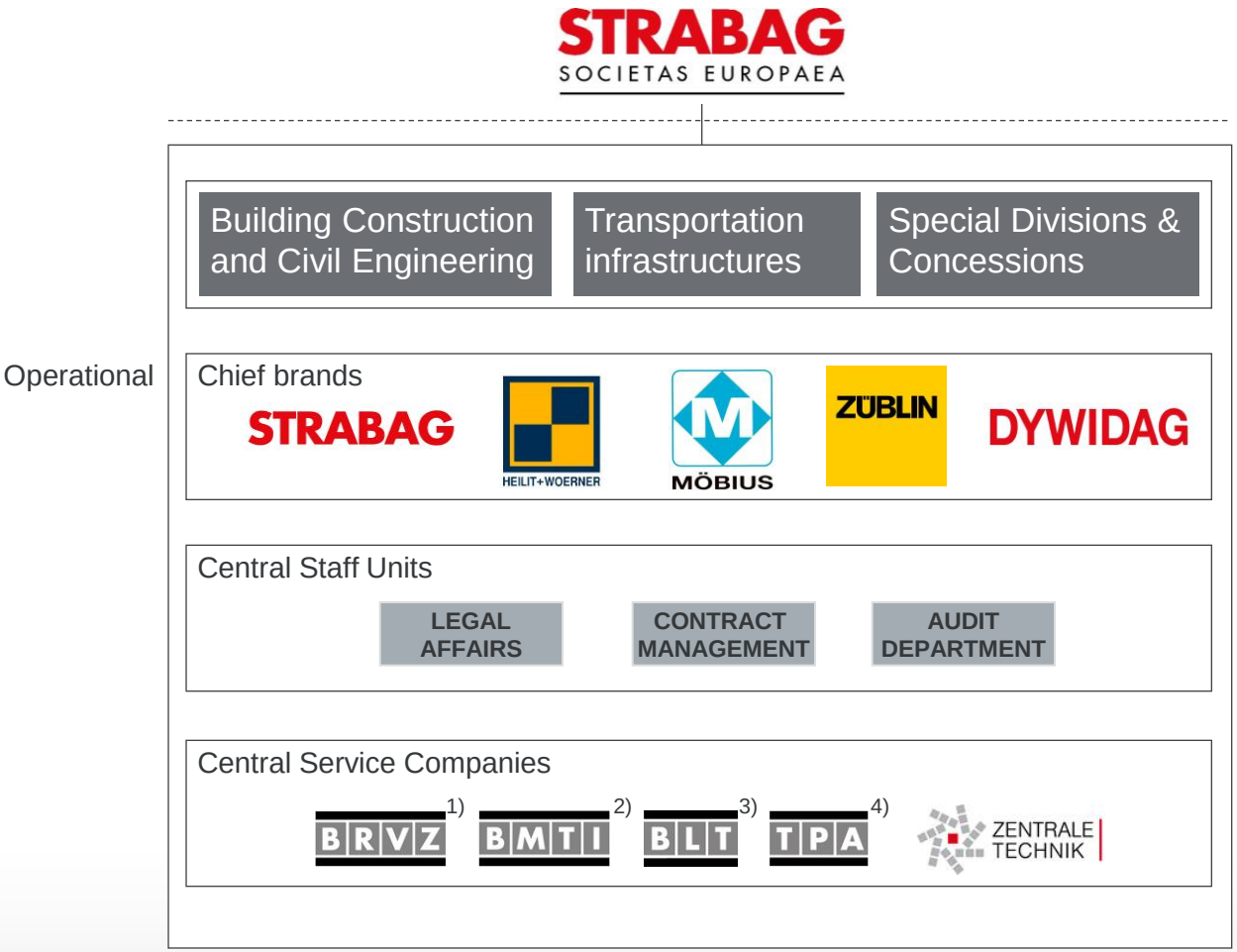
5D @ STRABAG | ZÜBLIN
5D Initiative, BIM, 5D Design

Konstantinos Kessoudis

ZÜBLIN

STRABAG SE GROUP

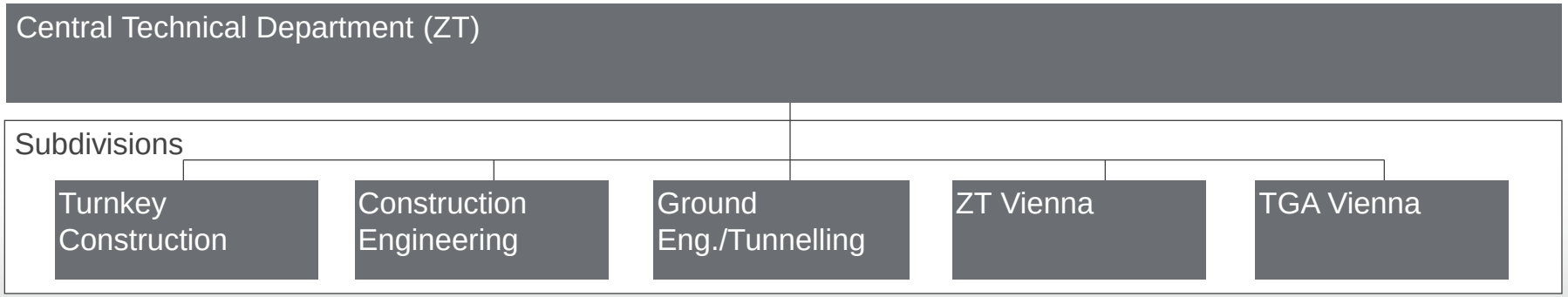


[1)]BRVZ Bau- Rechen- und Verwaltungszentrum [2)]BMTI Baumaschinentechnik International
[3)]BLT Baulogistik und Transport [4)]TPA Gesellschaft für Qualitätssicherung und Innovation

CENTRAL TECHNICAL DEPARTMENT
TECHNICAL KNOW-HOW AT OUR FINGERTIPS

ZENTRALE TECHNIK

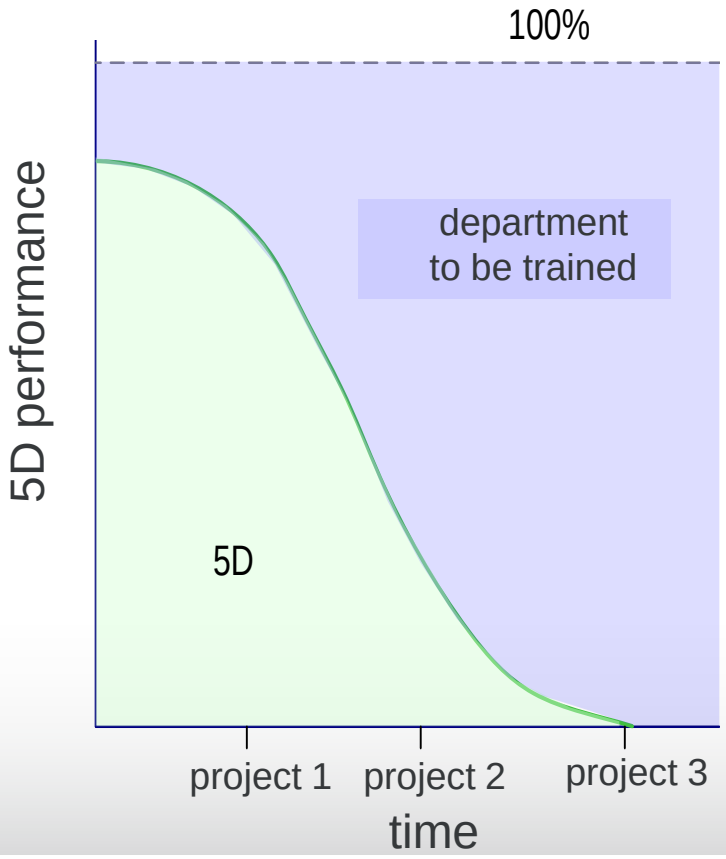
- technical support for all Group divisions in winning and executing contracts
- research, development and innovation
- training, transfer of know-how, creation of tools and materials
- public relations, talks and presentations, association and committee work
- 1 central department, 5 sub-divisions, 12 business units, 32 departments, 500 employees in 9 locations



ZÜBLIN

5D DEPARTMENT

- Definition of 5D
- Development of methods of operation for defined 5D work steps
  software, methods, tools
- Implementation of 5D work step in selected projects
- Definition of 5D work step as standard
  process
- Training of operational units in 5D methods
- Implementation phase: 5D department supervision
  to assure 100% performance even on the first project
- Hotline and backup for operational units

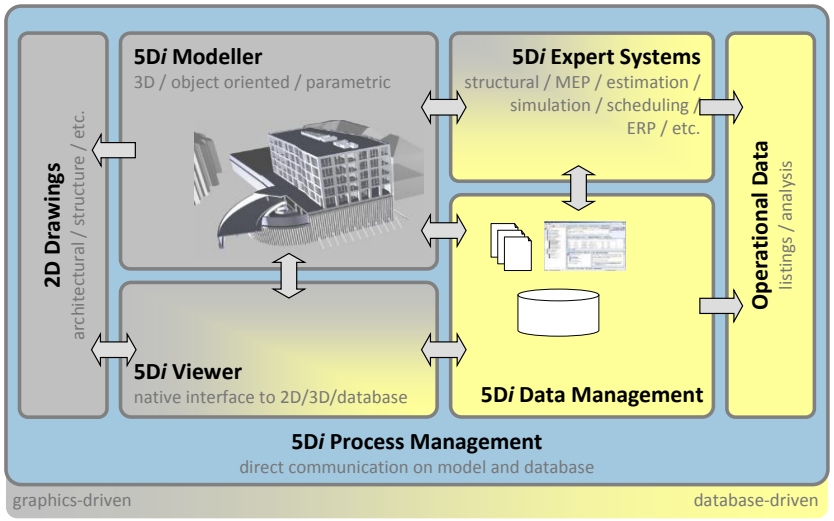


OVERVIEW

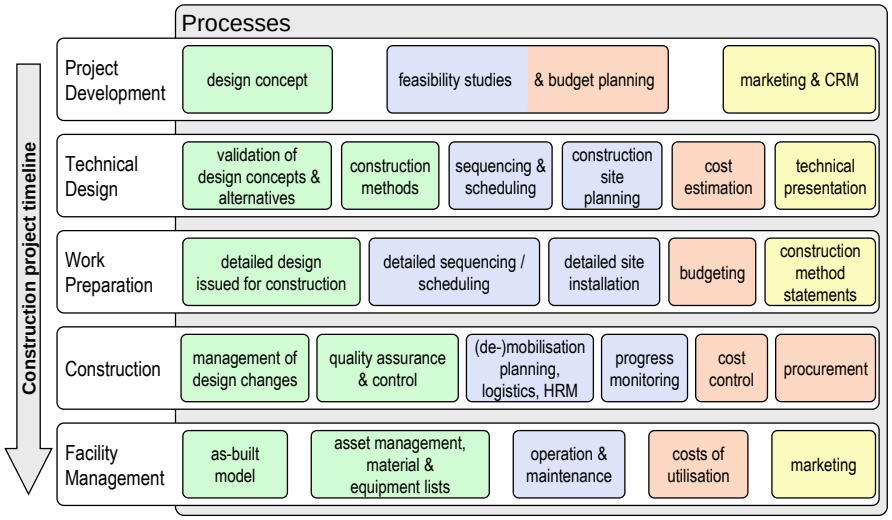
MOTIVATION FOR 5D*i* COLLABORATION
IMPORTANCE OF ZÜBLIN'S 5D*i* USE CASE
CURRENT SERVICES OF 5D
EXAMPLE 1: 5D PROCESS USING CLIENT'S MODEL
EXAMPLE 2: 5D "FROM SCRATCH"

5D*i* – COLLABORATION IN DEVELOPMENT AND IMPLEMENTATION

IT-platform



processes



quality control **guidelines** **knowledge on processes linkage**

structure **training concept** **templates**

knowledge on hard- and software

company implementation knowledge

5D*i* – COLLABORATION IN DEVELOPMENT AND IMPLEMENTATION

IT-platform **processes**

The industry challenge for process integration, is a challenge we share with other construction companies within 5D*i*

- the overall goal is too big for one company to describe it for the software industry
- software industry needs to understand the “overall goal” and the variety of implementation strategies in construction to develop sustainable 5D solutions

➔ we participate within 5D*i* to define our most critical requirements to software partners

➔ we profit from partners covering other critical focus points

- assurance of our investments in software, company methods and training
- the company implementation is structurally compatible to other companies' solutions ➔ not developing an “5D-island”

company implementation knowledge

5D*i* USE CASE MODEL BASED ESTIMATION

Ballast Nedam

Building Process Integration – Systems Engineering and BIM / Client Requirements Processing

bam

Manage Change – Change Δ Managed

MAX BÖGL
Progress is built on ideas.

Design to Fabrication

STRABAG ZÜBLIN

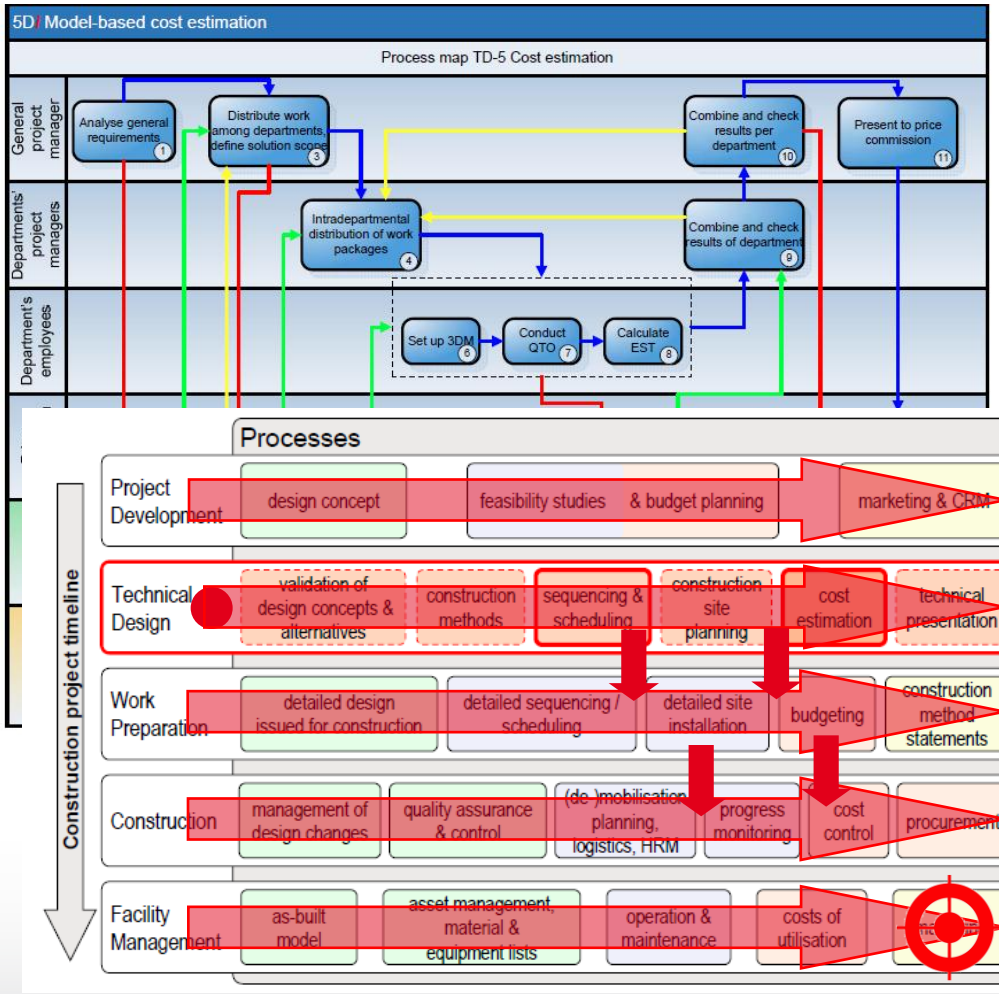
Model–based Estimation – QTO Processes

Progress Collection, Monitoring and Control

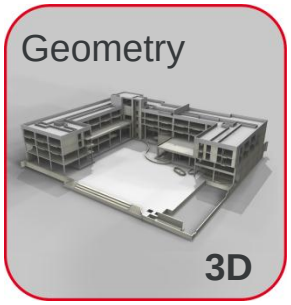
5D*i* USE CASE MODEL BASED ESTIMATION

The use case is critical to us:

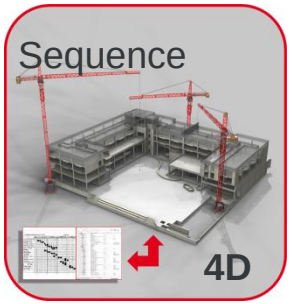
- our starting point for usage of 5D as a standard process: usually a construction company enters at the tender phase
- horizontal process integration, covering the whole tender phase
- this can only succeed if we transcend traditional tender processes. This assures:
  - model-based vertical integration
  - holistic process integration



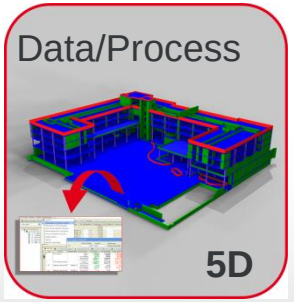
CURRENT SERVICES OF ZÜBLIN – 5D DESIGN



- **presentation** of STRABAG|ZUEBLIN|DYWIDAG solutions in the tender phase
- **creating a BIM-model** on the basis of 2D drawings and/or coordinating external planners to develop a high-end model suitable for further process integration and decision support
- a BIM-model to achieve proper **coordination of trades** in an early design phase
- **quality** checks and **augmentations** of **external models** for follow-up processes
- **clash detection** and the coordination of subsequent resultant amendments
- fast and reliable **design of complex structures**



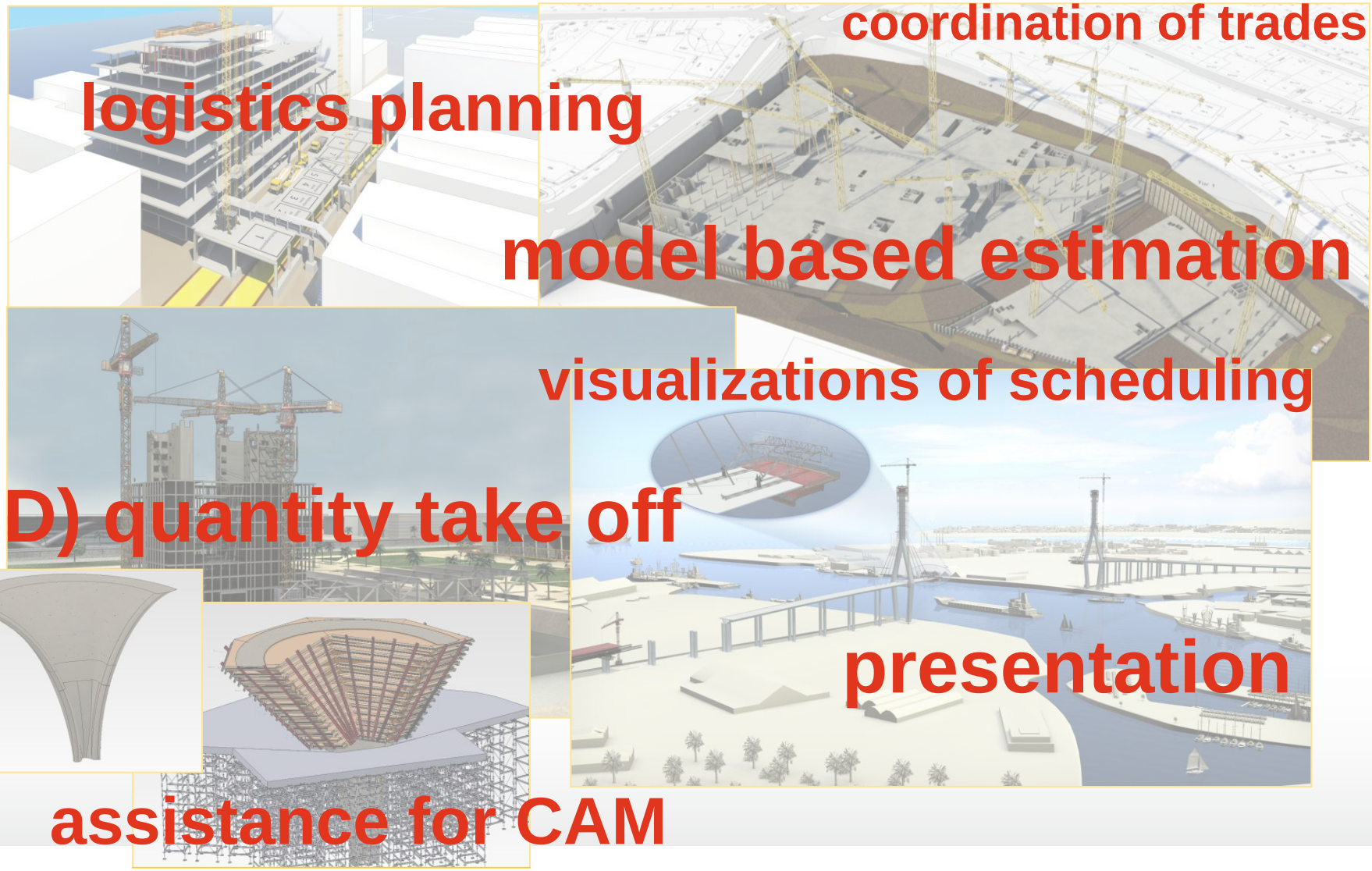
- **depicting** the construction process by connecting the 3D-model and the schedule
- **clash detection** of moving parts (e.g. cranes)
- preparation of **site instructions** for various construction methods



- model-based **quantity take-off** and **cost estimation**
- model-based quantity take-off for **logistics**
- as-built model for **facility management**
- **design to production**: 3D-model for “computer-aided manufacturing” (CAM)

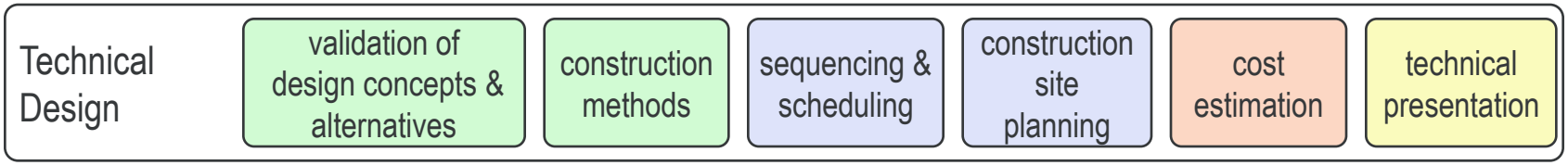
We are continuously **expanding our services**, the following slides will provide some illustrative examples.

EXAMPLES – 5D DESIGN



EXAMPLE 1: 5D PROCESS USING CLIENT'S MODEL

- multi-storey office building: BIM model provided by client with the explicit request to use this model in the tender phase



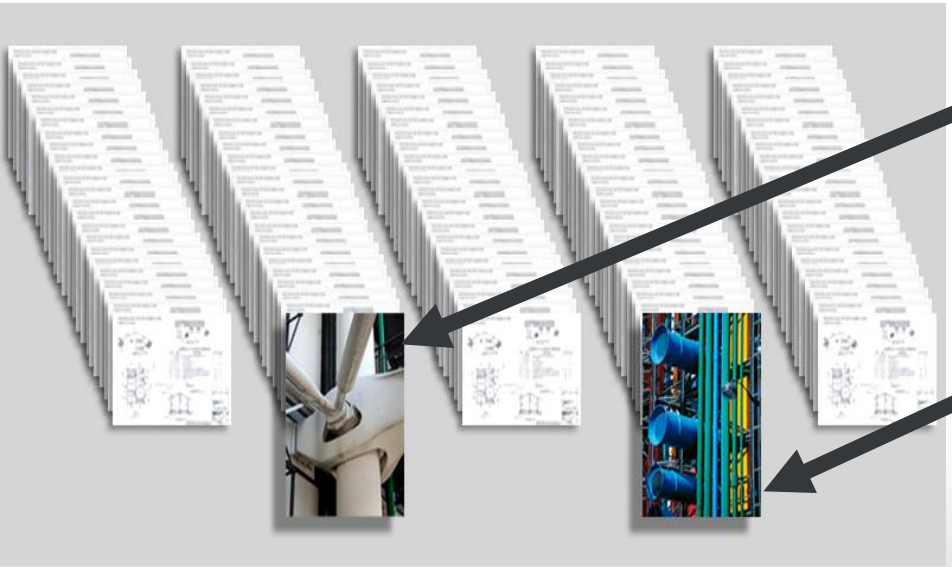
EXAMPLE 1: 5D PROCESS USING CLIENT'S MODEL

tender documents:

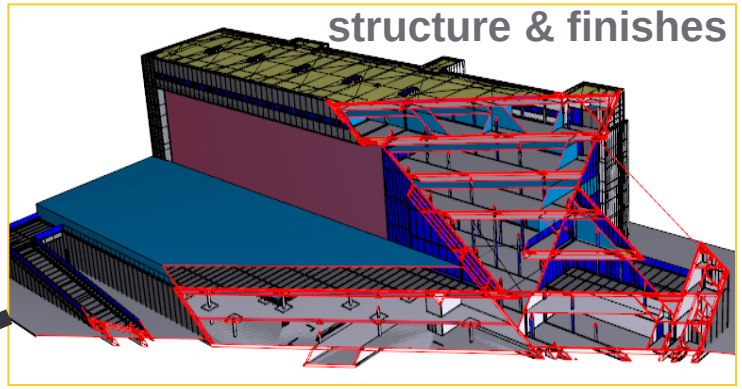
- structure
- finishes

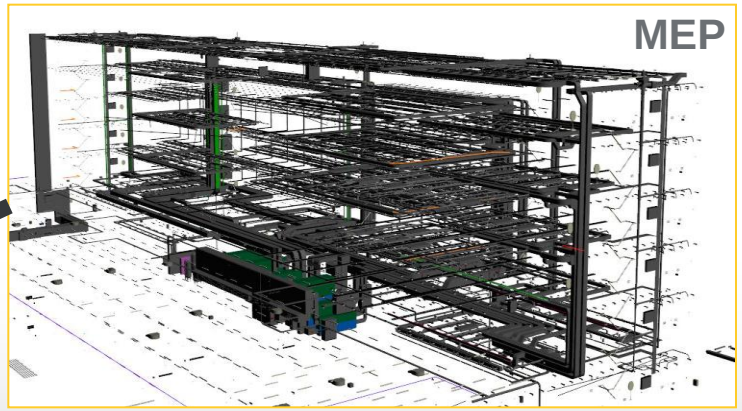
→ 173 A0 plans

- MEP → 63 A0 plans



- also including two BIM models

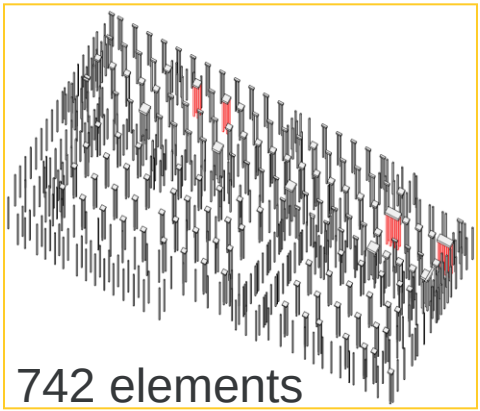




all drawings derived from BIM model

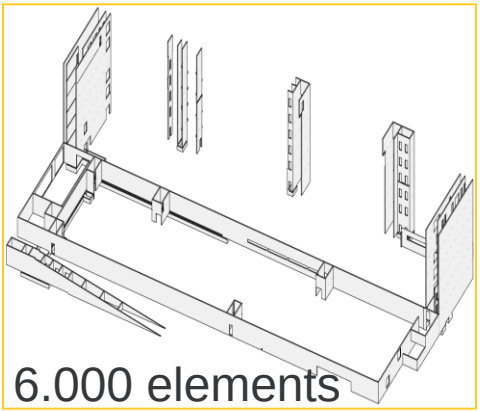
EXAMPLE 1: 5D PROCESS USING CLIENT'S MODEL

- **model-based QTO**. Since all drawings were derived from the model, a model-based QTO was valid by consequence and thus conducted.



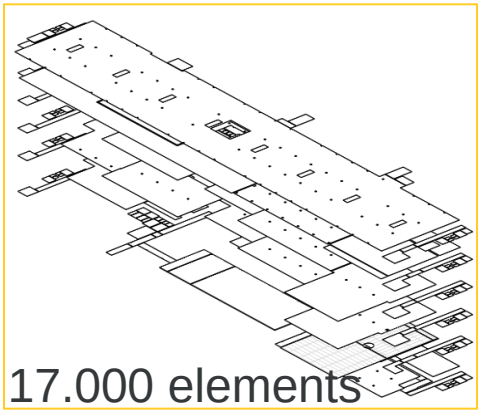
742 elements

foundation:
columns…



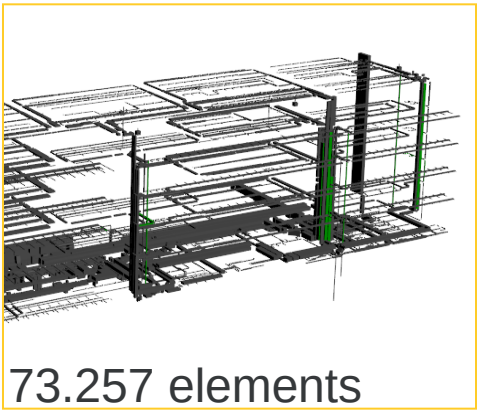
6.000 elements

structure:
walls, columns…



17.000 elements

finishes, façade:
suspended ceilings…

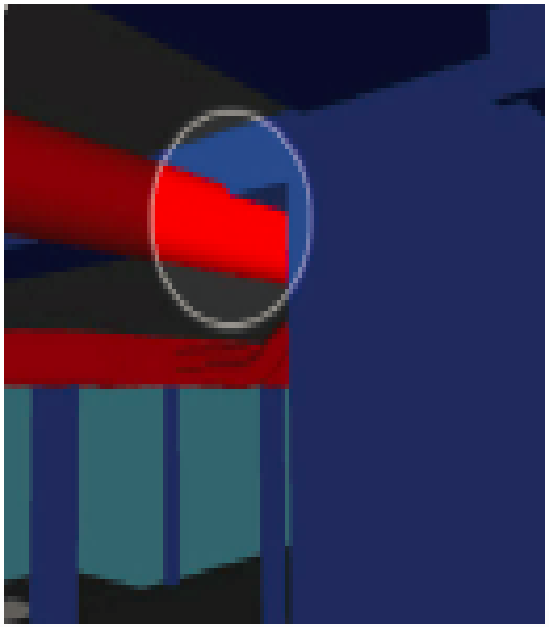


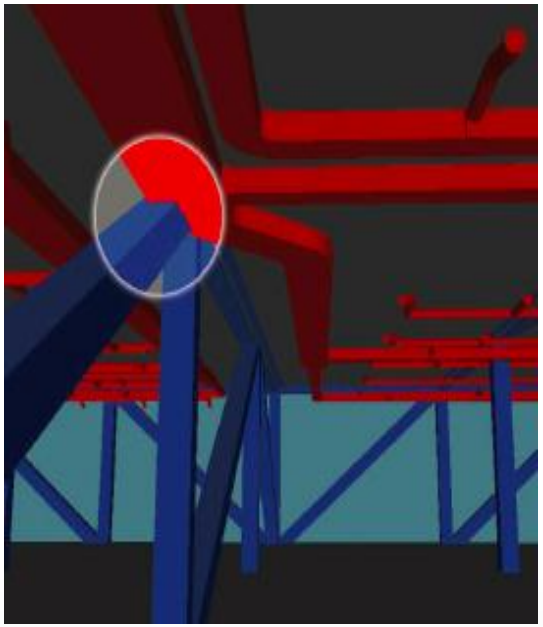
73.257 elements

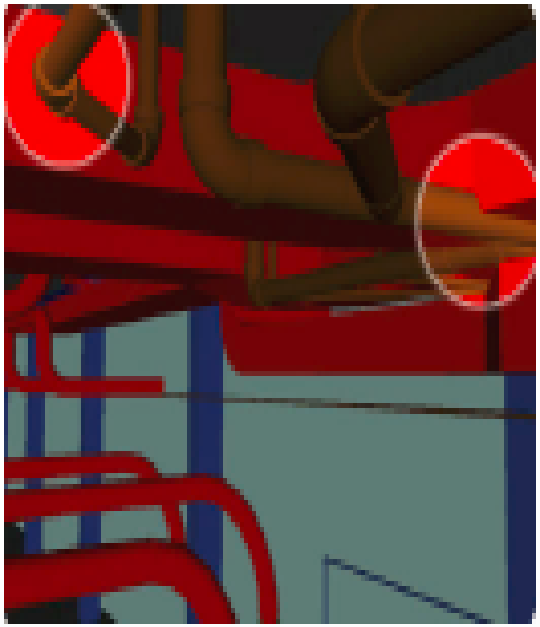
MEP:
ventilation,
electrics…

EXAMPLE 1: 5D PROCESS USING CLIENT'S MODEL

- **Clash detection**. For early coordination and estimation of required work

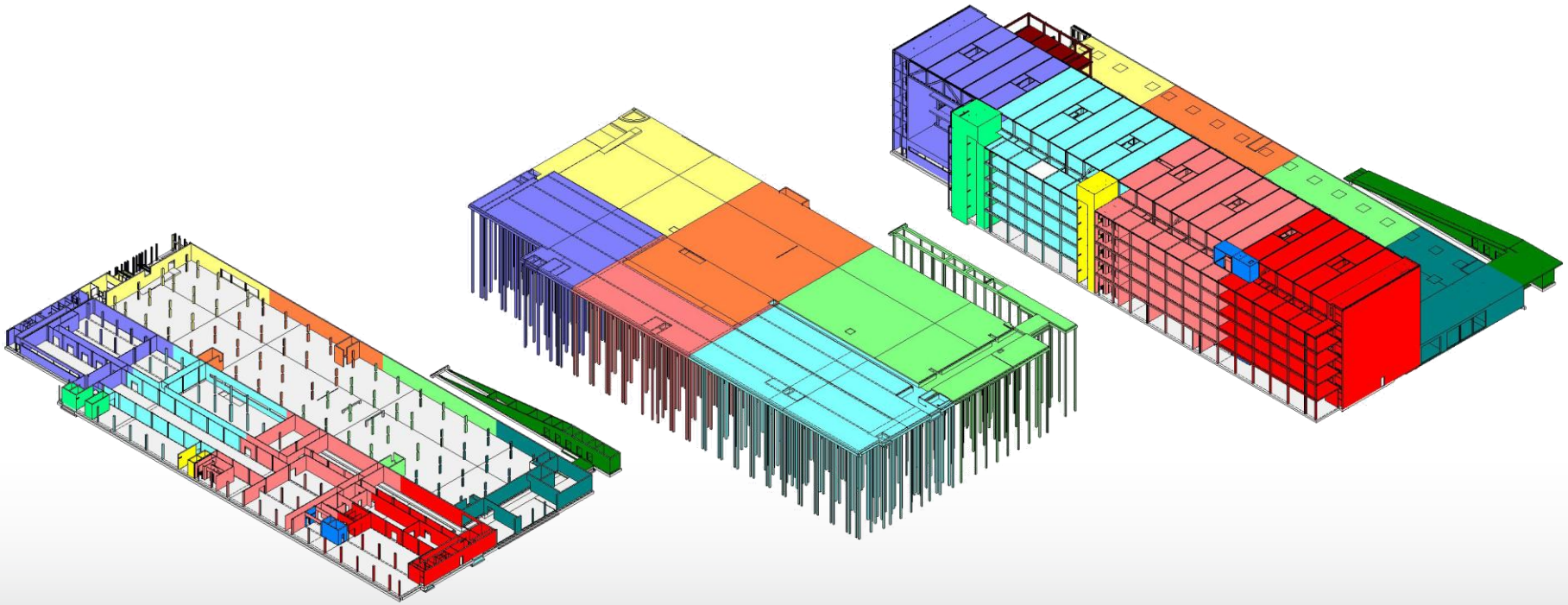






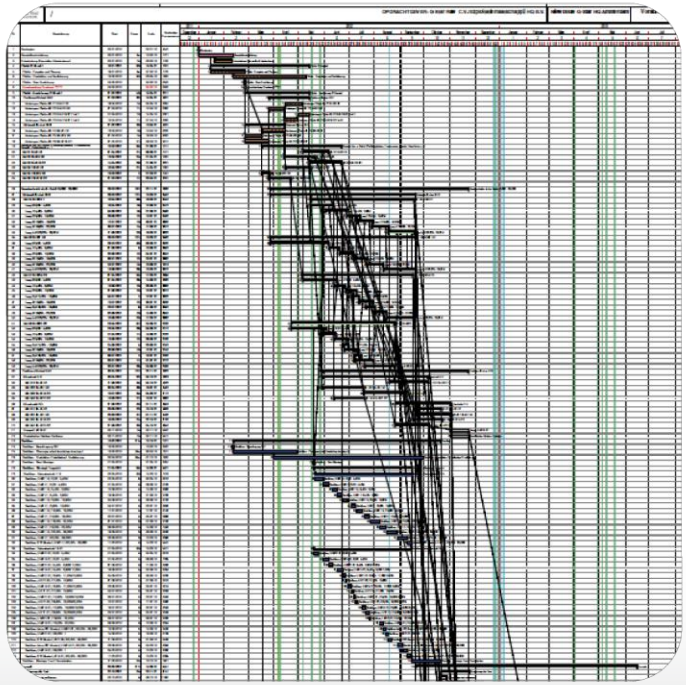
EXAMPLE 1: 5D PROCESS USING CLIENT'S MODEL

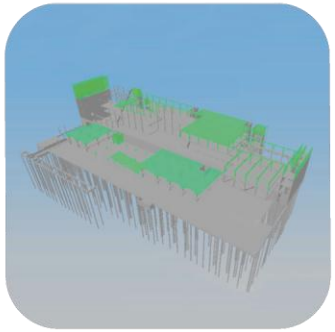
- **Scheduling**. Structural segmentation of work according to logical scheduling options. QTO per task

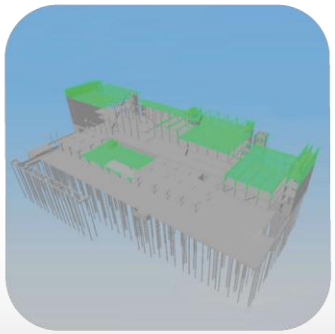


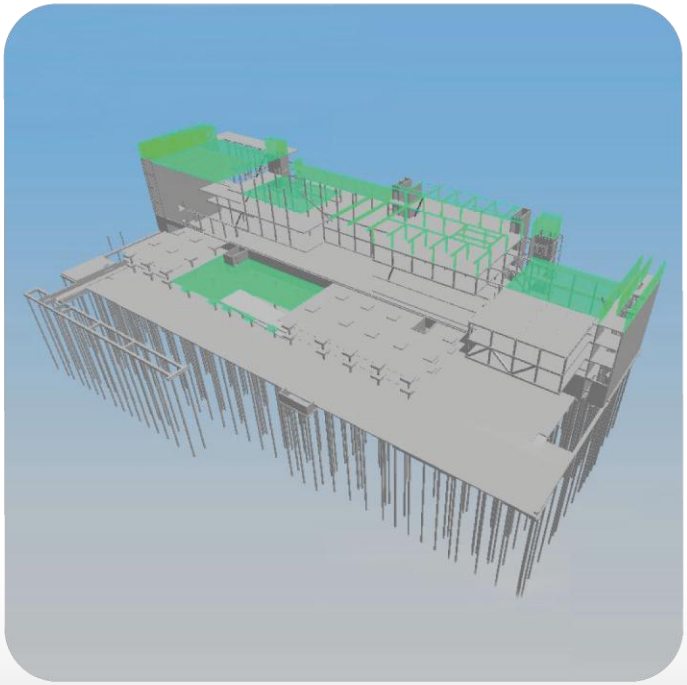
EXAMPLE 1: 5D PROCESS USING CLIENT'S MODEL

- **Scheduling**. Linking the adapted model to proposed schedule for internal verification and presentation to the client



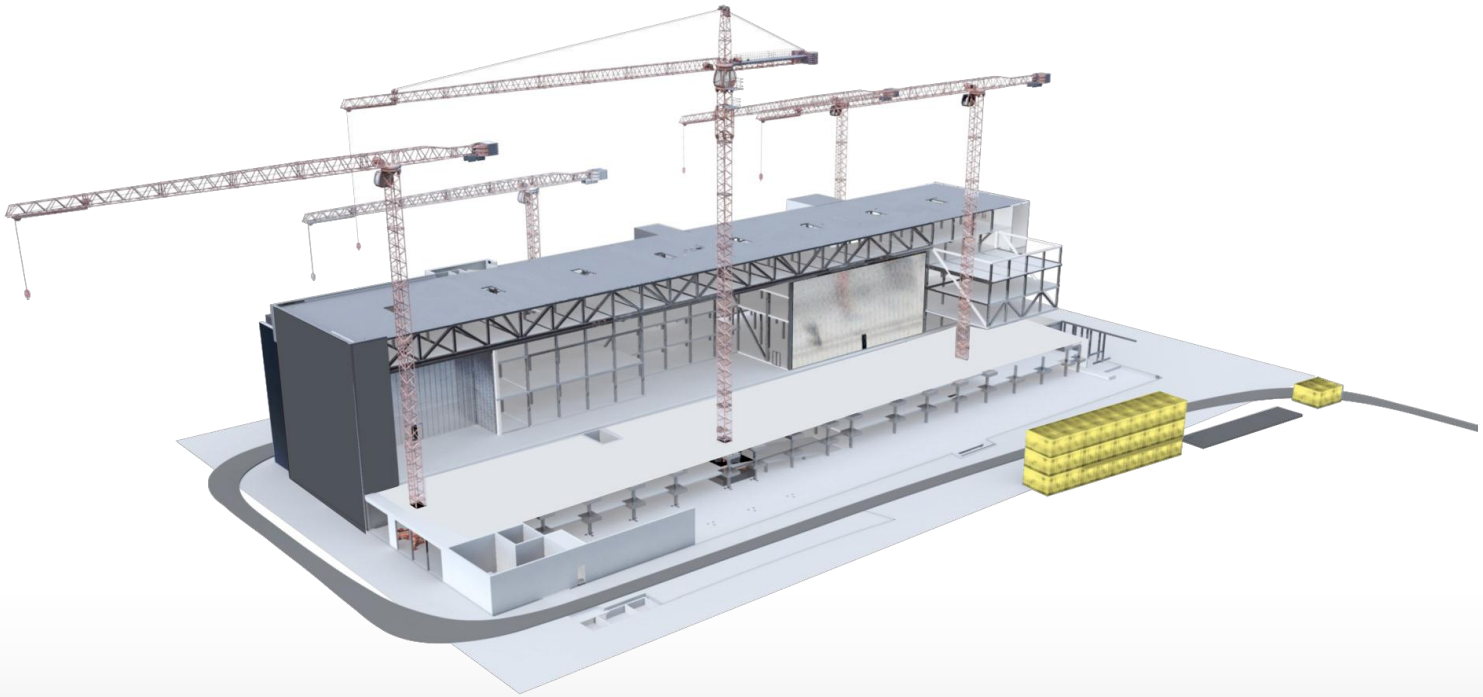






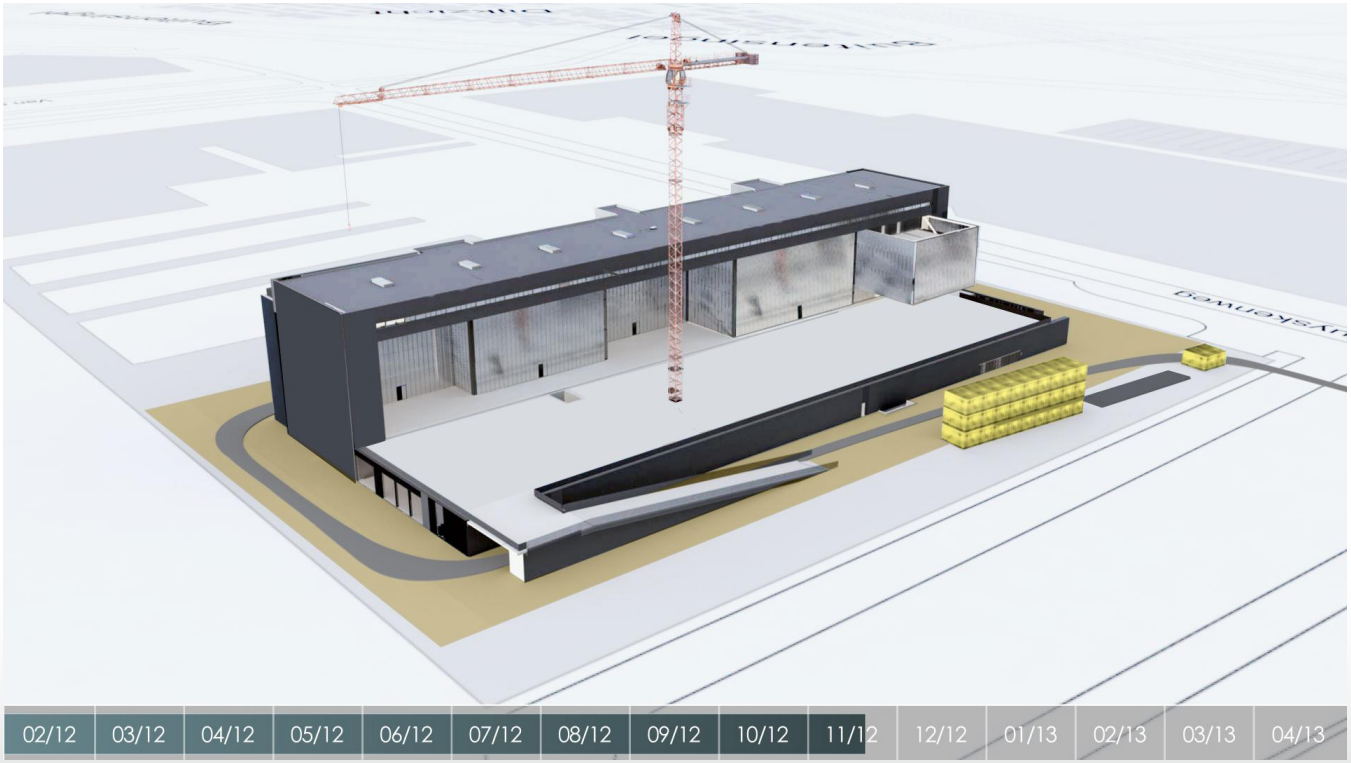
EXAMPLE 1: 5D PROCESS USING CLIENT'S MODEL

- **Site planning**. Use of existing BIM model to efficiently plan and assure site-planning



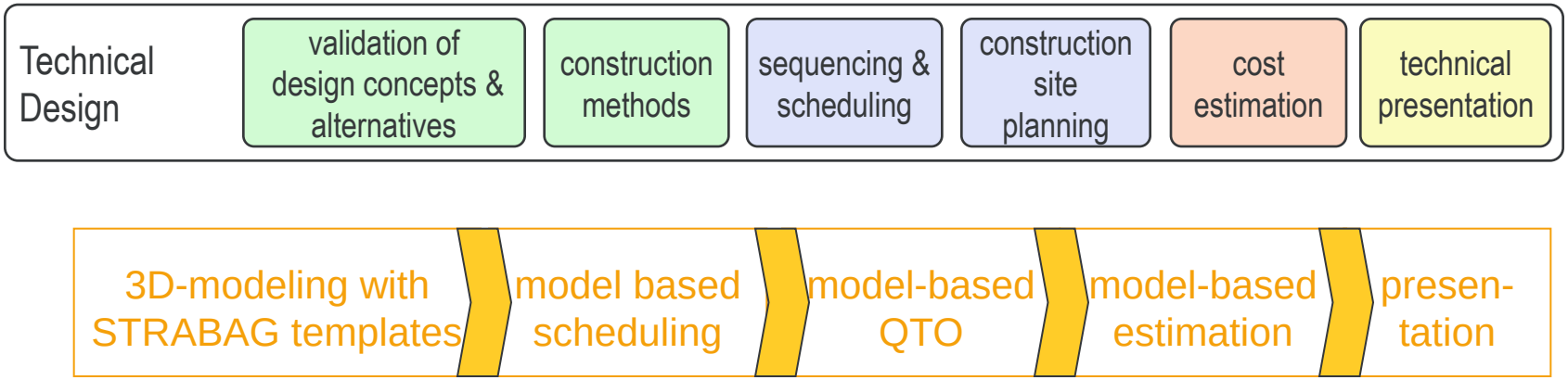
EXAMPLE 1: 5D PROCESS USING CLIENT'S MODEL

- **Presentation for the client.** Using all preceding sub-deliverables to show the client the result of the tender.



EXAMPLE 2: 5D "FROM SCRATCH"

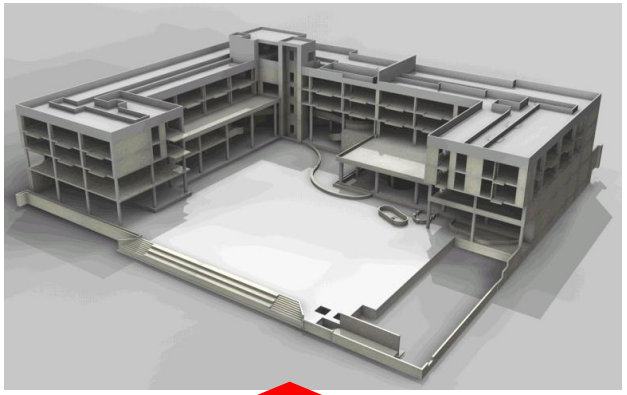
- multi-storey office building: in-house creation of tender model



EXAMPLE 2: 5D "FROM SCRATCH"

- Quality, efficiency and thorough processes enabled by process integration

template-based 3D modeling



template library

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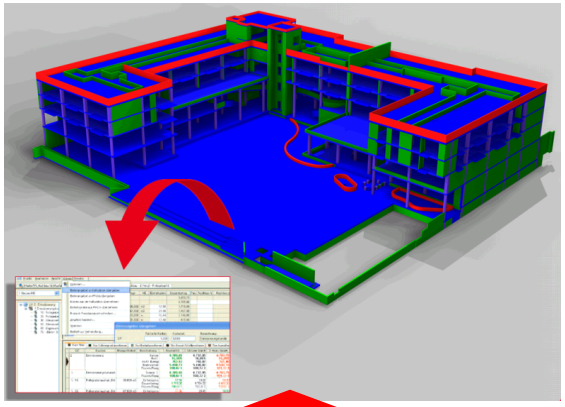
model-based quantity take-off and estimation



standardized QTO recipies and estimation structure

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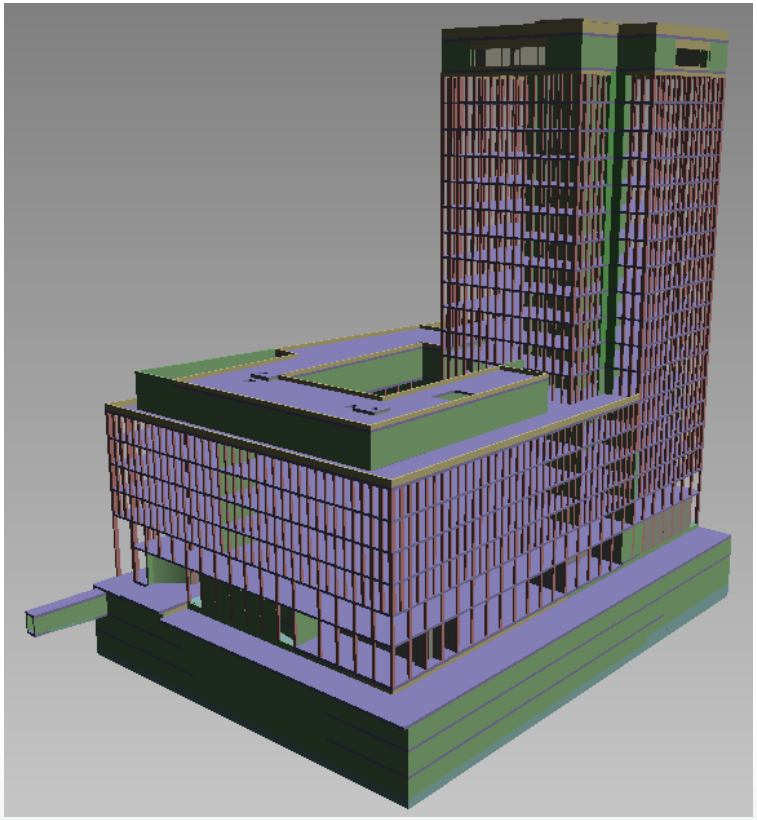
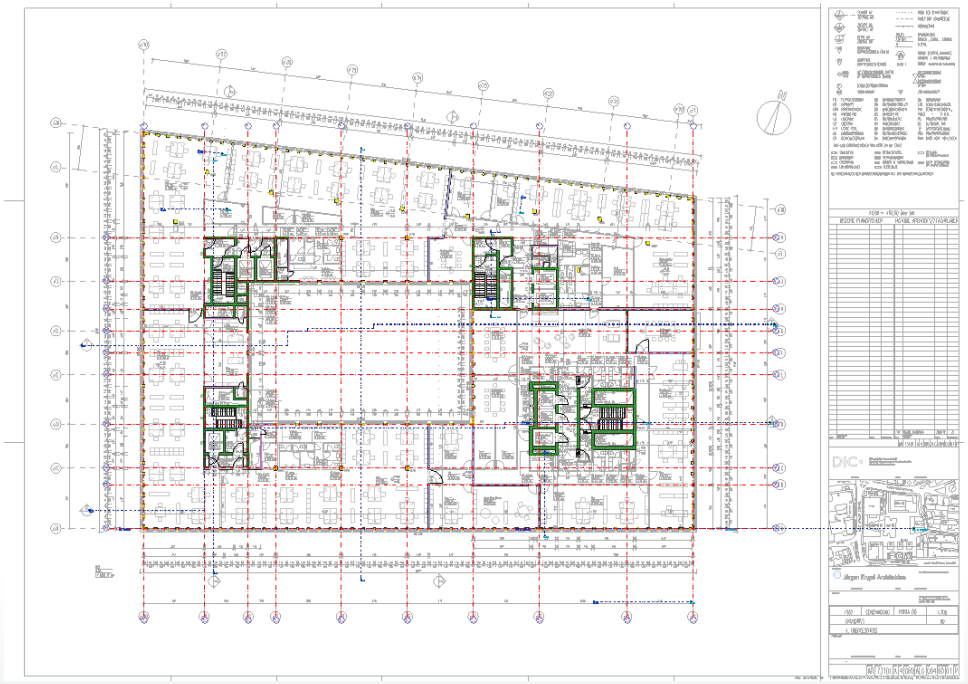
EXAMPLE 2: 5D "FROM SCRATCH"

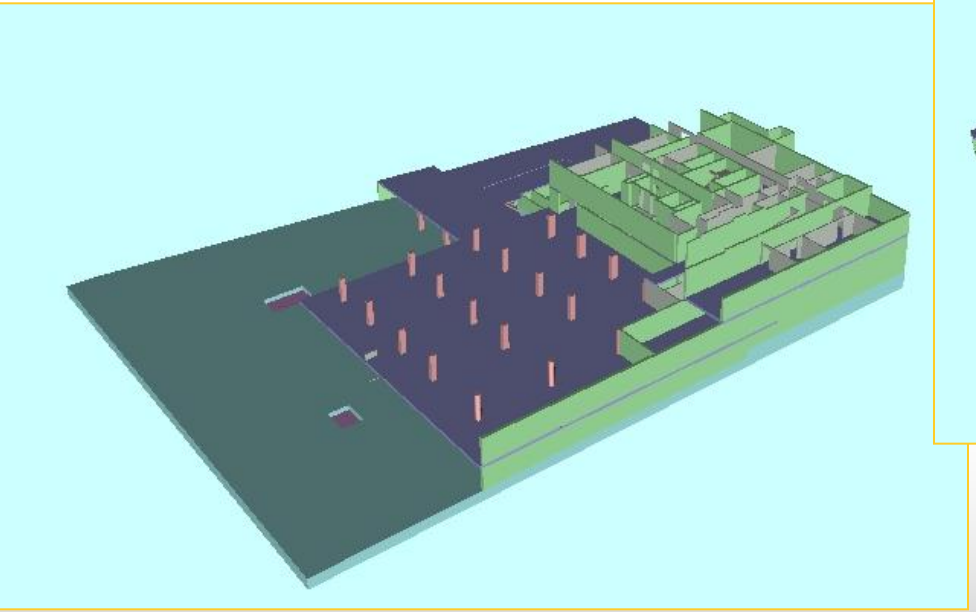
- 3D modeling

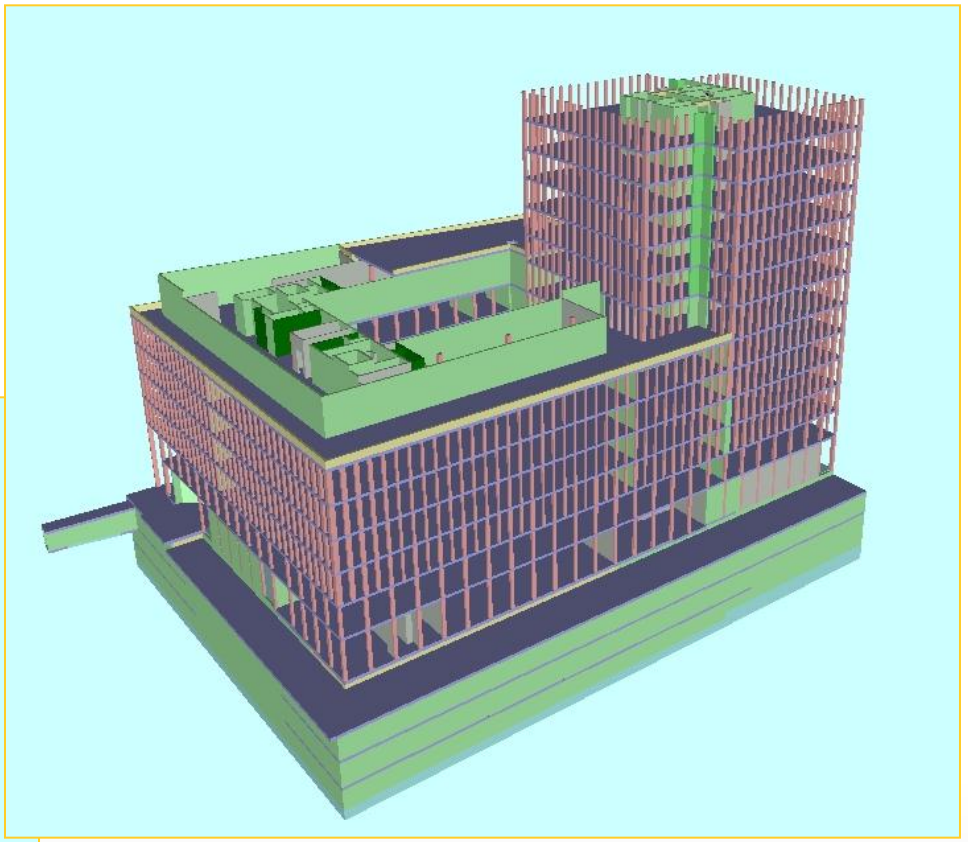




EXAMPLE 2: 5D "FROM SCRATCH"

- 3D scheduling

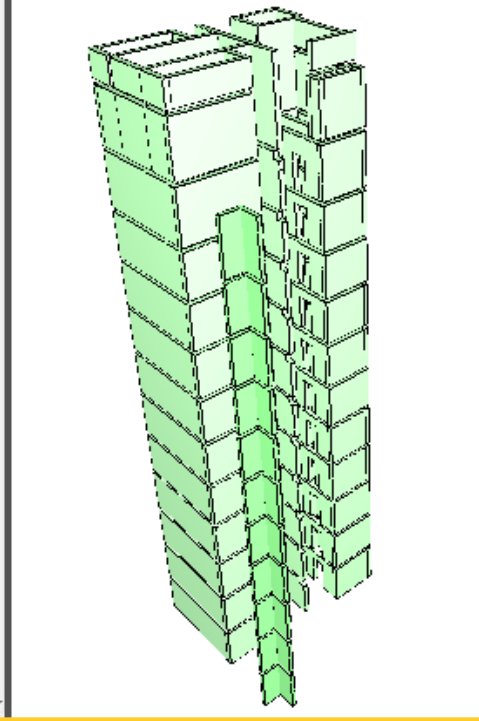




EXAMPLE 2: 5D "FROM SCRATCH"

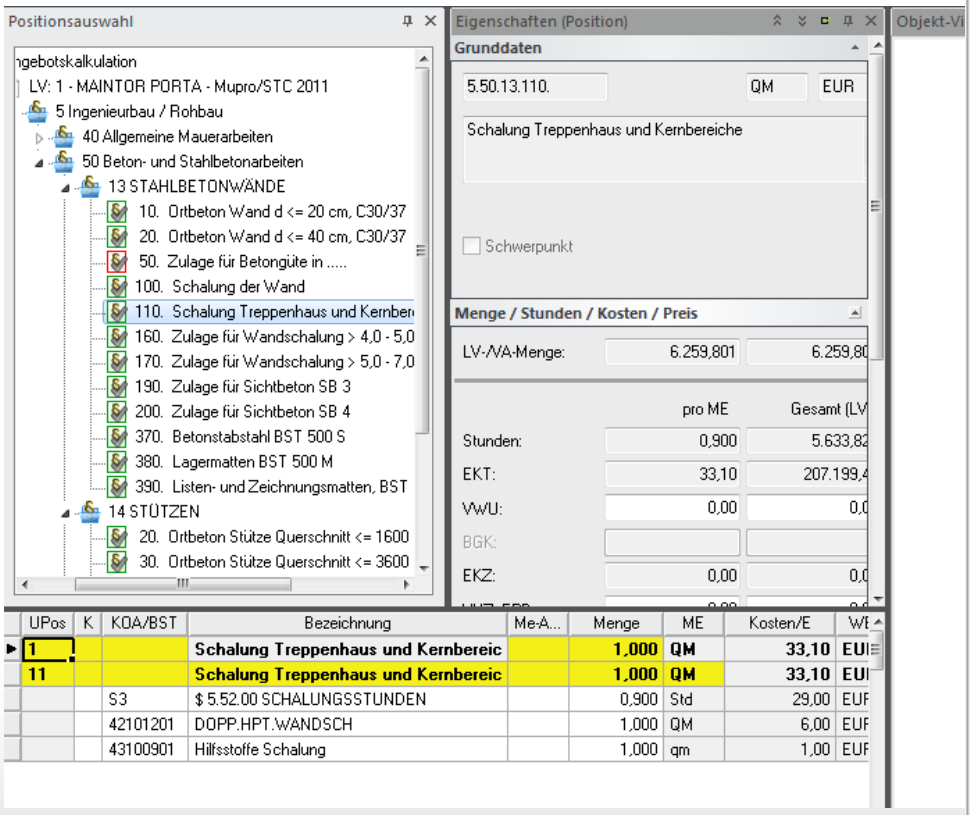
- Model-based quantity take-off according to STRABAG standards

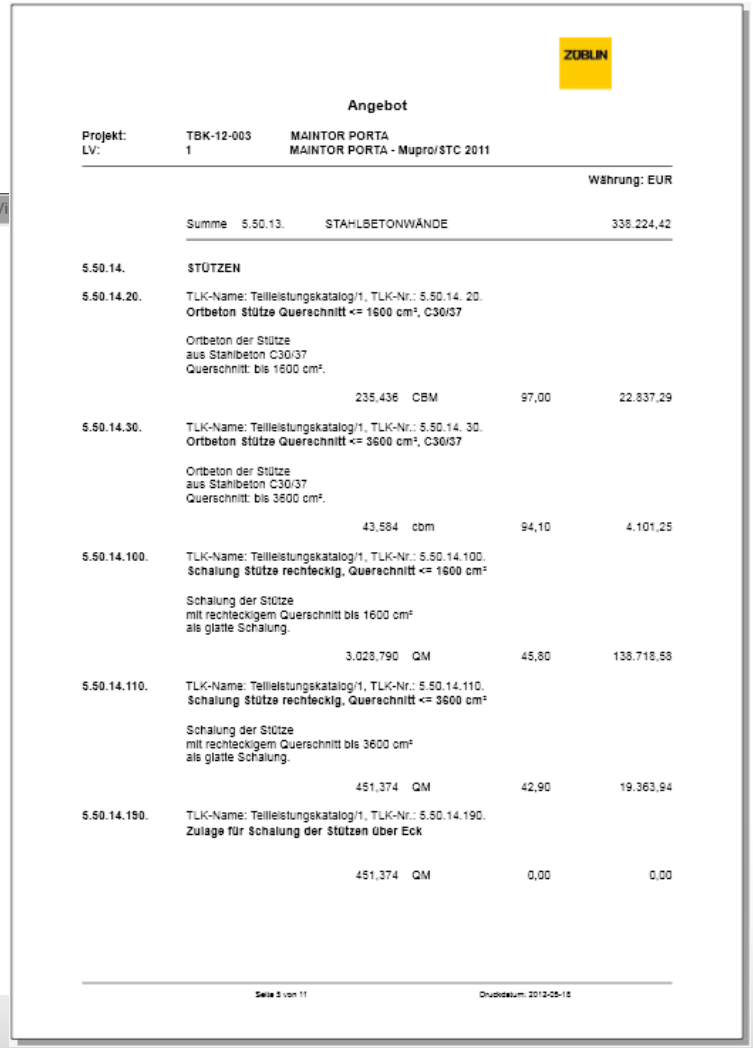
Struktur	Schlüssel	Bezeichnung	Menge	ME
	-	**Ausstattung**		
	10	Rohbau		
	10.30	Mauerwerk		
	10.60	Stahlbetonwände		
	10.60.10	Stahlbetonwand		
	10.60.10.10	Ortbeton Wand d <= 20 cm, C30/37	30,434	CBM
	10.60.10.20	Ortbeton Wand d <= 40 cm, C30/37	59,546	CBM
	10.60.10.40	Schalung der Wand	787,134	QM
	10.60.10.800	Plausibilität		
	10.60.10.900	Konsistenzcheck		
	10.60.30	Stahlbeton-Kernwand		
	10.60.30.20	Ortbeton Wand d <= 40 cm, C30/37	1.044,241	CBM
	10.60.30.40	Schalung Treppenhaus und Kernberei	6.259,801	QM
	10.60.30.60	Zulage für Wandschalung > 5,0 - 7,0 r	328,201	QM
	10.60.30.800	Plausibilität		
	10.60.30.900	Konsistenzcheck		
	10.70	Stützen		
	10.70.10	Stützen - rechteckig		
	10.70.10.20	Ortbeton Stütze Querschnitt <= 1600 c	235,436	CBM
	10.70.10.30	Ortbeton Stütze Querschnitt <= 3600 c	43,584	cbm
	10.70.10.90	Schalung Stütze rechteckig, Querschr	3.028,790	QM
	10.70.10.100	Schalung Stütze rechteckig, Querschr	451,374	QM
	10.70.10.114	Zulage für Schalung der Stützen über	451,374	QM
	10.70.10.800	Plausibilität		



EXAMPLE 2: 5D "FROM SCRATCH"

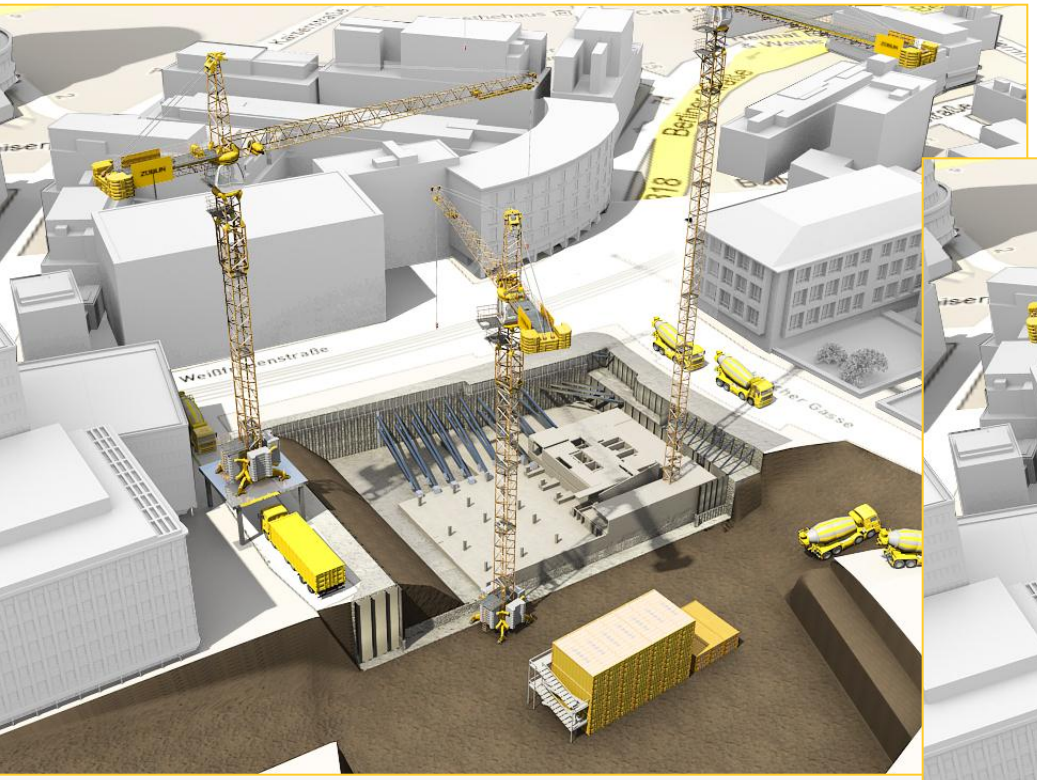
- Model-based estimation

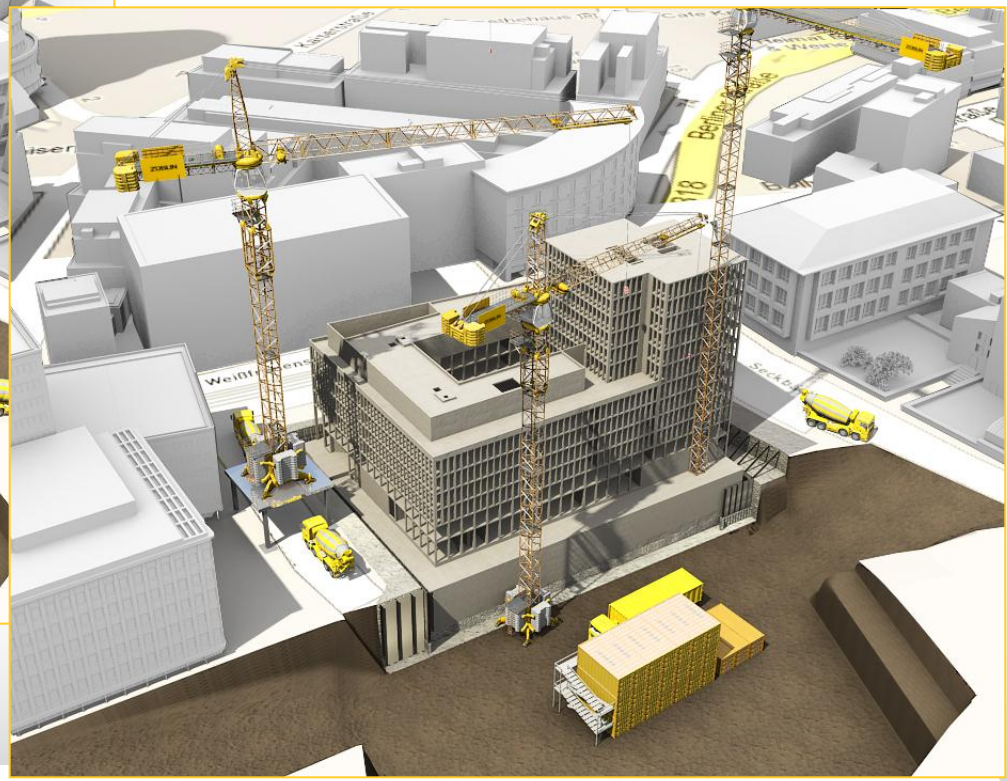




EXAMPLE 2: 5D "FROM SCRATCH"

- presentation to the client – on base on „work“ model





THANK YOU.

ZÜBLIN

closing

closing

πάντα ῥεῖ (panta rhei)
- all flowes (Heraklit)