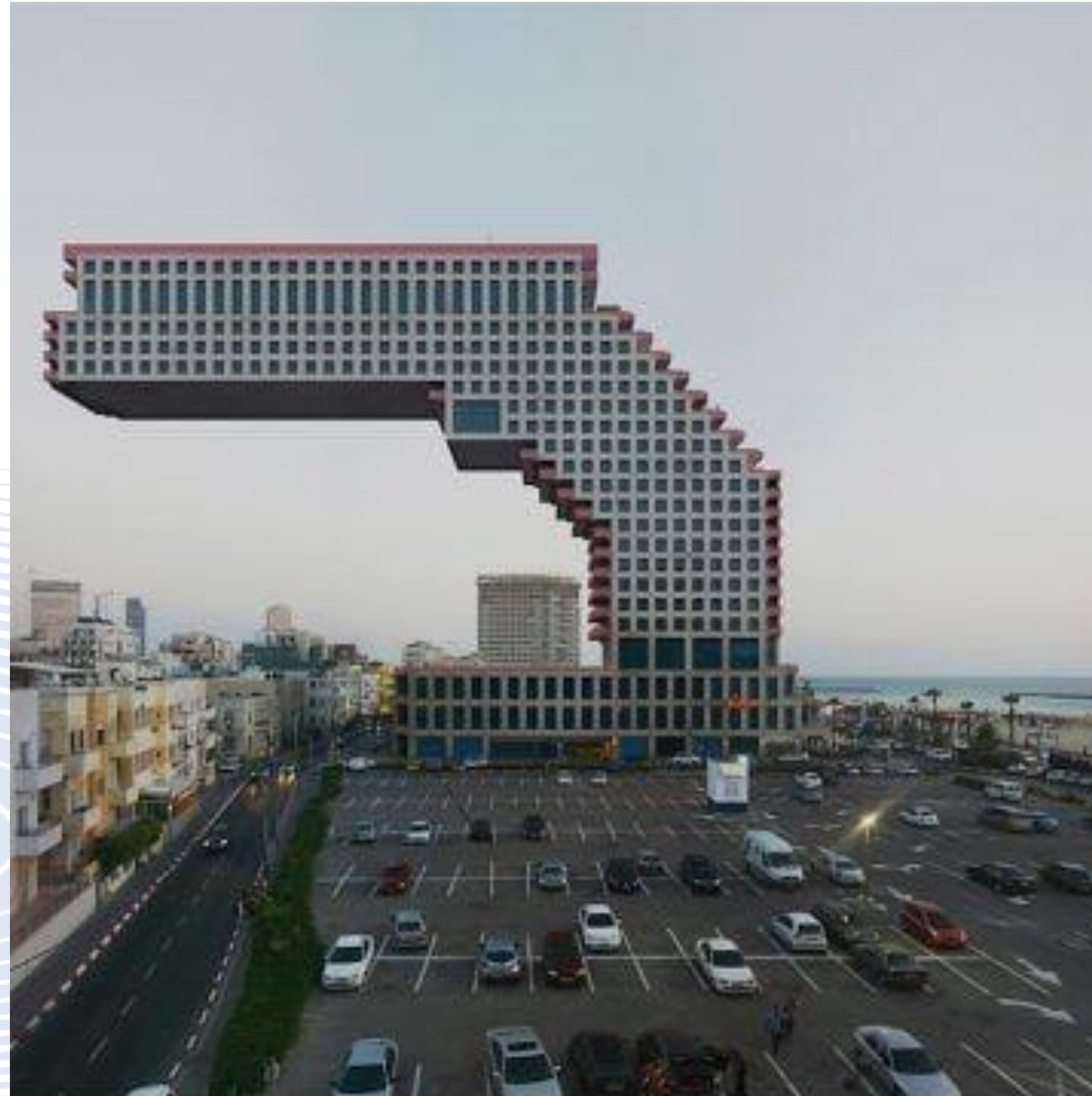
# Estimating ?

## Maybe not... here are some Human Intelligence tips:

1. You can use Cost per M2 from experience

2. You know the total Area and Volume of the building

3. Rough figures OK for Construction  
It is not like Automotive Industry!



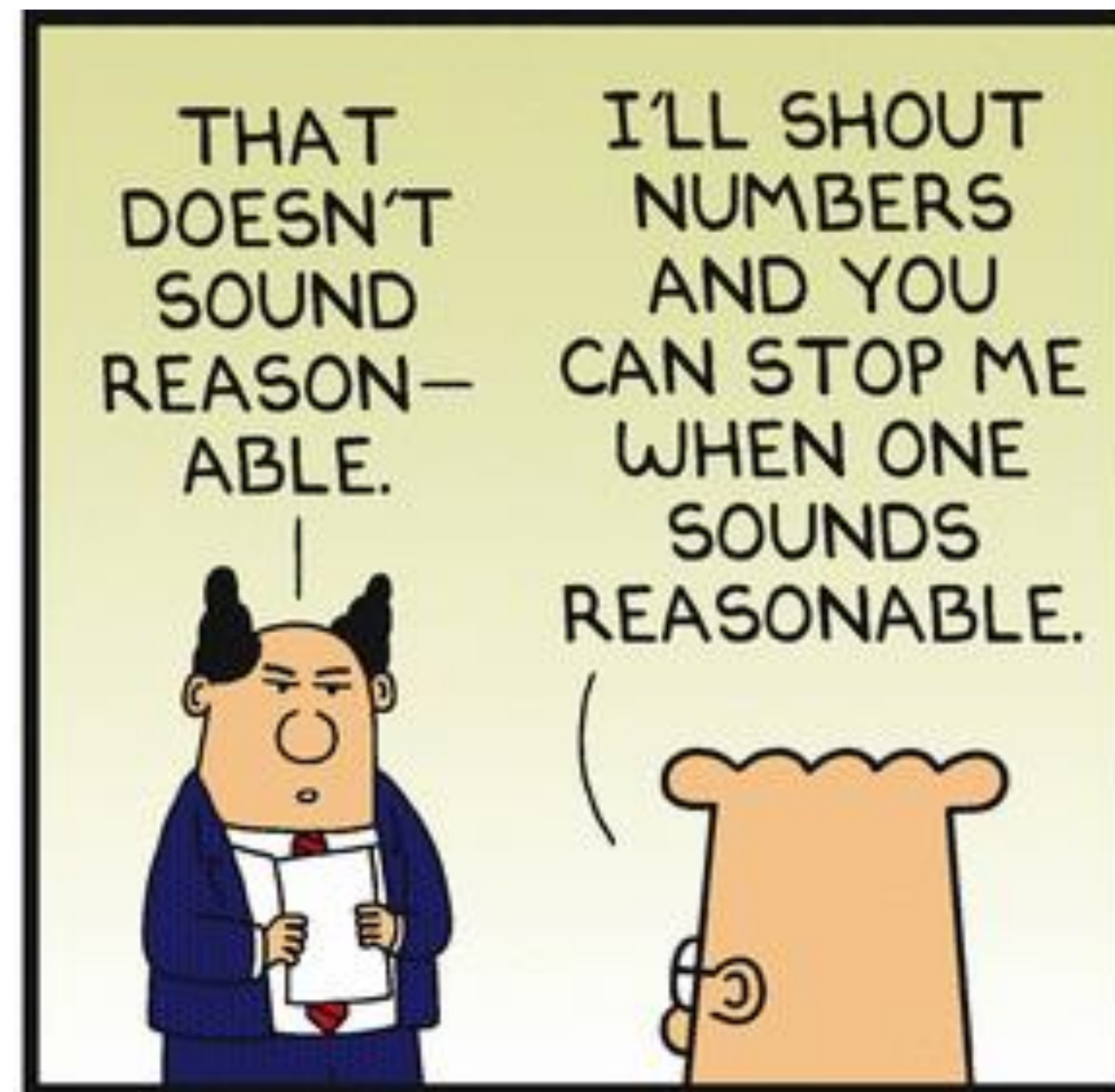


# WOW! ChatGPT can give me the estimates I need



ChatGPT can adjust the estimates

You can prompt ChatGPT and get an estimate



At the end you get the number you want!





# What is the problem with that?



Back to the Basics: What types of estimates Exist?

	Primary Characteristic	Secondary Characteristic			
ESTIMATE CLASS	MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES Expressed as % of complete definition	END USAGE Typical purpose of estimate	METHODOLOGY Typical estimating method	EXPECTED ACCURACY RANGE Typical +/- range relative to index of 1 (i.e. Class 1 estimate) <sup>[a]</sup>	PREPARATION EFFORT Typical degree of effort relative to least cost index of 1 <sup>[b]</sup>
Class 5	0% to 2%	Screening or feasibility	Stochastic (factors and/or models) or judgment	4 to 20	1
Class 4	1% to 15%	Concept study or feasibility	Primarily stochastic	3 to 12	2 to 4
Class 3	10% to 40%	Budget authorization or control	Mixed but primarily stochastic	2 to 6	3 to 10
Class 2	30% to 75%	Control or bid/tender	Primarily deterministic	1 to 3	5 to 20
Class 1	65% to 100%	Check estimate or bid/tender	Deterministic	1	10 to 100

Notes:  
[a] If the range index value of "1" represents +10/-5%, then an index value of 10 represents +100/-50% (at an 80% confidence interval).  
[b] If the cost index value of "1" represents 0.005% of project costs, then an index value of 100 represents 0.5%.

Table 1 – Generic Cost Estimate Classification Matrix

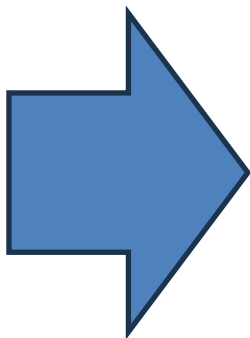
AACE  
CLASSIFICATION  
SYSTEM



COSTOS

Collect Data in a Database

	Primary Characteristic	
ESTIMATE CLASS	MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES Expressed as % of complete definition	END USAGE Typical purpose of estimate
Class 5	0% to 2%	Screening or feasibility
Class 4	1% to 15%	Concept study or feasibility



CLASS 5  
CLASS 4

COSMO

BIG DATA

MO

HomeCategoriesProjectsBenchmarks

GENERALANALYTICAL REPORT

PROPERTIESPROJECTS

RESET DECISIONGET PREDICTION

Projects

TargetDecision

AE0998 - MBT Hotel 3 stars

AE1006 - Umm Hurair Hotel Apt

AE1410 - Resort Hotel

AE1411 - Bateen Marina Resort

AE1719 - H2B Hotel

AE1545 - JBR Hotel

AE1108 - Waldorf Astoria

Normalization Impact

Attributes

Number of Rooms

Cost per m2 of BUA

Total Cost

00000000 Procurement and Contracting Requirements

01000000 General Requirements

02000000 Existing Conditions

03000000 Concrete

04000000 Masonry

05000000 Metals

06000000 Wood, Plastics, and Composites

07000000 Thermal and Moisture Protection

08000000 Openings

09000000 Finishes

10000000 Specialties

11000000 Equipment

12000000 Furnishings

13000000 Special Construction

14000000 Conveying Equipment

21000000 Fire Suppression

22000000 Plumbing

23000000 Heating, Ventilating, and Air Conditioning (HVAC)

Overview

NameBM\_CAT\_N

CategoryN-Hotels

NormalizationTPI24

Data GroupingCSI Masterformat 2016

Target CurrencyAED - United Arab Emirates Dirhams

Target Date01/01/2024

Created byadmin

Created on24/01/2024, 18:05

Last Updated byadmin

Last Updated on12/03/2024, 13:43

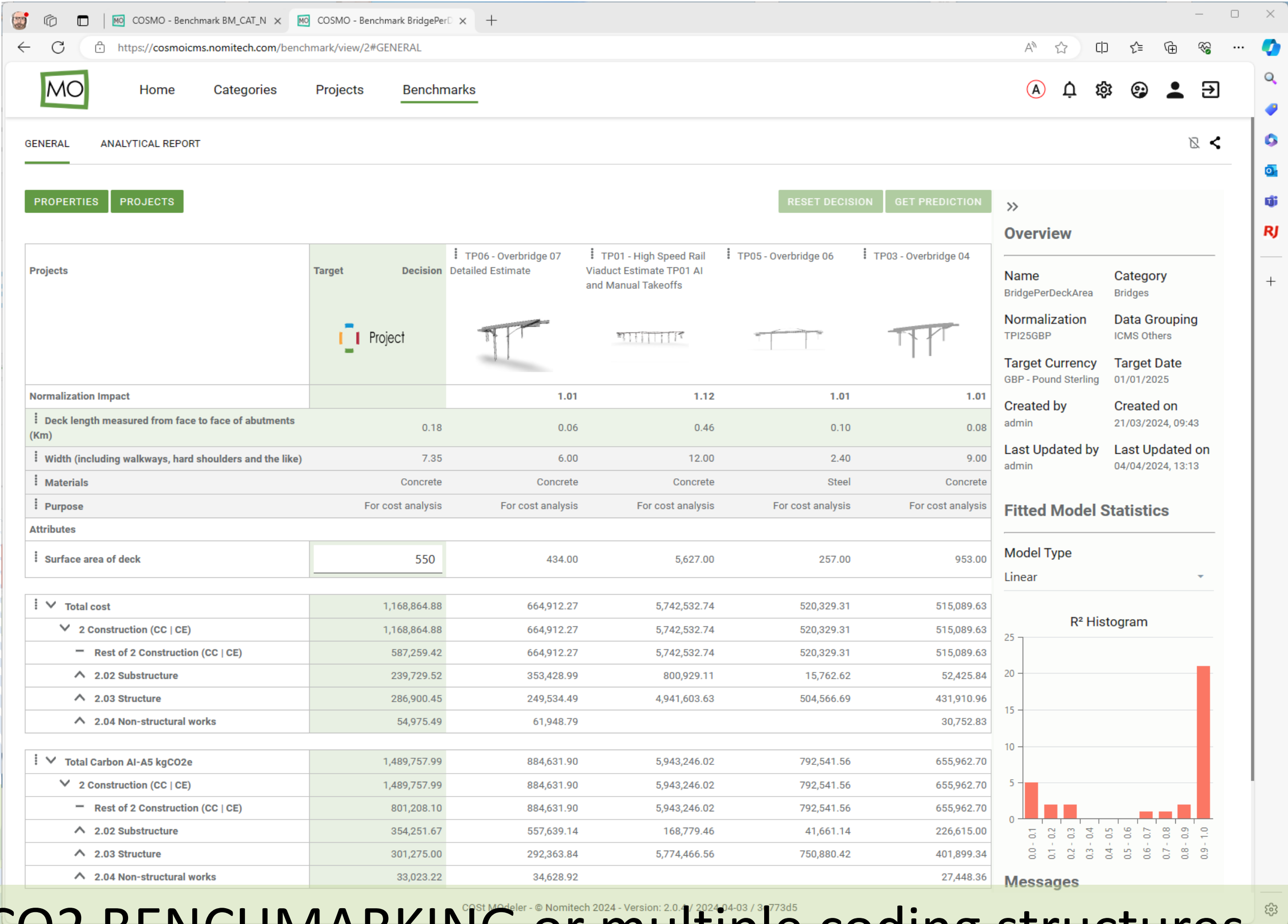
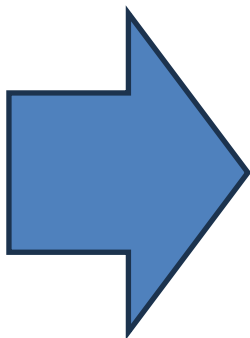
Fitted Model Statistics

Model TypePolynomialN2

R<sup>2</sup> Histogram

COST Modeler - © Nomitech 2024 - Version: 2.0.4 / 2024-04-03 / 5a9f10a

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CLASS 5  
CLASS 4

COSMO

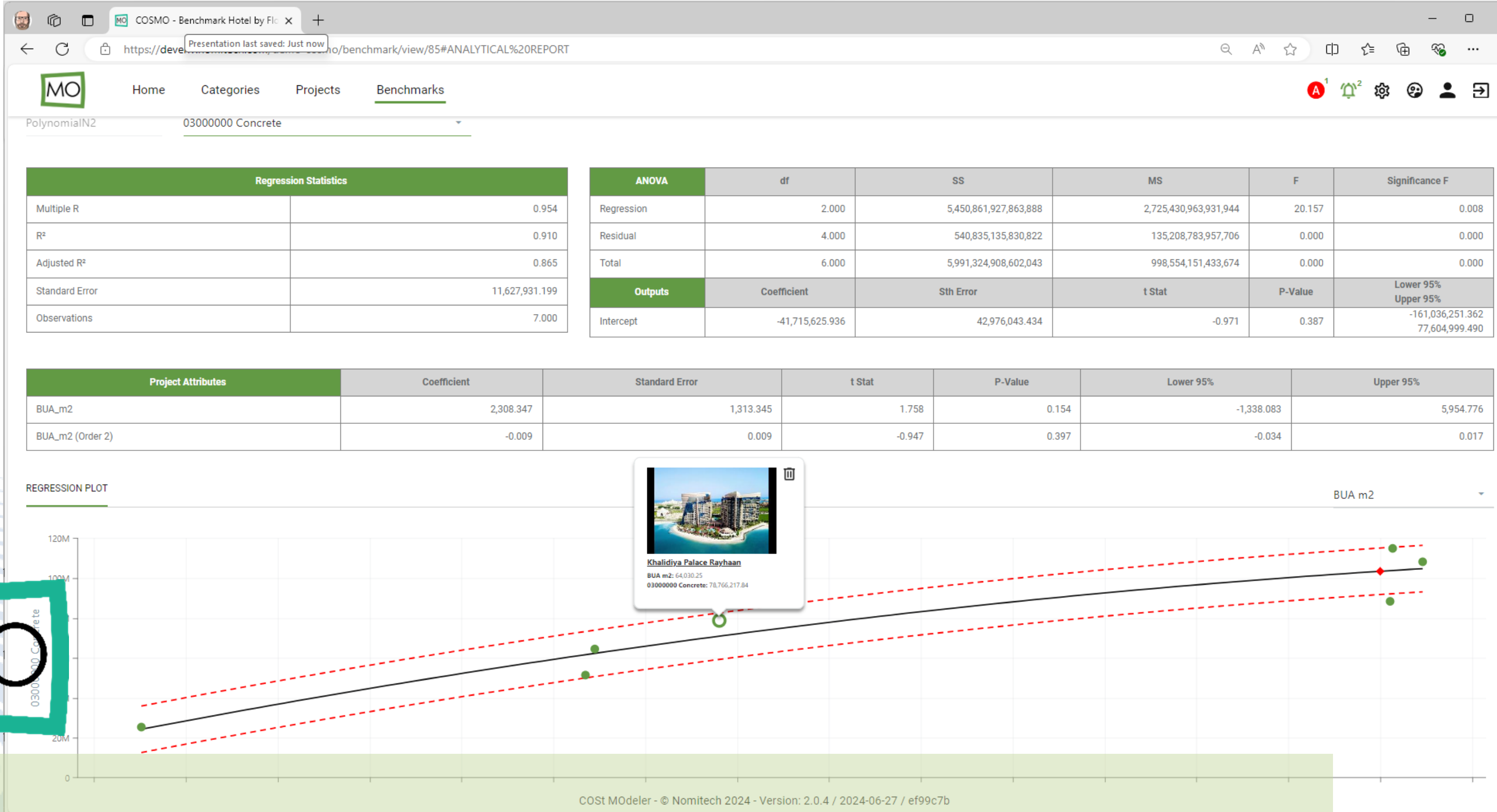
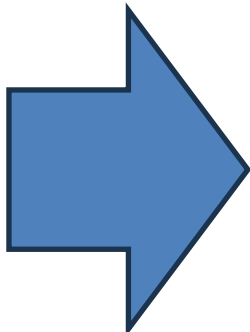
BIG DATA

ICMS COST & CO2 BENCHMARKING or multiple coding structures



# COST FINAL METHOD DEPENDS ON DATA

	Primary Characteristic	
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CLASS 5  
CLASS 4



BIG DATA

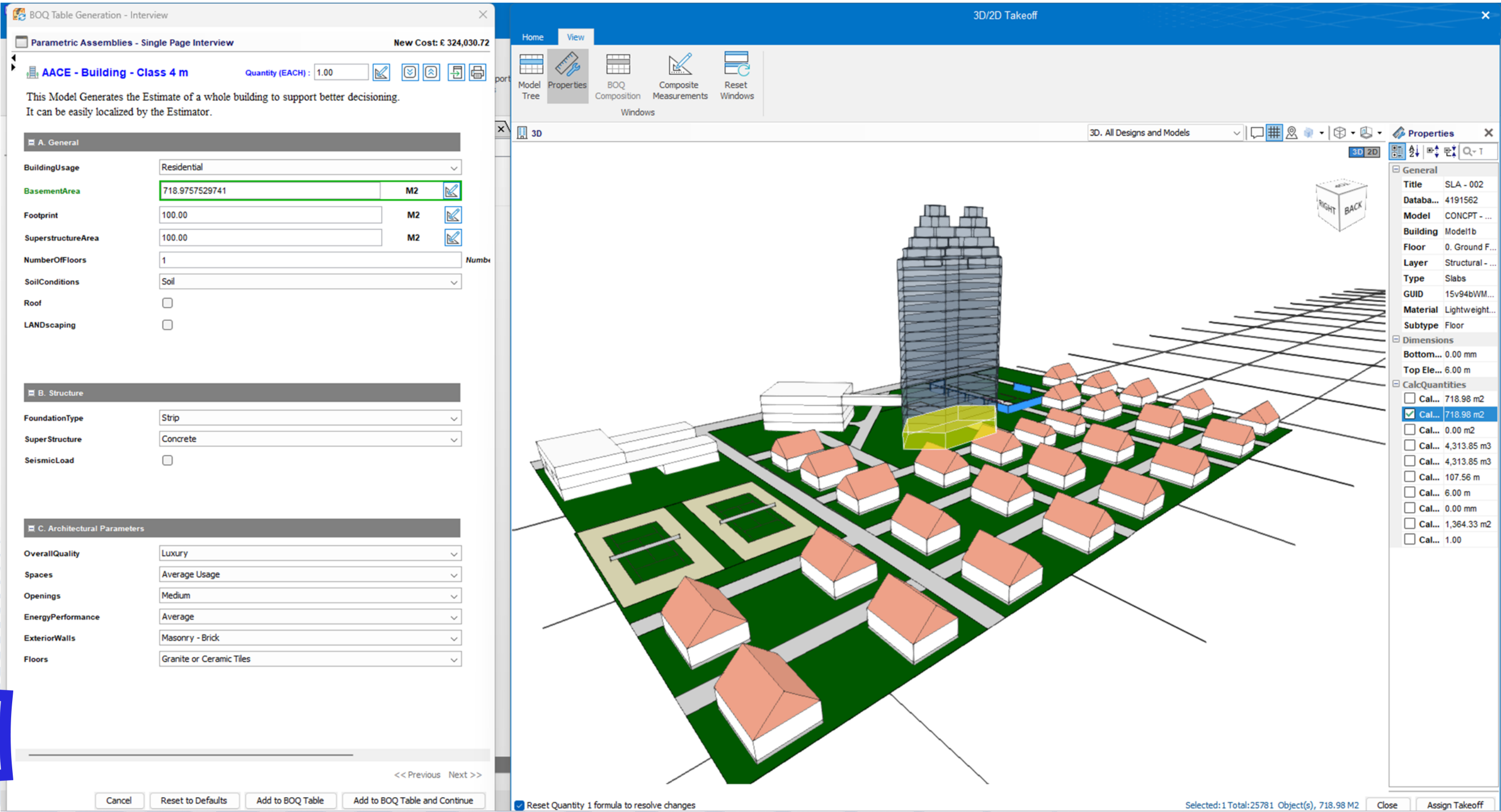
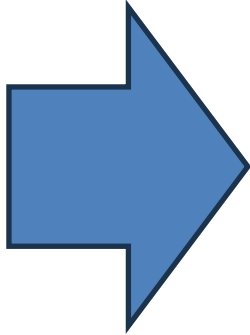
ICMS COST & CO2 BENCHMARKING or multiple coding structures

STATISTICAL ANALYSIS AND MACHINE LEARNING

COSTOS

BIM Enabled Class 5,4 estimates

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CLASS 5  
CLASS 4

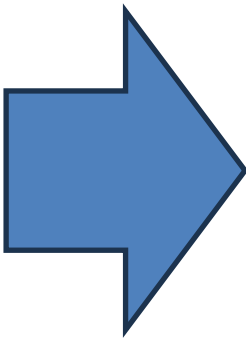
COSTOS

PARAMETRIC ESTIMATING WITH ALGORITHMS, GIS, SCHEMATICS/VOLUMETRIC MODELS



# Innovation in Estimating

	Primary Characteristic	
ESTIMATE CLASS	MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES Expressed as % of complete definition	END USAGE Typical purpose of estimate
Class 3	10% to 40%	Budget authorization or control



BOQ Table Generation - Interview

Parametric Assemblies - Single Page Interview

Title

New Cost

Ground Slab: 100m Length£ 12,865,900.60

Ground Slab: 100m Length

Smart (Parametric) Assembly for Ground Slab calculations

A. General Data

Ground Slab

50.0

0.5

3.0

Description

100m Length

B. Slab

Length (m)

100.00

Depth (m)

0.50

Width (m)

50.00

Steel (tn/m3)

0.20

C. Piles

Diameter of piles

300

Depth of piles (m)

3.00

Steel (tn/m3)

0.25

Resource Cost Bar Chart

Cost (£)

6000000

5000000

4000000

3000000

2000000

Equ.

Lab.

Mat.

New Cost

Quantity (EACH) : 1.00

<< Previous

Next >>

Cancel

Reset to Defaults

Add to BOQ Table

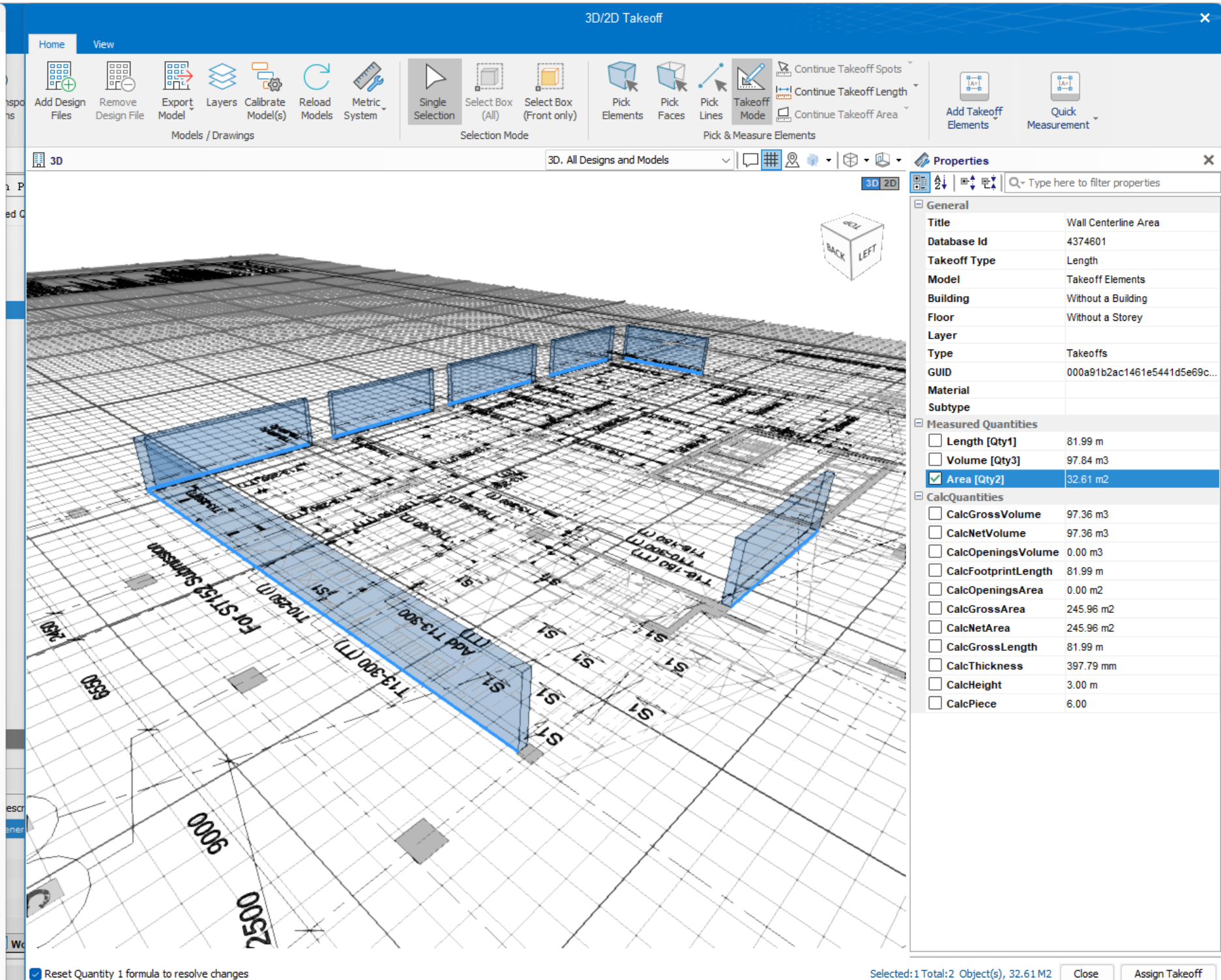
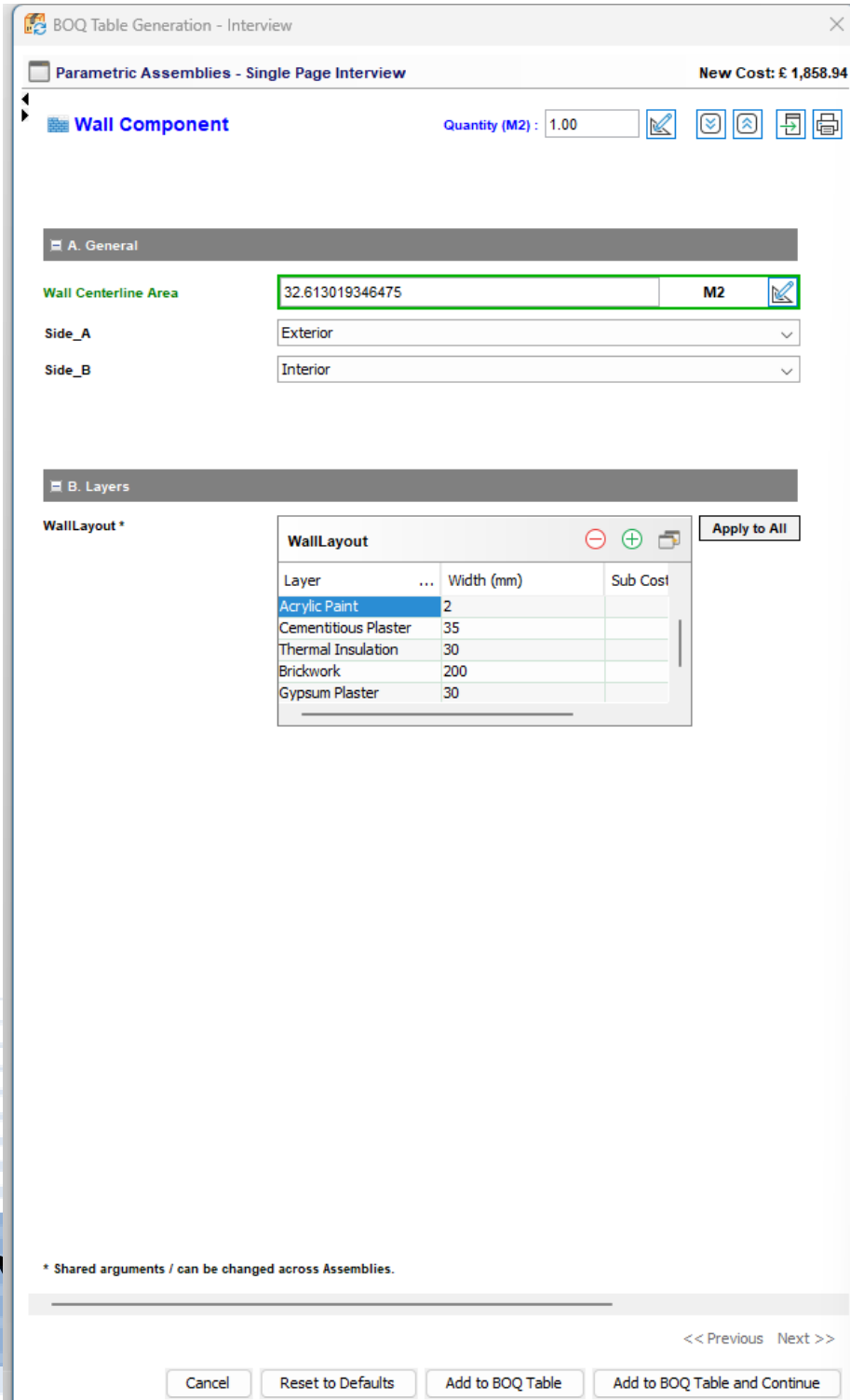
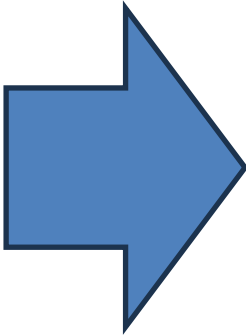
Add to BOQ Table and Continue

CLASS 3

PARAMETRIC ESTIMATING

# COMBINING BIM WITH PARAMETRIC ESTIMATING

	Primary Characteristic	
ESTIMATE CLASS	MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES Expressed as % of complete definition	END USAGE Typical purpose of estimate
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CLASS 3

PARAMETRIC ESTIMATING

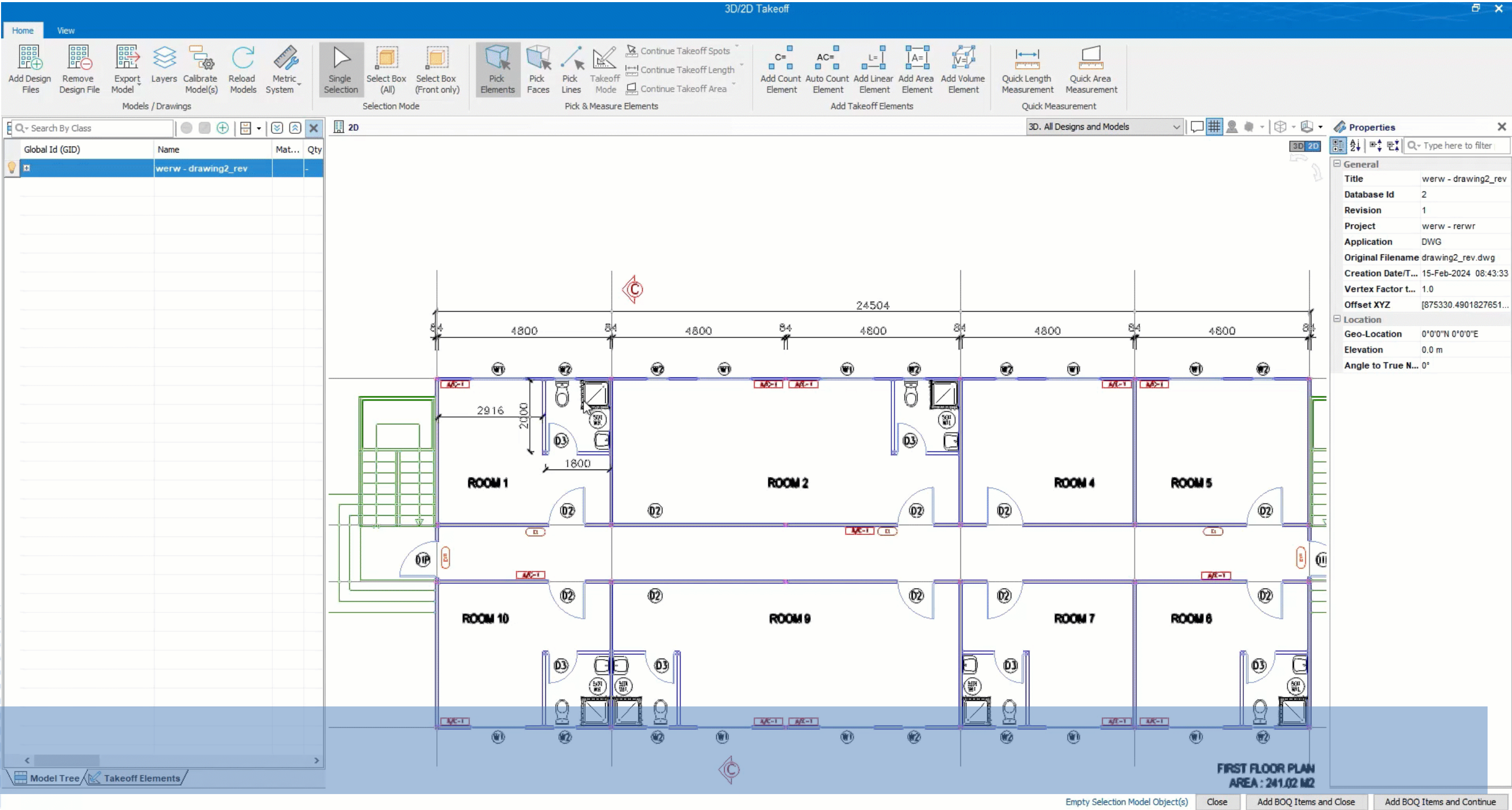
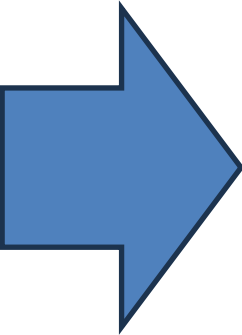
INTEGRATED PARAMETRIC ESTIMATING (2D, BIM, GIS, COST CONTROL, ERPs etc)



# Innovation in Estimating

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Class 2	30% to 75%	Control or bid/tender
Class 1	65% to 100%	Check estimate or bid/tender

Notes:



CLASS 2 & 1  
COMPUTER VISION



# Innovation in Estimating

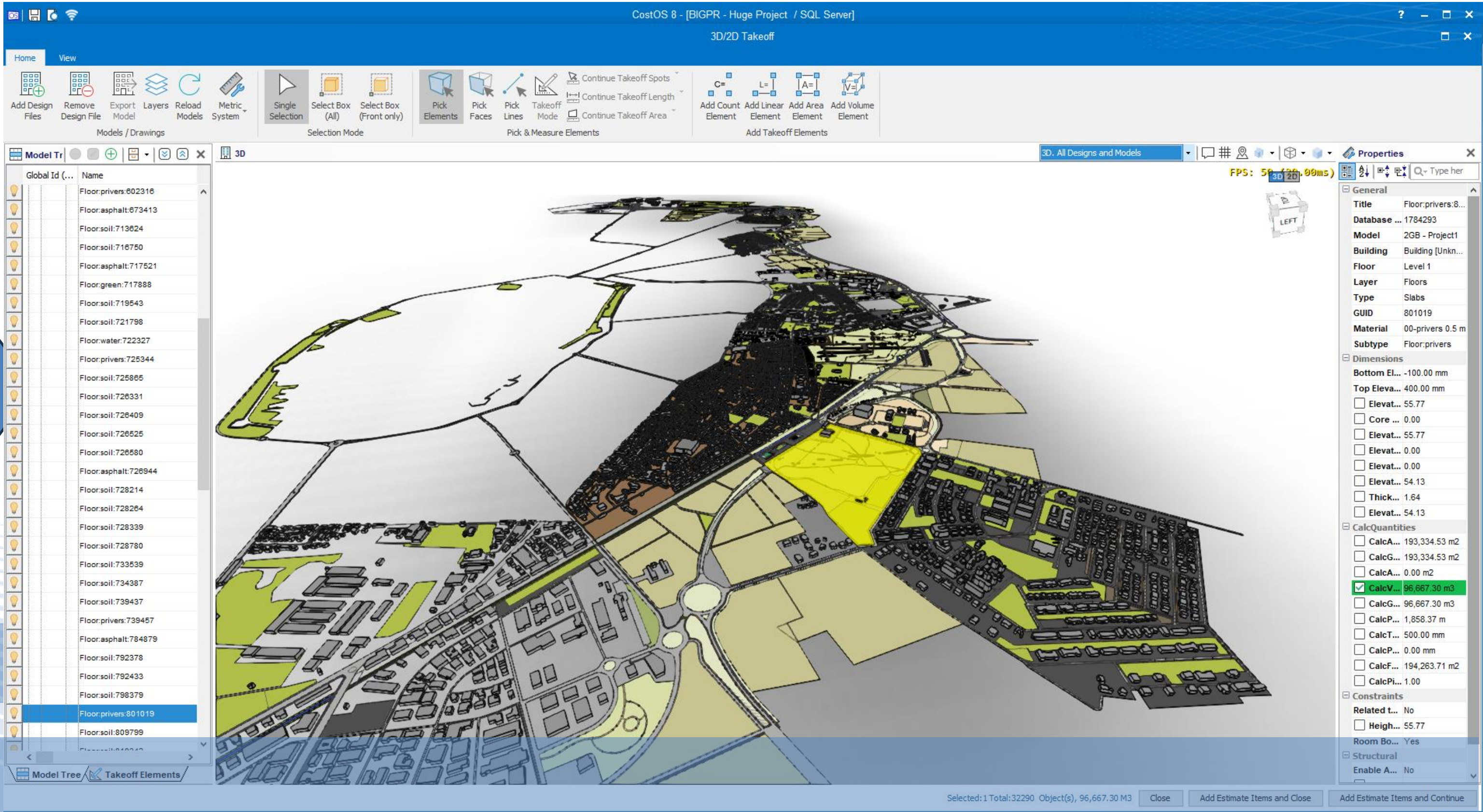
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Notes:

CLASS 2 & 1

COMPUTER VISION

BIM AUTOMATION





FileHomeTable & LayoutsEstimateVisualizeTools & HelpSearch help...CostOS Administrator

WorksheetsAdd TakeoffsAdd AssembliesAdd Line ItemsProject Resource DatabaseProject SummariesProject VariationsProject Carbon TransportSetAssignAssignReviewFindCleanupModifyModifySynchronizeAutomaticGlobal ChangeExchange RatesQuotation ManagementCompare QuotesRequest for QuotesSubmit Received QuotesQuotes

BOQ Table Generation - Interview

Enterprise Project StructureAACEKSA - AACE KSA Examples

Item Code

Title

[Double click to insert a blank item or drag assemblies, resources or takeoffs here]

Parametric Assemblies - Single Page Interview

TitleNew Cost

IFC BoQ Generator 0.00

IFC BoQ Generator NRM2 v3.8 (Concrete Works)Quantity (EACH) : 1.00

Generates BoQs on the basis of NRM2 standard from imported BIM model (IFC2x3 specification).

A. Model Selection

71 - Office\_Building\_project\_design 2020.ifc

<< Hide Model

B. Global Data

Use BIM Concrete Grade?☒

To use concrete grade from BIM (according to BS 8500)

Rebar Content for vertical work0.12tn/m3

Rebar Content for horizontal work0.10tn/m3

☒ Automatic Resource/Cost Pre-Calculation

<< PreviousNext >>

CancelReset to DefaultsAdd to BOQ TableAdd to BOQ Table and Continue

Totals0.00

Project WBS 1NRM2Masterformat 2016ARUP (Letters)Custom

3D/2D Visualizer

Snapshot

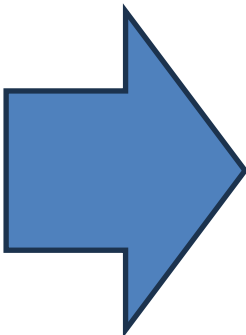
FRONT

Layout: STANDARD BOQ - NRM2\* Items: 0100%

10:34 AM 4/17/2024

# Detailed BOQ Pricing

	Primary Characteristic	
ESTIMATE CLASS	MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES Expressed as % of complete definition	END USAGE Typical purpose of estimate
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Class 1	65% to 100%	Check estimate or bid/tender



Item Code	Title	Quantity	Unit	Price
1	Site Conditions			
1.1	Site Clearance			
1.2	Hoarding			
1.3	Excavation in Semi Rock up to 3m			
2	Concrete Works			
2.1	Concrete C20/25 for Misc Works on Landscaping			
2.2	Concrete C20/25 for Foundation			
2.3	Concrete C20/25 for Slab on Grade			
3	Fire Dampers			
3.1	FD1 - 275x275 mm Fused link			
3.2	FD2 - 450x400mm Fused link			
3.3	FD3 - 600x500mm Fused link			
3.4	FD4 - 750x550 Fused link			
3.5	FD5 - 750x550 Fused link			
3.6	FD6 - 600x500 Fused link			
3.8	FD8 - 900x550 Fused link			
3.9	FD9 - 700x900 Fused link			
3.10	FD10 - 900x300 Fused link			
4	Pipe Work			
4.1	Straight Chilled Water and Condensate Piping			
4.1.01	NB 100 steel			
4.1.02	NB 80 steel			
4.1.03	NB 65 steel			
4.1.04	NB 50 steel			
4.1.05	NB 40 steel			
4.1.06	NB 32 steel			
4.1.07	NB 40 Galvanised Steel Condensate Drain			
4.1.08	NB 32 Galvanised Steel Condensate Drain			
4.1.09	NB 25 Galvanised Steel Condensate Drain			
4.1.10	Pipe Schedule 80, 16inc			
4.2	Chilled Water and Condensate Pipe Fittings with NB <= 50mm in accordance with Part V.2, Section 9.02			
4.2.1	Fittings <= NB 50mm steel			
4.2.2	Fittings <= NB 50mm galvanised			
4.3	Chilled Water Elbows with NB > 50mm in acc			
Totals				543,244.82

CLASS 2 & 1

COMPUTER VISION

BIM AUTOMATION

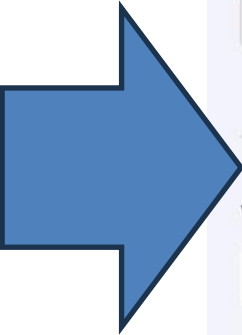
RULE BASED AUTO-PRICING OF BOQs , BOMs and MANAGING REVISIONS



# Innovation in Estimating

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Notes:



COSTOS

User Input

Line Items Library

RSMeans

Load Library

Vectorization Method

Word2Vec (Google)

The method for semantic text segmentation prior to generating text embeddings (Vectorization). This method is used for text segmentation/splitting/chunking to improve document retrieval from vector databases based on similarity search functions.

Similarity Metric

N-Gram Overlap

## NLP Search in CostOS

A web application that matches BoQ description in question with k-top line items of a specific database using the semantic similarity NLP concept. Currently the user can load the following libraries to search in: RSMeans, Richardson and SPONS.

### Line Items Library

ID	Title	EXTRACODE1
1	Field personnel, general purpose laborer, average	01311320 - Fiel
2	Miniature circuit breaker lock out device	01311420 - Loc
3	Miniature pin circuit breaker lock out device	01311420 - Loc
4	Single circuit breaker lock out device	01311420 - Loc
5	Multi-pole circuit breaker lock out device (15 to 225 Amp)	01311420 - Loc
6	Large 3 pole circuit breaker lock out device (over 225 Amp)	01311420 - Loc
8	Lock out disconnect switch, 30 to 100 Amp	01311420 - Loc
9	Lock out disconnect switch, 100 to 400 Amp	01311420 - Loc
10	Lock out disconnect switch, over 400 amp	01311420 - Loc
11	Lock out hasp for multiple lockout tags	01311420 - Loc

Total Line Items in library: 58111

### Search & Results

e.g. steel plate

Search

CLASS 2 & 1

NLPs FOR MATCHING DATABASES WITH MACHINE LEARNING

Enterprise Project Structure 1 - 1 X Search Database

. | X ✓ fX | 1

[Double click to insert a blank item or drag assemblies, resources or takeoffs here to add]

Totals	€ 0
--------	-----

[Assignments - Resources](#)









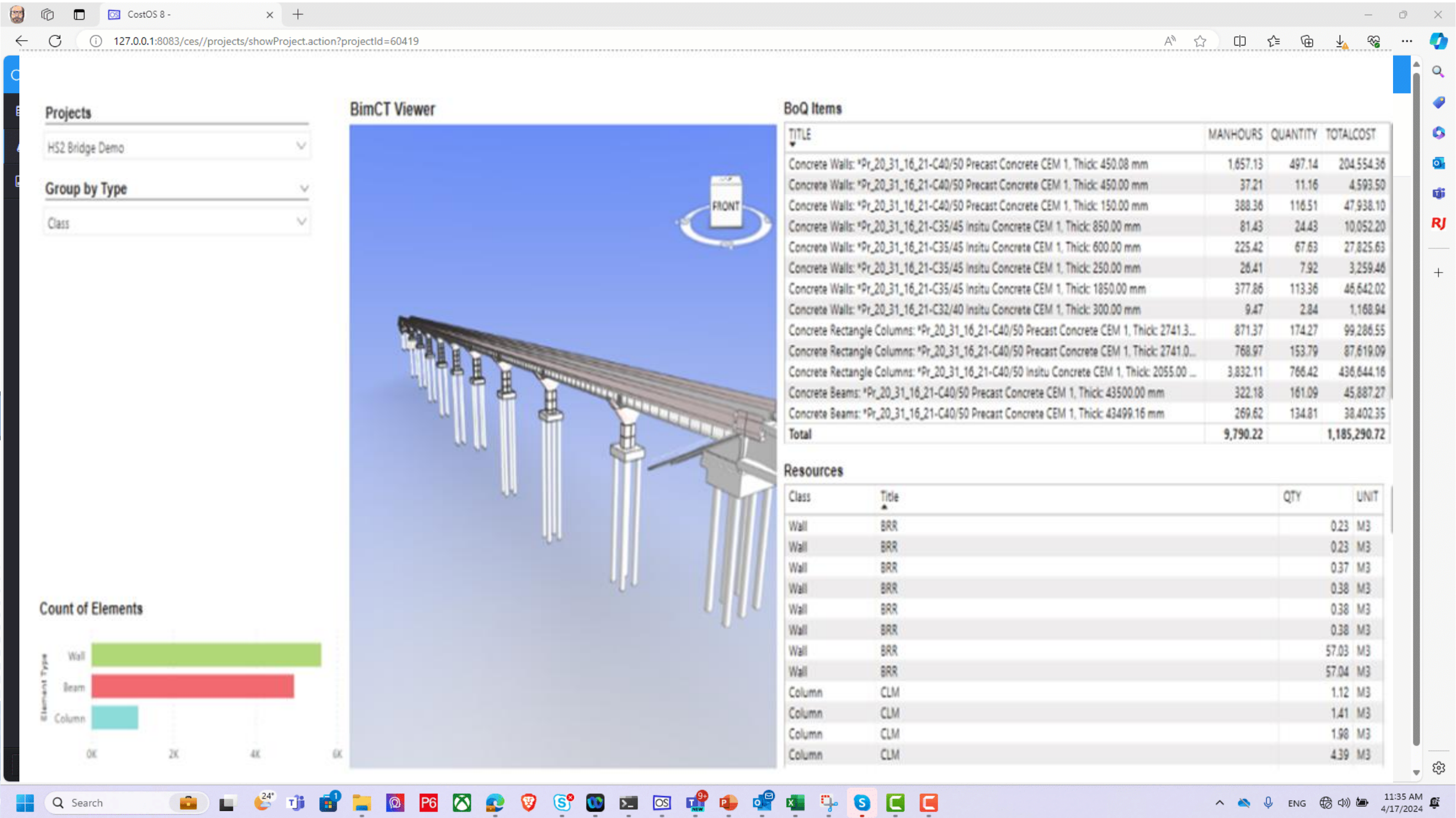
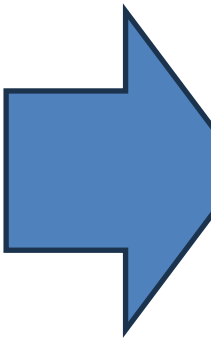



Item Code	Title	AI Search Score	Quantity/Unit OR (M)Hours/Unit	Productivity	Resource Rate	Currency	Factor 1	Factor 2	Factor 3	Total Manhours	Total Equipment Hours	Final Rate	Total Cost



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CLASS 2 & 1

NLPs FOR MATCHING

INTEGRATED COST LOADED DIGITAL TWINS



COSTOS

COSMO

Navisworks IFC Exporter

PowerBI BIM Addon

CellBIM

NOMITECH's Solutions

BIMCT







أرامكو السعودية  
saudi aramco



## Our Customer Base

Nomitech is proud to have as customers multiple project stakeholders, Mega Project Owners, International Consultancies, International and Local Contrators in Various Sectors



HITACHI





THANK YOU  
FOR WATCHING

**Contact**



Tolis Chatzisyneon  
CEO at Nomitech

