

PLANNING THE FUTURE

Data. Facts. References.

1. Our company
2. What is BIM and why using it ?
3. BIM History within OBERMEYER.
4. Digital design process (examples)
5. BIM at site.

***“Give me six hours to chop down a tree and I will spend the first four sharpening the axe.”***

*Abraham Lincoln*



## COMPANY DATA AND FIGURES

Locations. History. Facts.

# BUSINESS FIELDS



Architecture & Urban Development

Industry & Trade

Airports

Healthcare

Education & Research

Security Engineering

Structural Engineering

Technical Equipment

Energy Efficiency

Building & Room Acoustics

Construction Management



Traffic Planning

Roads

Railways

Traffic Structures & Bridges

Tunnels & Underground Engineering

Construction Management



Energy Systems

Water & Waste Management

Immission Protection

Building & Area Recycling

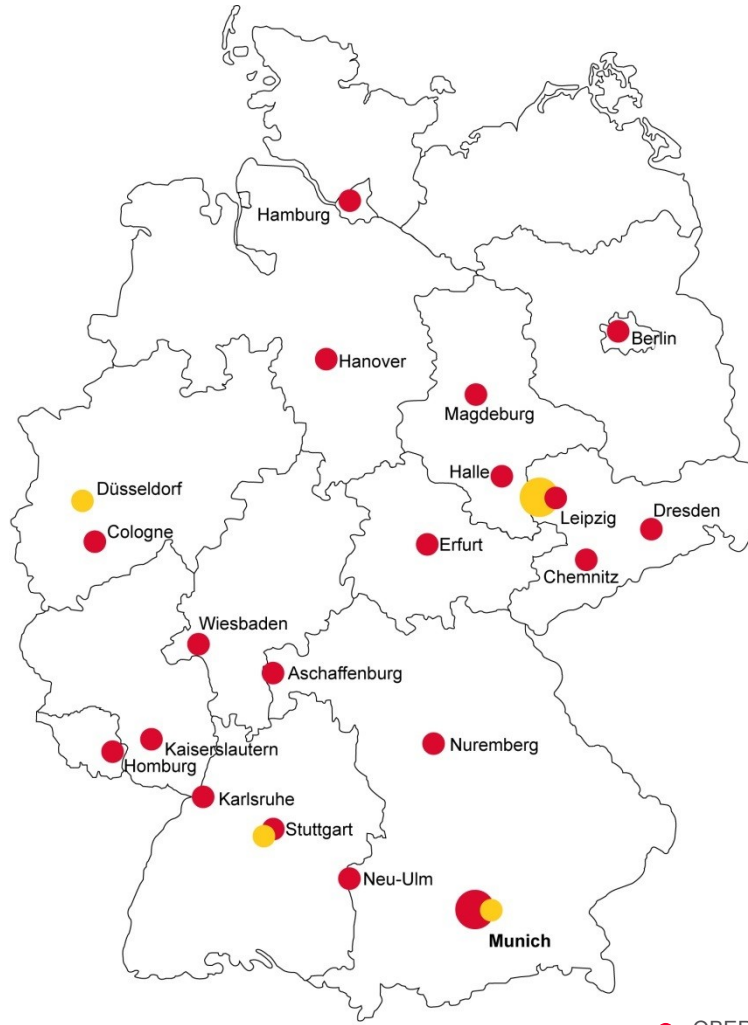
Site Development Planning



- **Independent design** and advice in the business fields buildings, transport and energy & environment
- Integrative **overall planning** with extensive technical know-how
- Tailor-made and customer-oriented solutions for **complex construction projects**
- Coordination and control of **interdisciplinary** projects
- Implementation of the **latest scientific findings** from research and development
- International activities, regional presence

# OBERMEYER GERMANY

Locations branch offices and subsidiaries



- OBERMEYER Planen + Beraten GmbH
- OBERMEYER Project Management GmbH

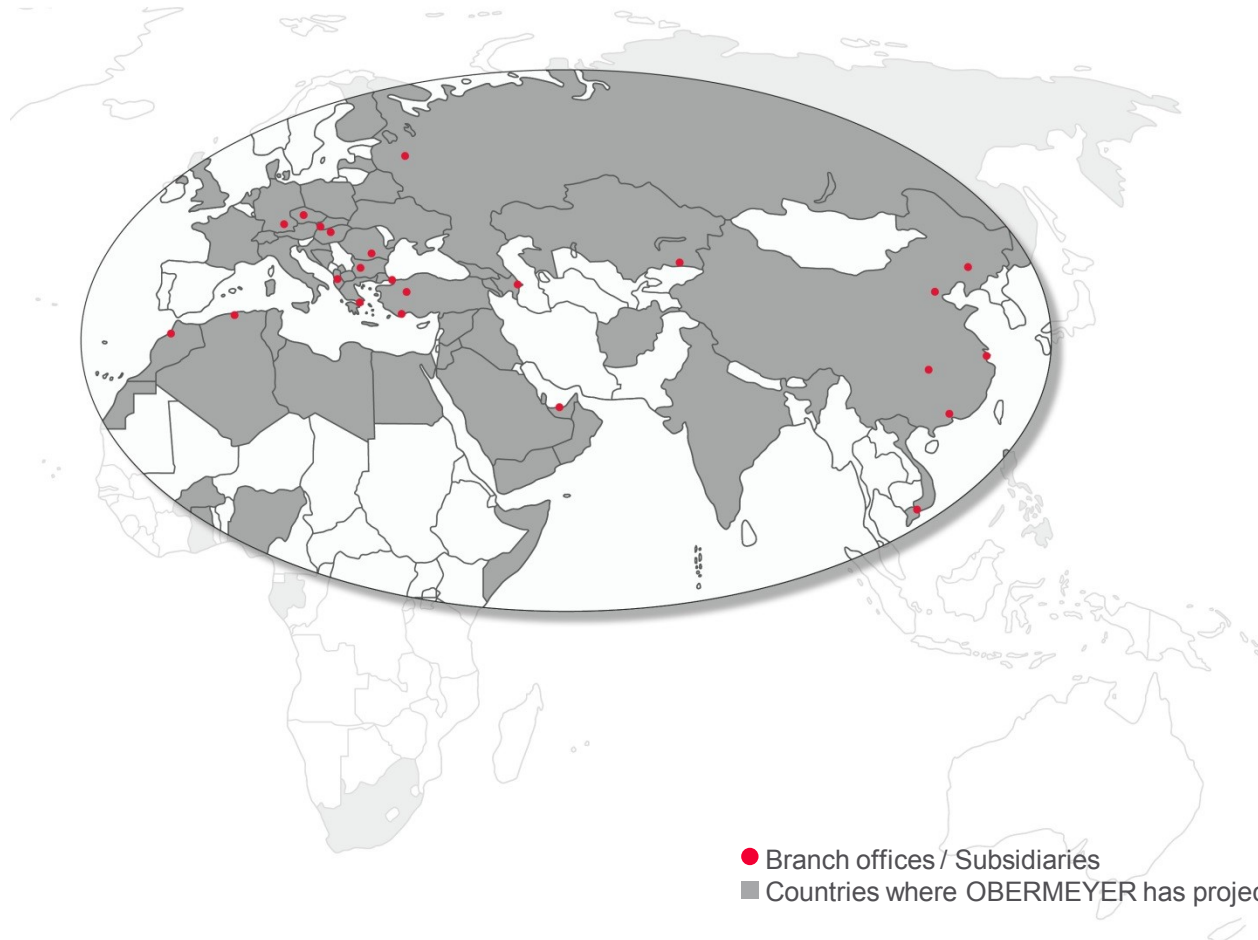
# OBERMEYER INTERNATIONAL

International branch offices and subsidiaries

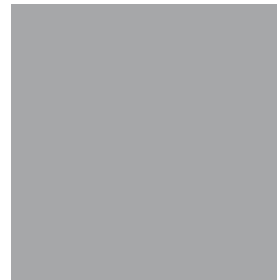


Abu Dhabi  
Algiers  
Almaty  
Ankara  
Antalya  
Athens  
Baku  
Beijing  
Bratislava  
Budapest  
Bucharest  
Guangzhou  
Ho Chi Minh City

Istanbul  
Moscow  
Munich  
Prague  
Rabat  
Shanghai  
Shenyang  
Sofia  
Tirana  
Wuhan



● Branch offices / Subsidiaries  
■ Countries where OBERMEYER has project experience



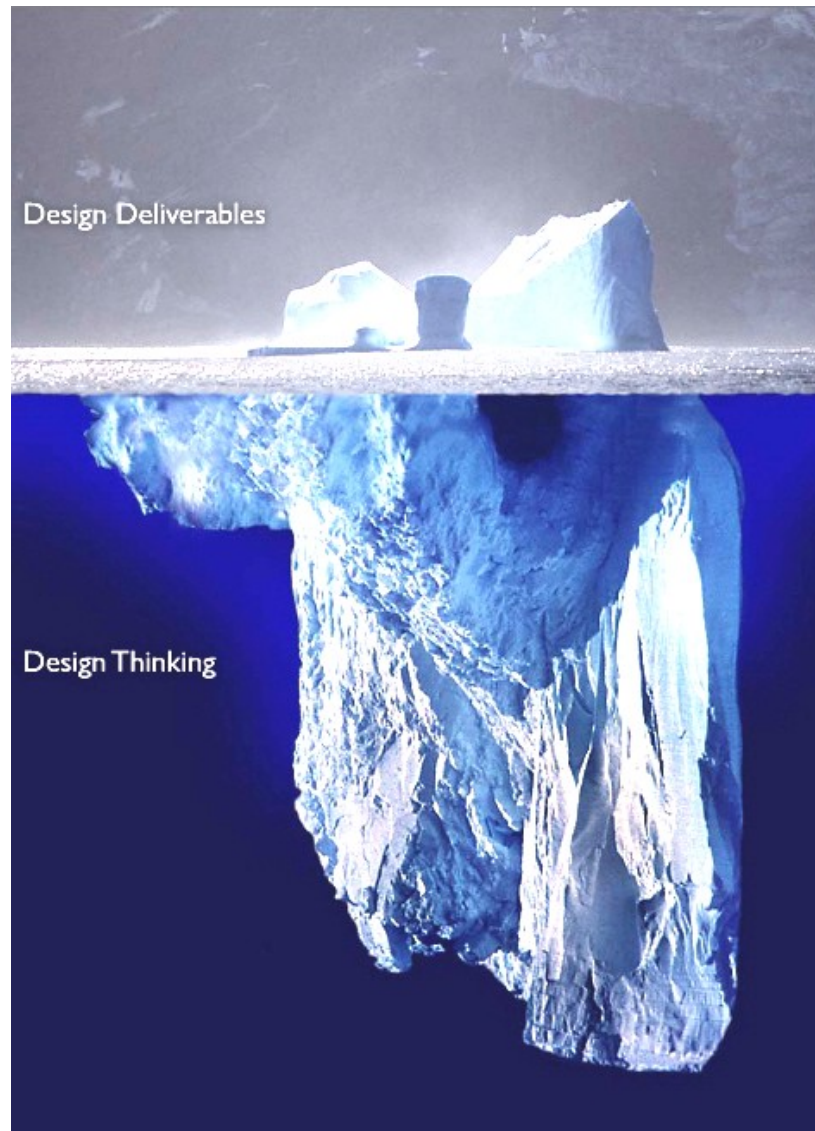
# WHAT IS BIM?

Ideas. History. Development.

BIM (BUILDING INFORMATION MODELING)  
IS A  
**WORK METHODOLOGIE**  
IN THE CONSTRUCTION BUSSINES  
IT IS NOT AN IT-PROJECT.

THE MAIN FOCUS IS THE CENTRIC  
**MANAGEMENT** OF  
**PROJECT INFORMATION**  
AND THE COHERENT  
**PRODUCTIVITY** AND **QUALITY** INCREASE

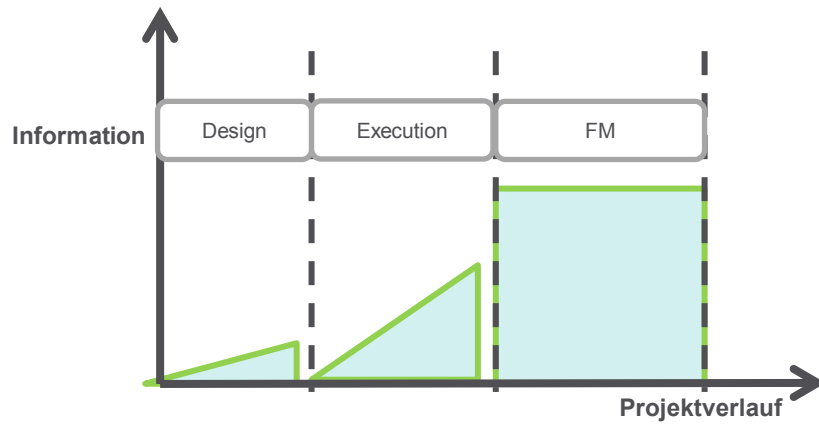
## Main challenge of a traditional design approach



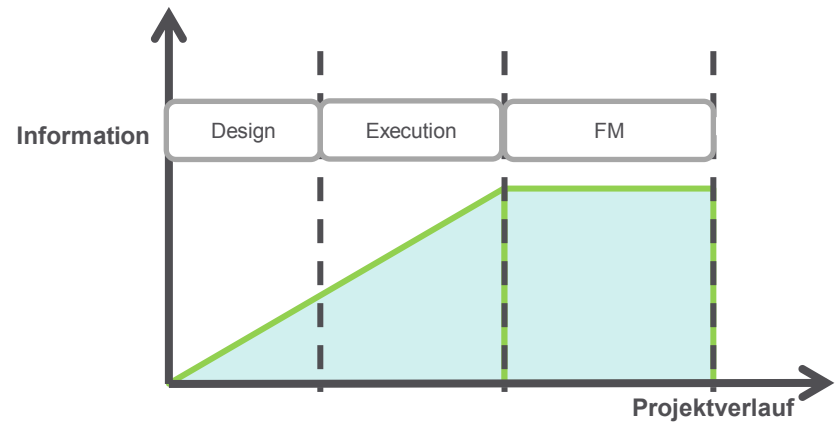
this information  
reaches the site

lost information

## Concept – continuity of information



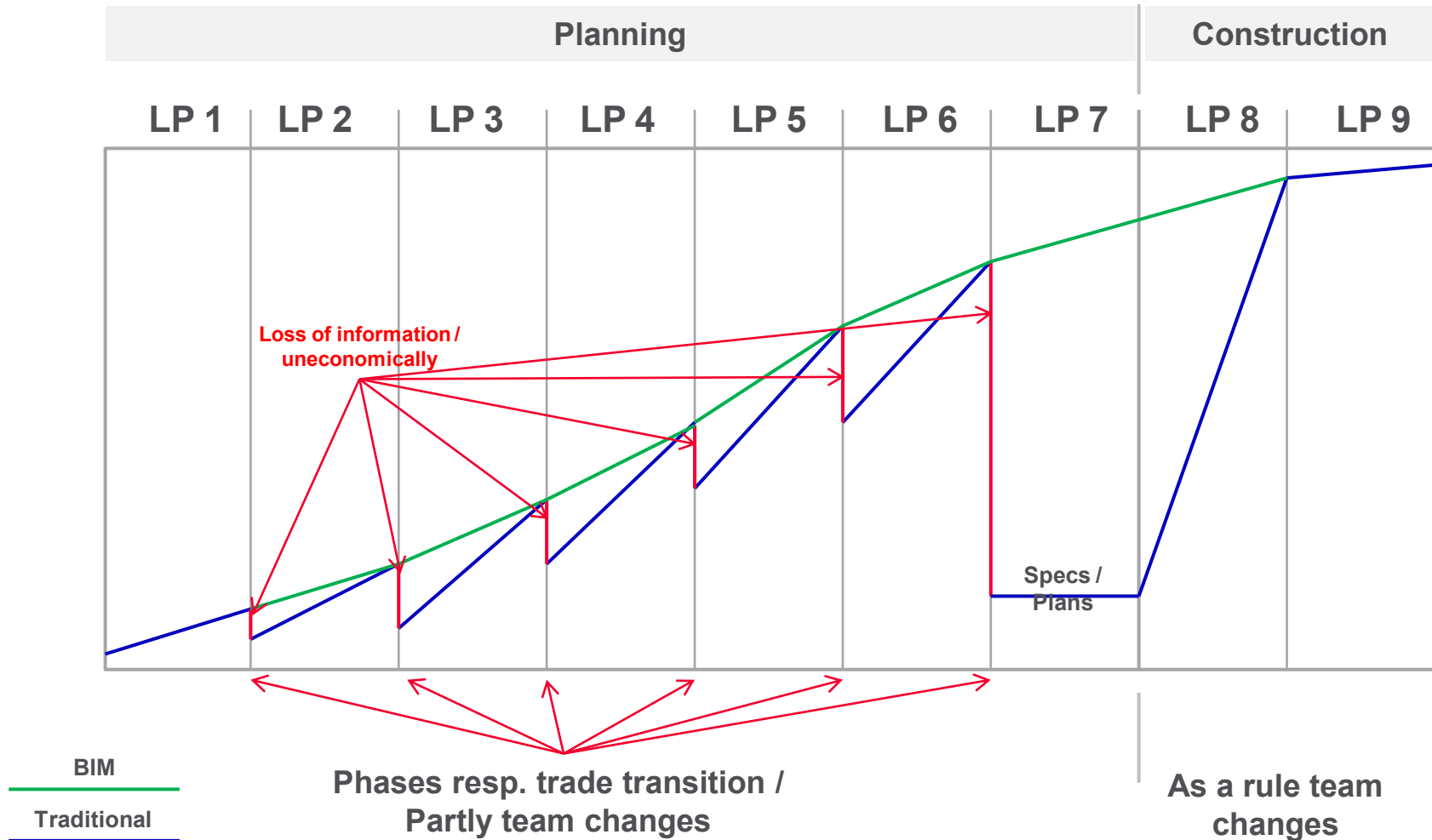
TRADITIONAL



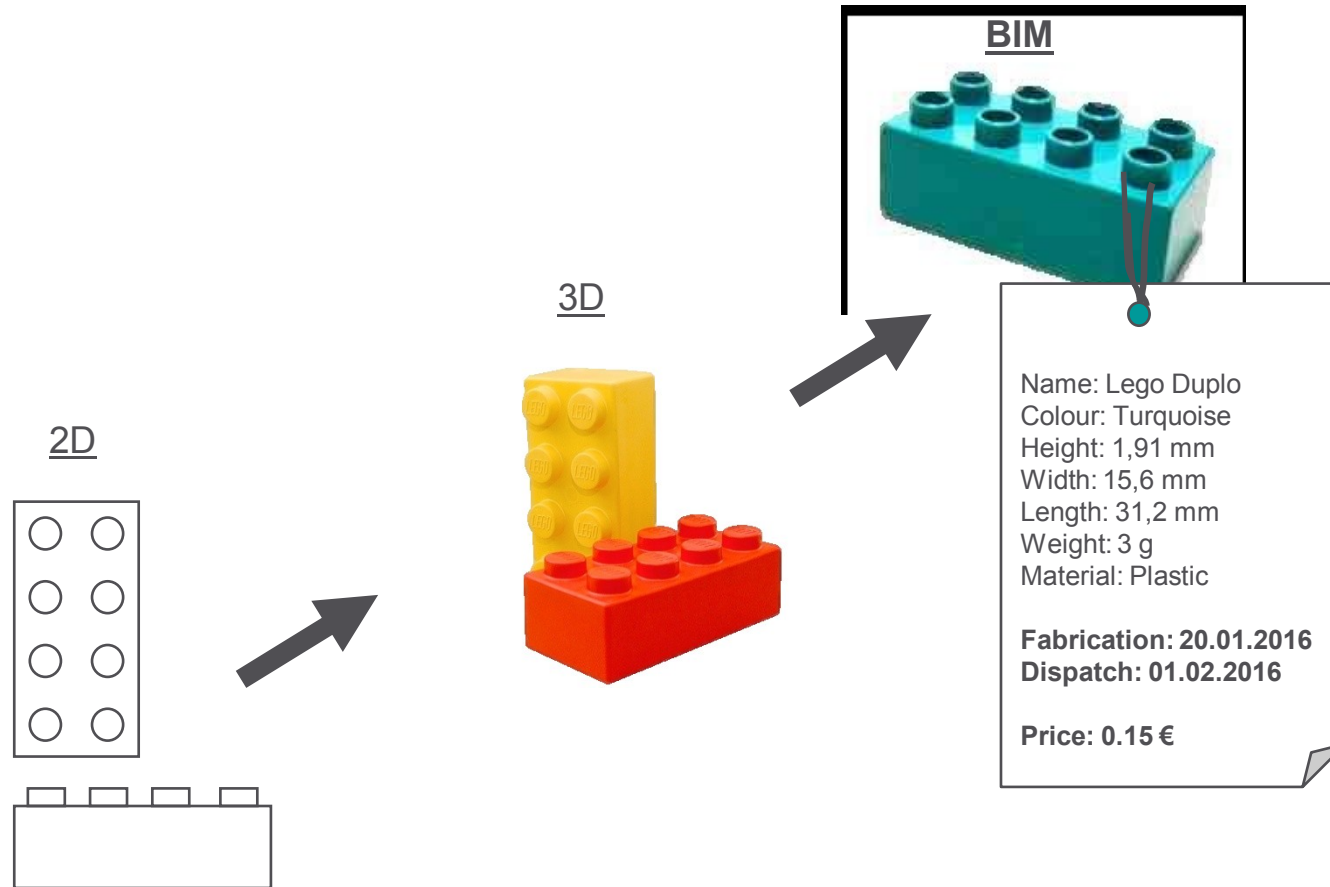
BIM

## ... AND THIS IS SO IN PLANNING TOO...

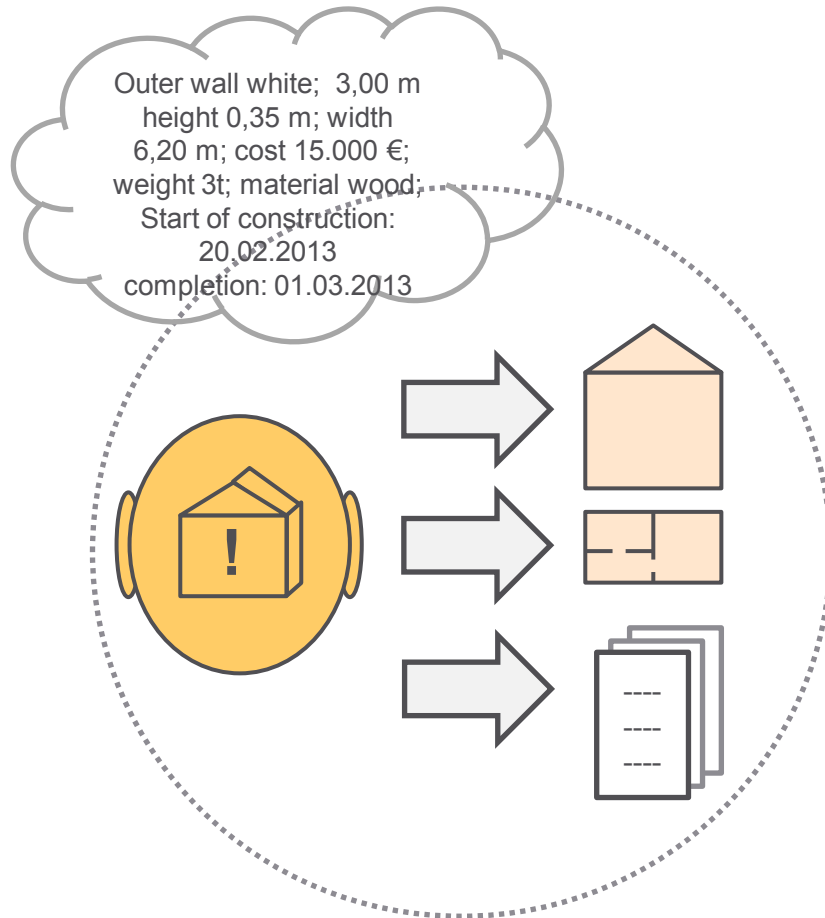
Qualitative description of the Information level in the planning process



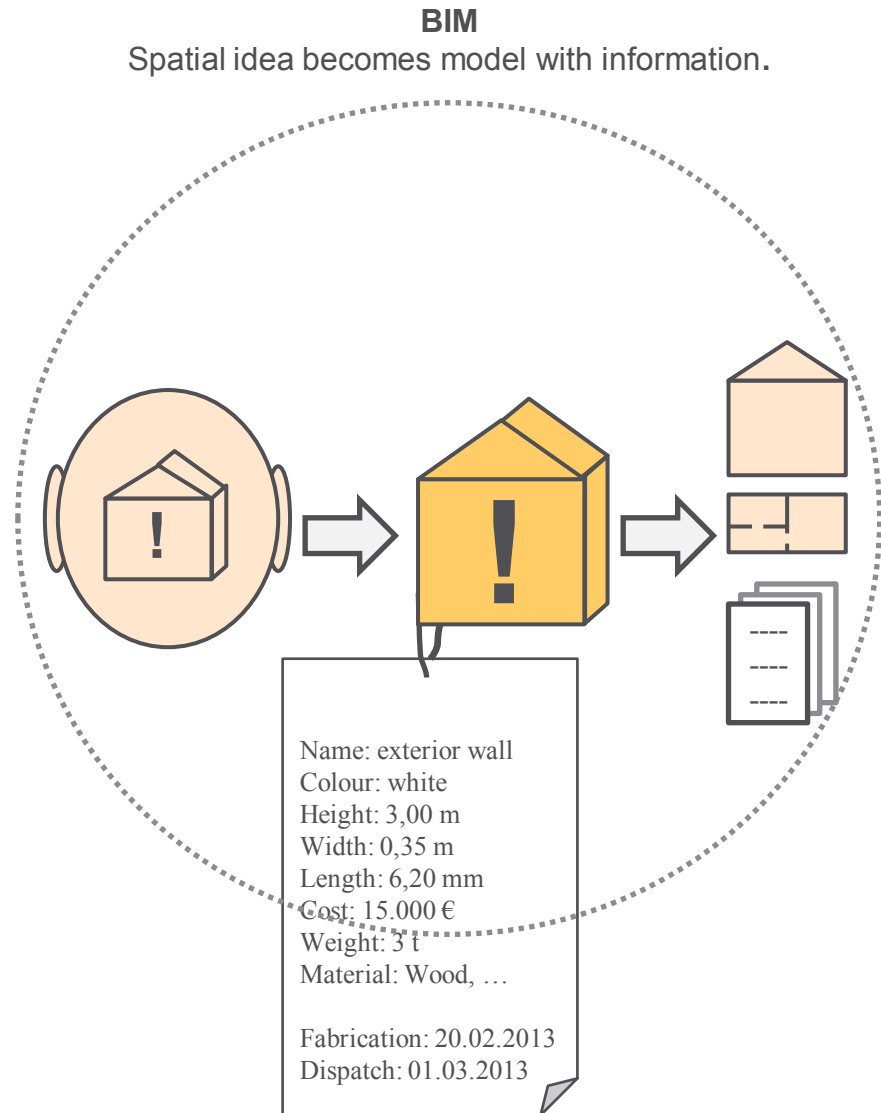




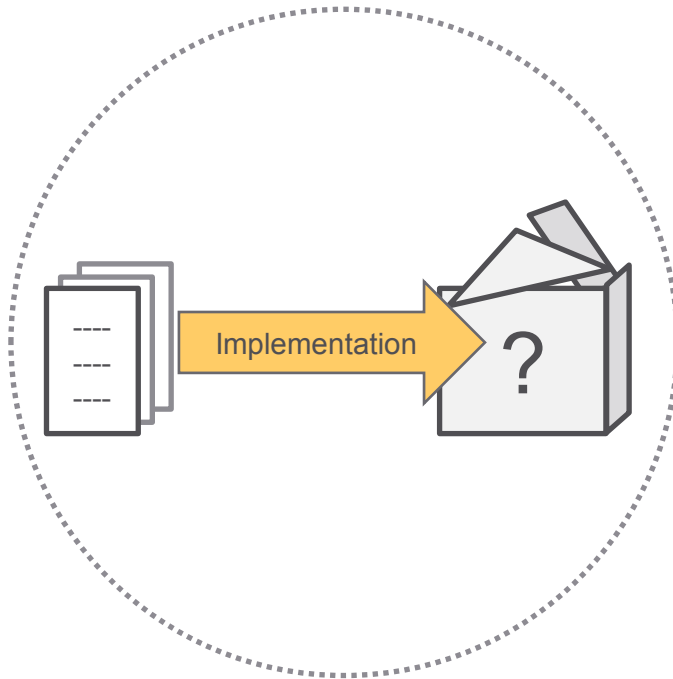
... Where does the following come from...



**TRADITIONAL**  
Spatial idea becomes plans and LVs.

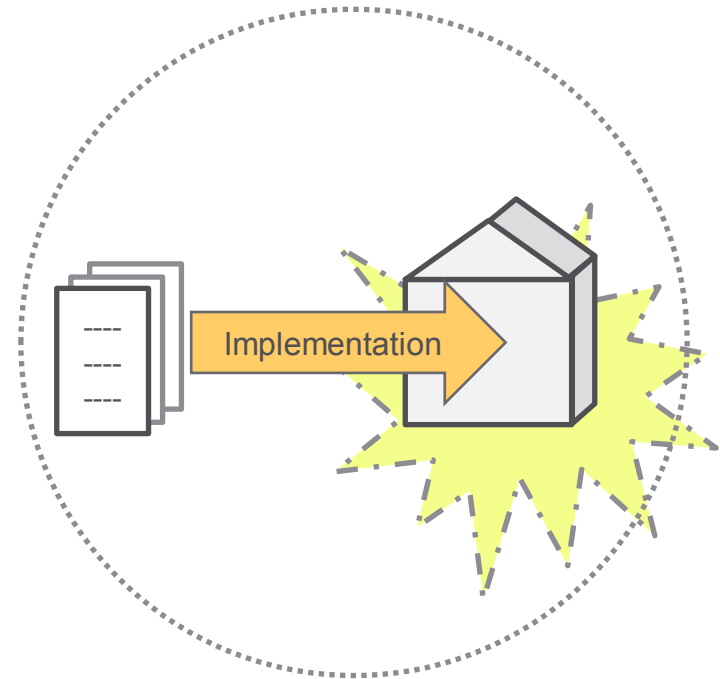


**BIM**  
Spatial idea becomes model with information.



### TRADITIONAL

The idea of designing is “put together” for the first time on the spatial level.



### BIM

The spatial fit has been simulated in the model.

# CLASSICAL SEQUENTIAL DESIGN PROCESS

Design of  
**Infrastructure**  
XXX



Design of  
**Structure**  
XXX



Design of  
**Fire Protection**  
XXX



Design of  
**MEP**  
XXX



Design of  
**Interiors**  
XXX



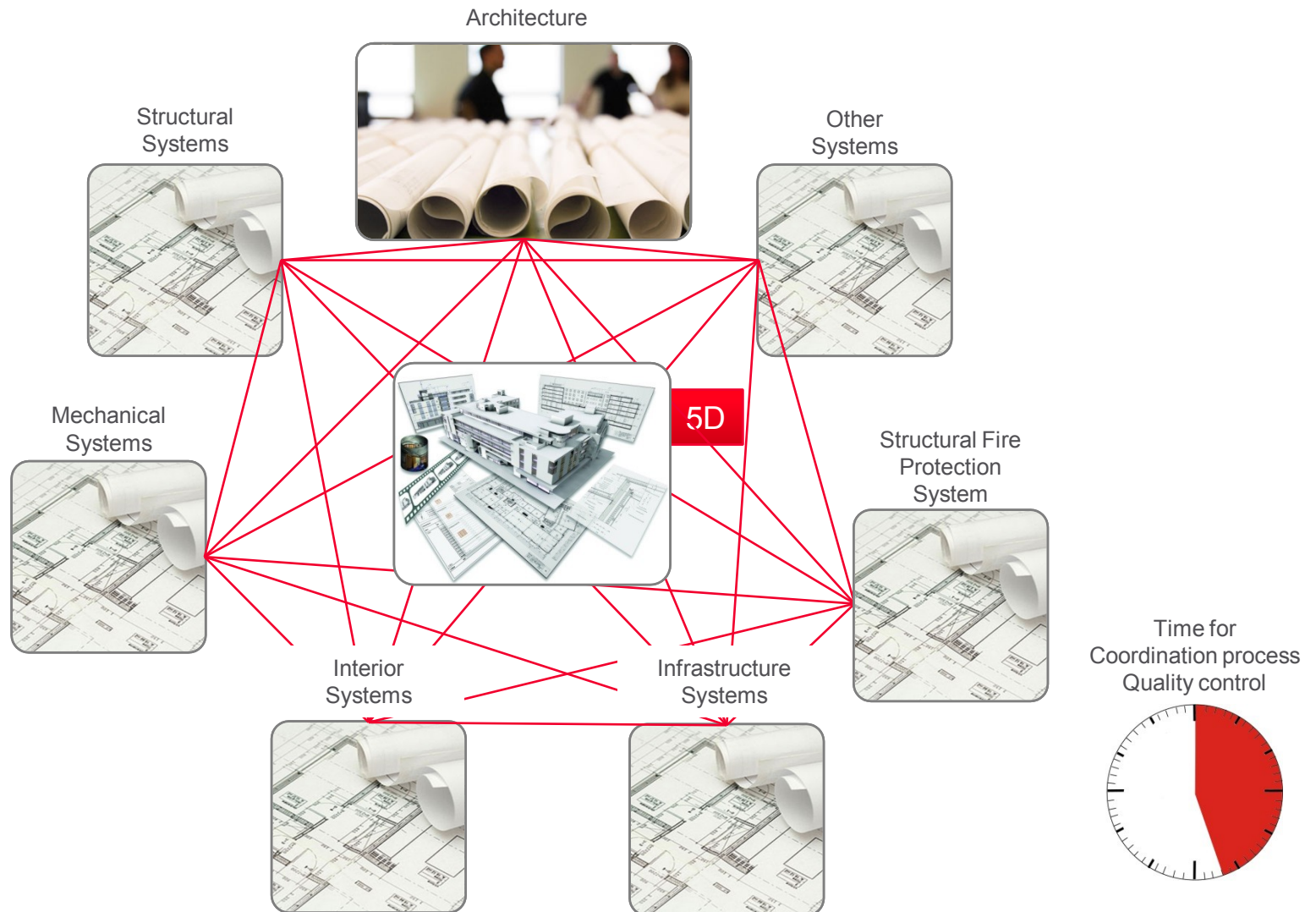
Additional  
**Specialists**  
XXX

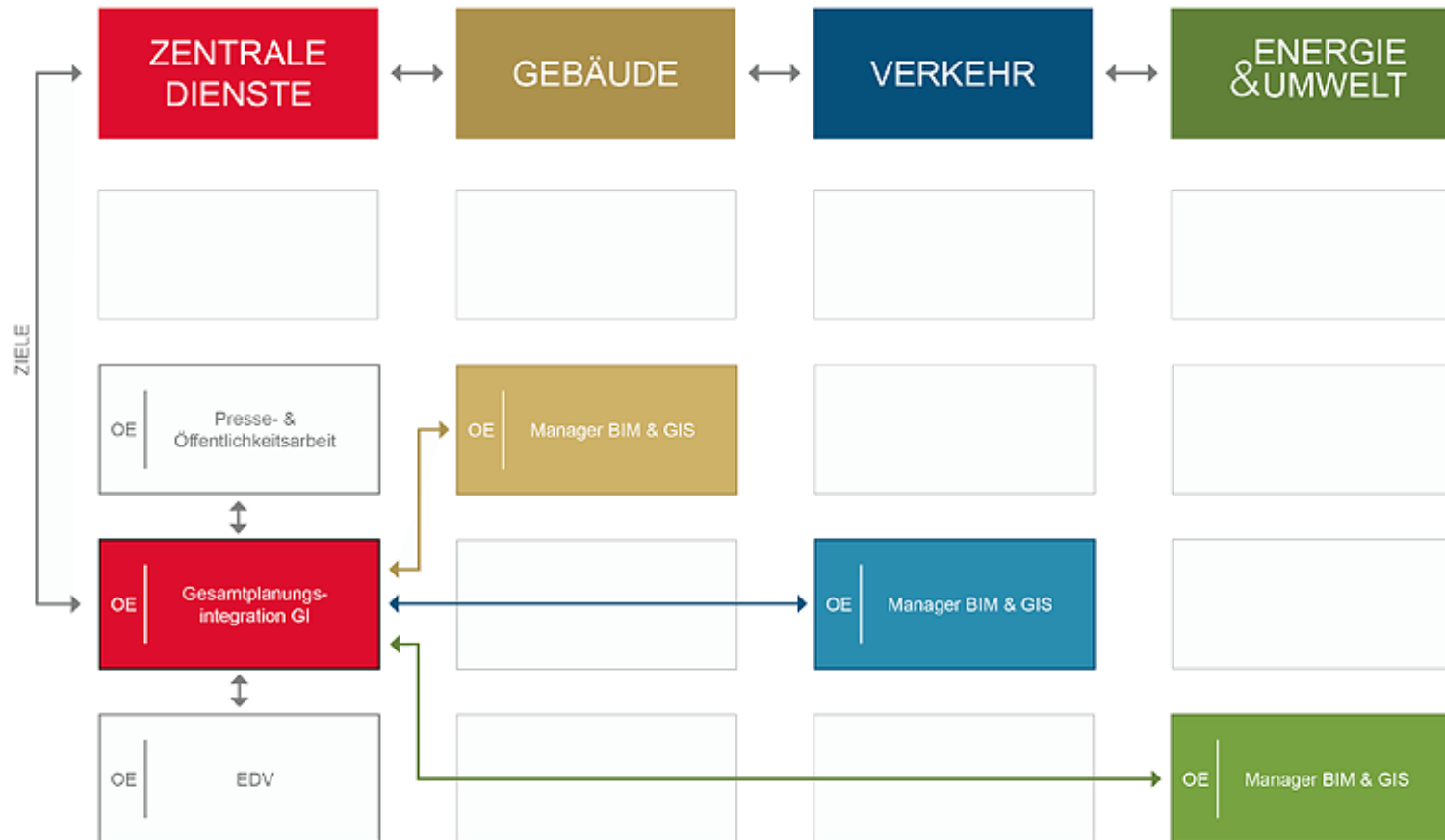


Time requirement  
for coordination

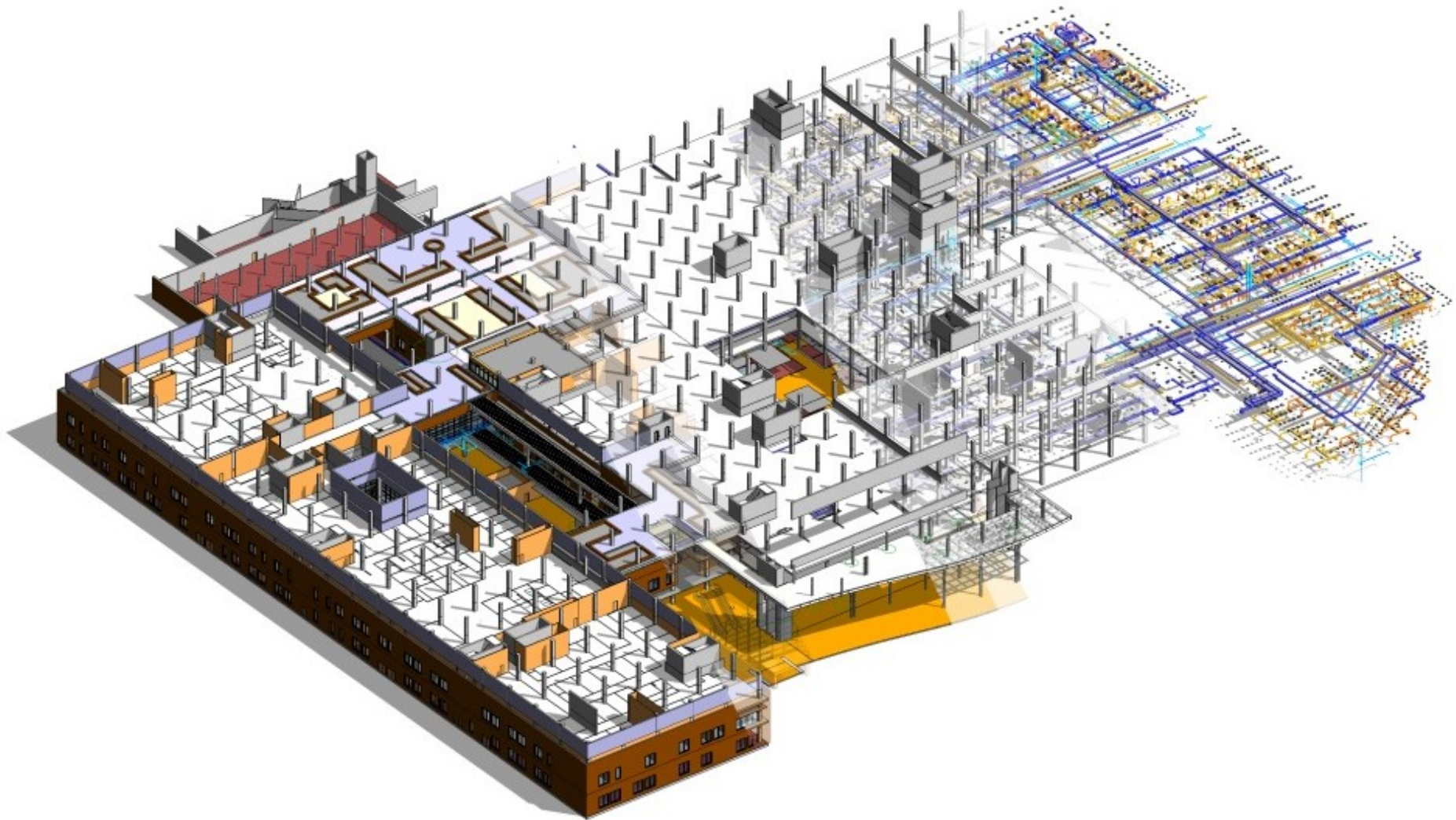
> **High risk for  
mistakes!**

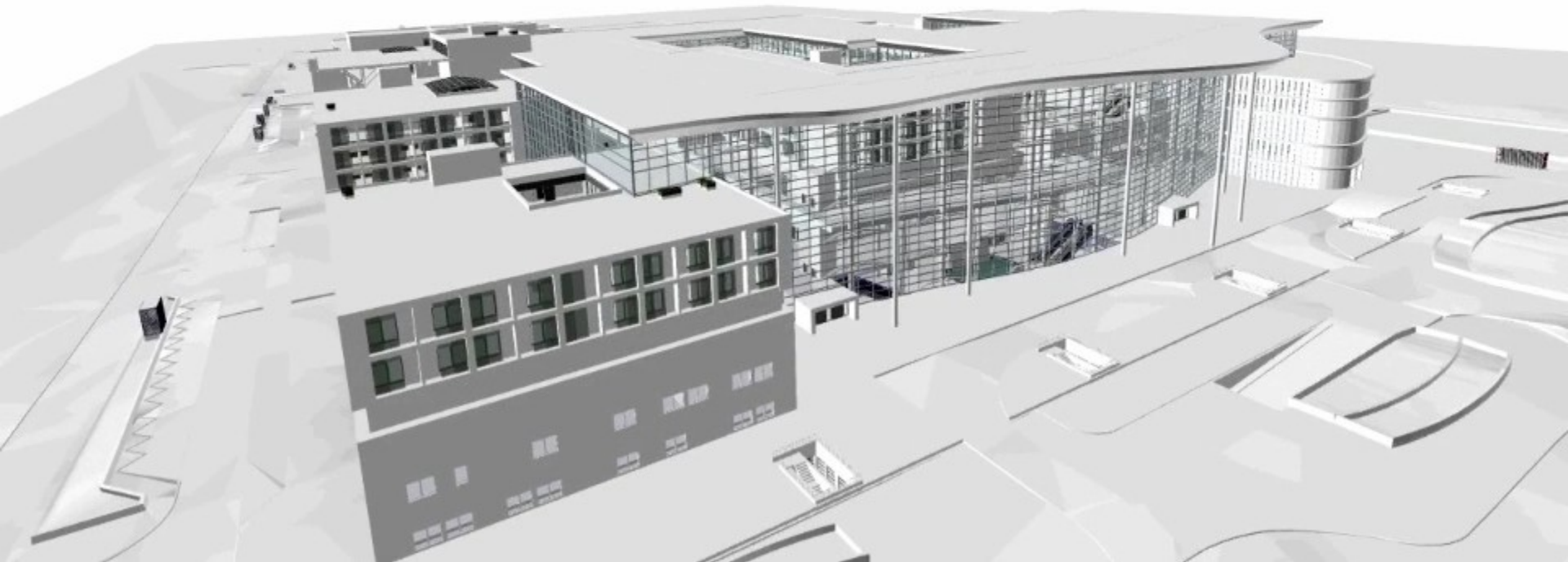






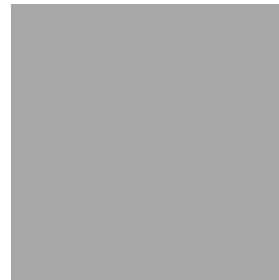






„... for the continuous usage and development of BIM since 2005 for integrated planning, analysis and documentation ...“





## HISTORY OF BIM / IT WITH OBERMEYER

Motivation. Objectives. Advantages.

# MILESSTONES OF DEVELOPMENT

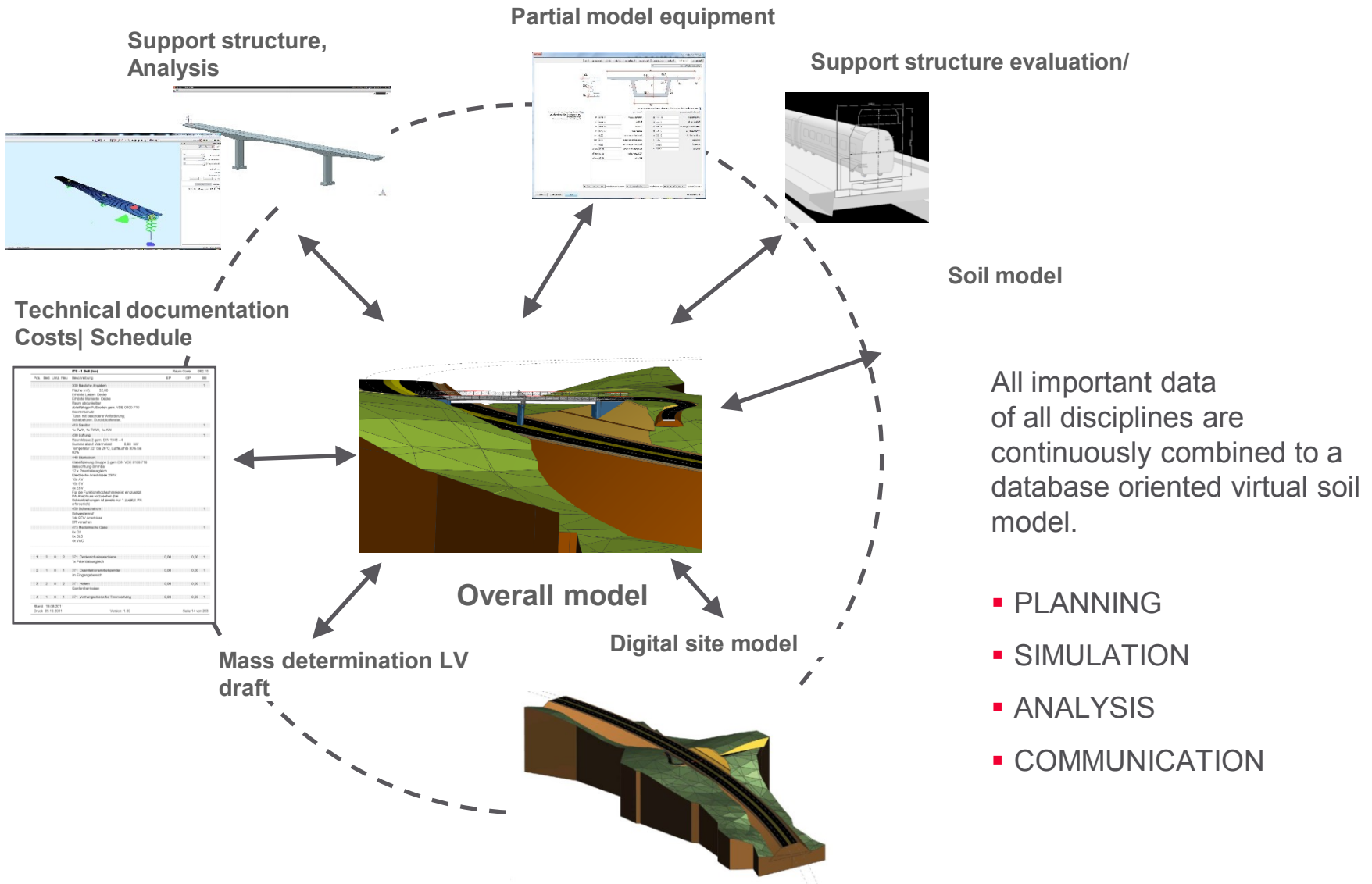
- 1958 Obermeyer foundation
- 1967 First computer, ½ m deutschmarks, IBM 1130
- 1975 Company headquarters at Hansastraße, Munich,  
IBM 370/145 & additional equipment, 8 m deutschmarks
- 1985 Initial application of **object-oriented software** on a project
- 1990 Introduction of a **geographical information system**  
with OPB under operating system of Unix
- 1995 BuildingSMART e. V. foundation member
- 1997 **3D model concept** - Route as parametric model
- 2001 Working with competition Xiangjiang  
With GIS and CAD in predetermined frames
- 2003 Joint work of GIS and CAD  
Projects in standardized coordination system
- 2004 Initial BIM large **building project** with OBERMEYER
- 2005 Planning for about **1 000 km high speed railway** line  
Wuhan–Guangzhou, China

- 2006 Introduction of a **project database**
- 2006 Introduction of the **mobile GIS** with a railway project in Algeria
- 2008 Master planning for the city expansion (34 km<sup>2</sup>) and Trade Fair Fuzhou, China
- 2008 Beginning of **Al Ain Hospital** (Large project, structural engineering 0.9 bn. €)
- 2008 Introduction of **project presentation with GIS** with real Project data
- 2011 **Professional BIM team**
- 2012 Planning of Metroline 2 (about 11 km) Ho-Chi-Minh City, Vietnam
- 2013 Interface bridge construction to iTWO
- 2013 Foundation of **LOC “Leonhardt Obermeyer Center”** at TUM
- 2014 Bringing together GIS area with BIM area into the newly founded overall planning integration.
- 2014 Strategic overall transition of the company to BIM techniques.



## INTEGRATED PLANNING PROCESS

Challenges. Solutions. Experience.



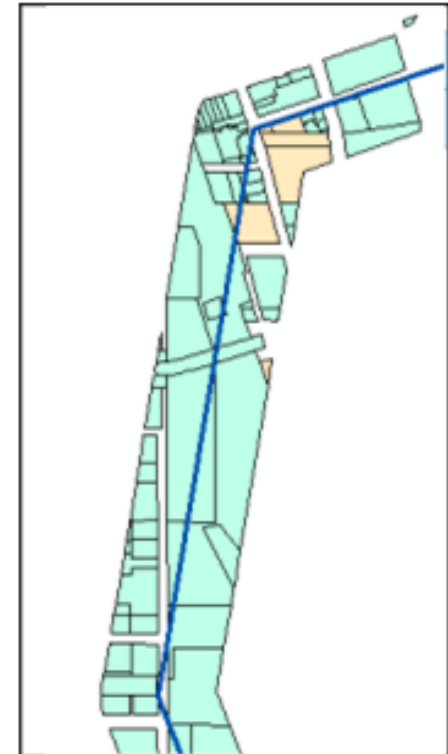


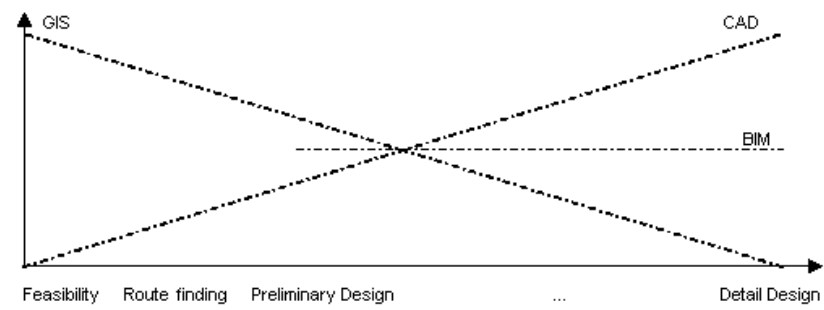
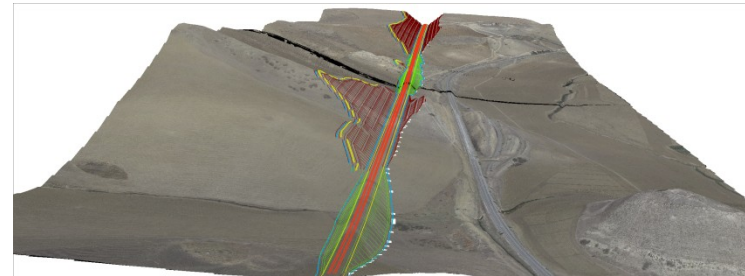
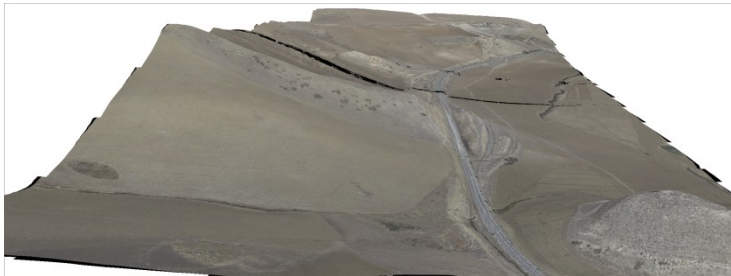
## GIS - TRACK SELECTION

Challenges. Solutions. Experience..

## What is GIS?

- 3D Analyst
- Data Management
- Geocoding
- Geostatistical Analyst
- Network Analyst
- Spatial Analyst
- Tracking Analyst
- Hydrological Analyst
- Data Interoperability
- Statistics
- Raster Analysis



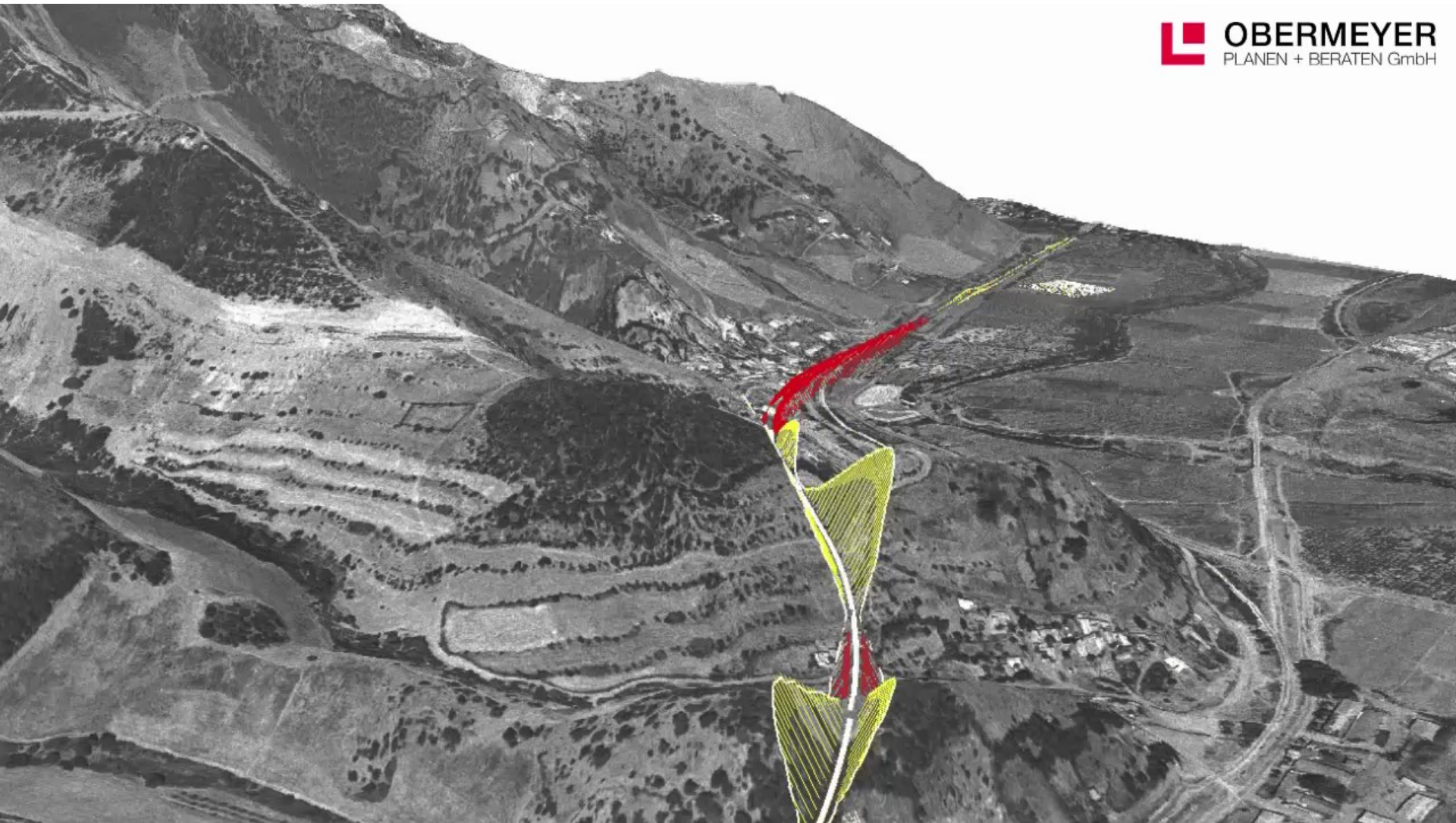






## BIM - TRACK DESIGN (PROVI)

Challenges. Solutions. Experiences.



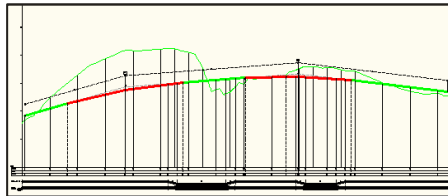
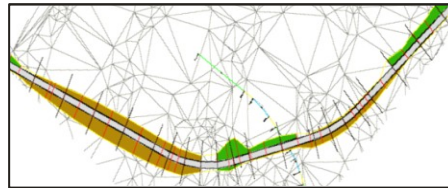
GIS / BIM Integration



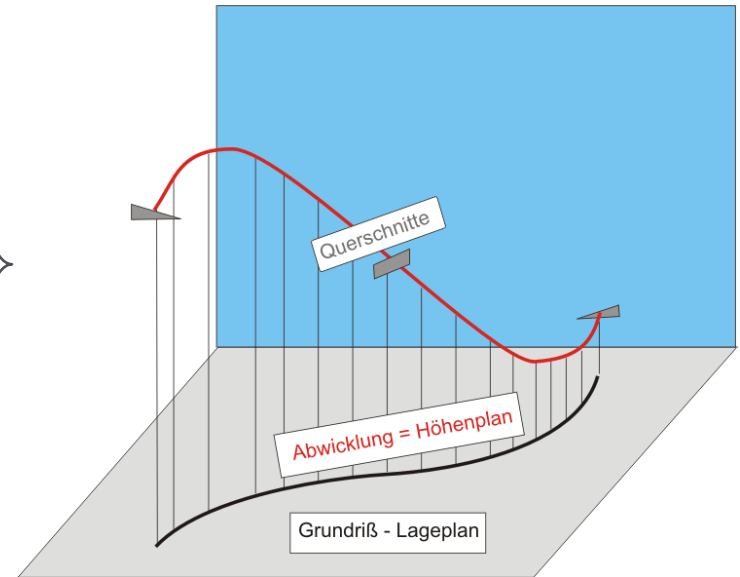
## BIM - INTEGRATED BRIDGE DESIGN

Motivation. Objectives. Advantages.

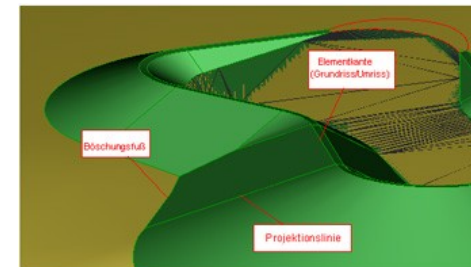
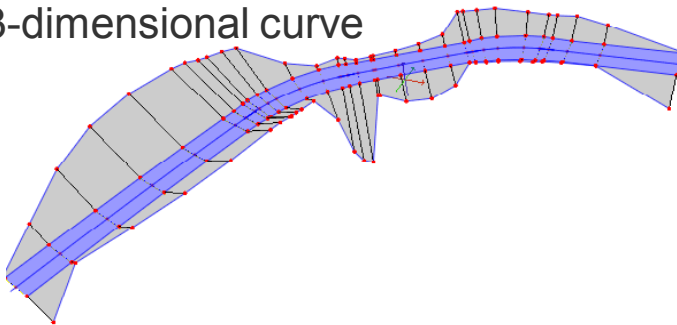
- Top view
- Longitudinal section
- Cross profile



3D 3-dimensional curve



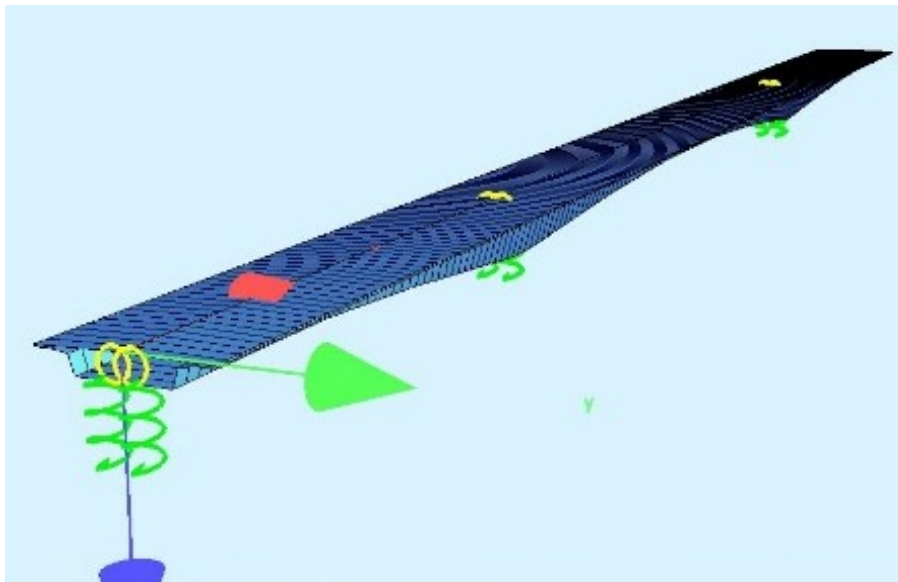
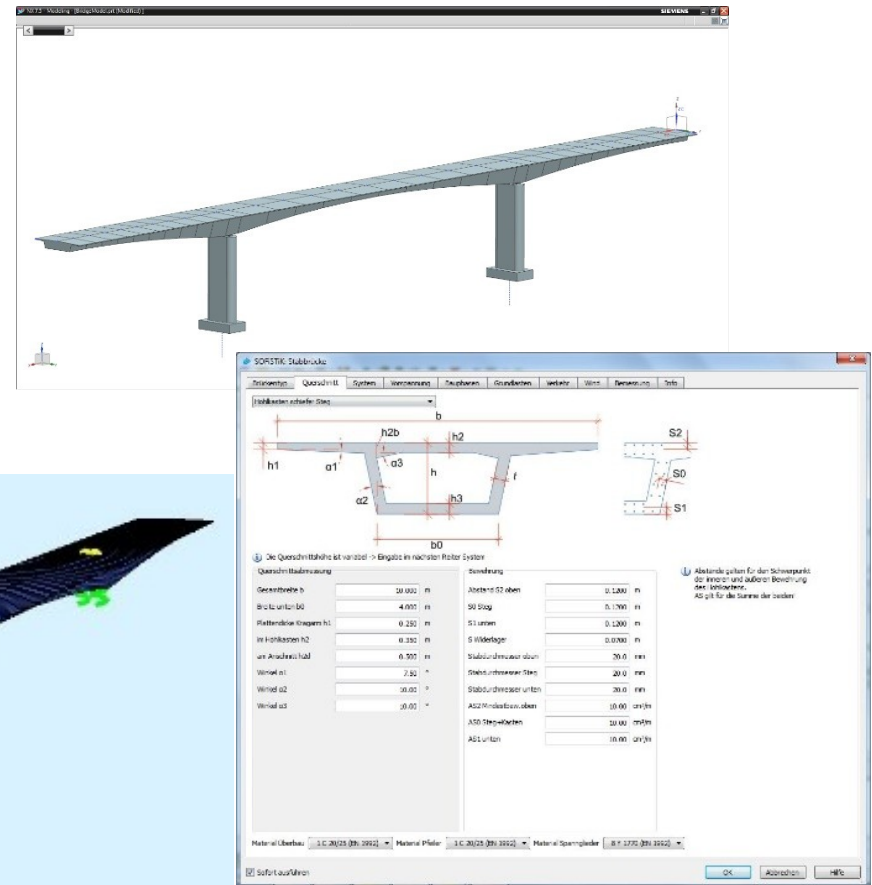
3D 3-dimensional curve





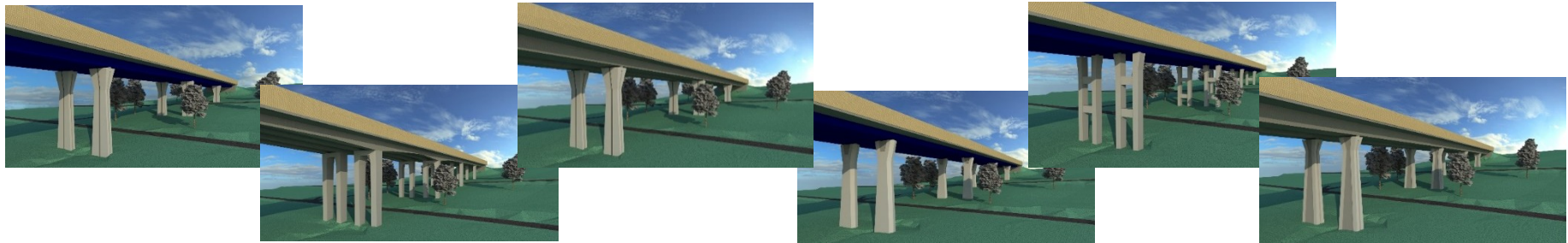
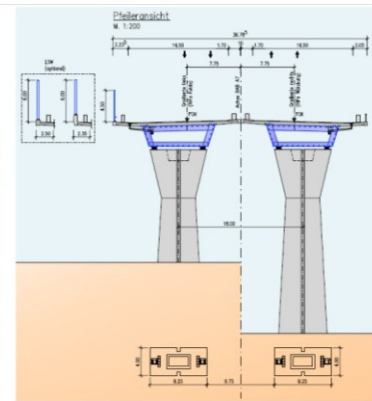
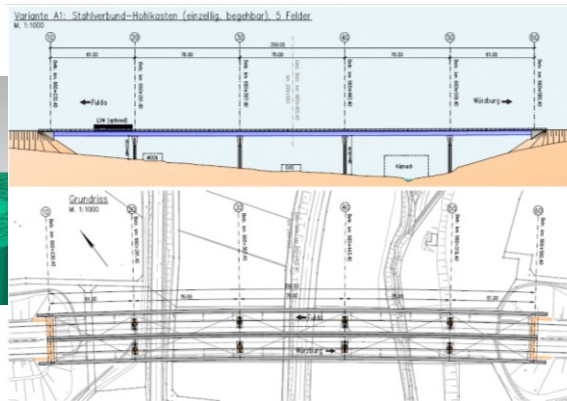
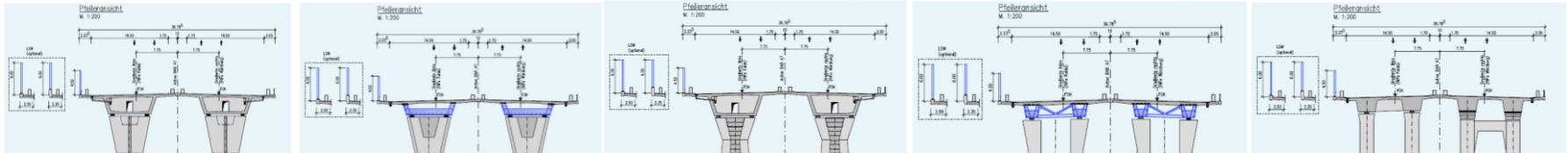


- Linking models to SOFiSTiK via CADINP-interface
- Quick generation and calculation of an easy associative calculation model in NX
- Direct interface, consistent data use
- Structure specific loads, standards and issue



10% design

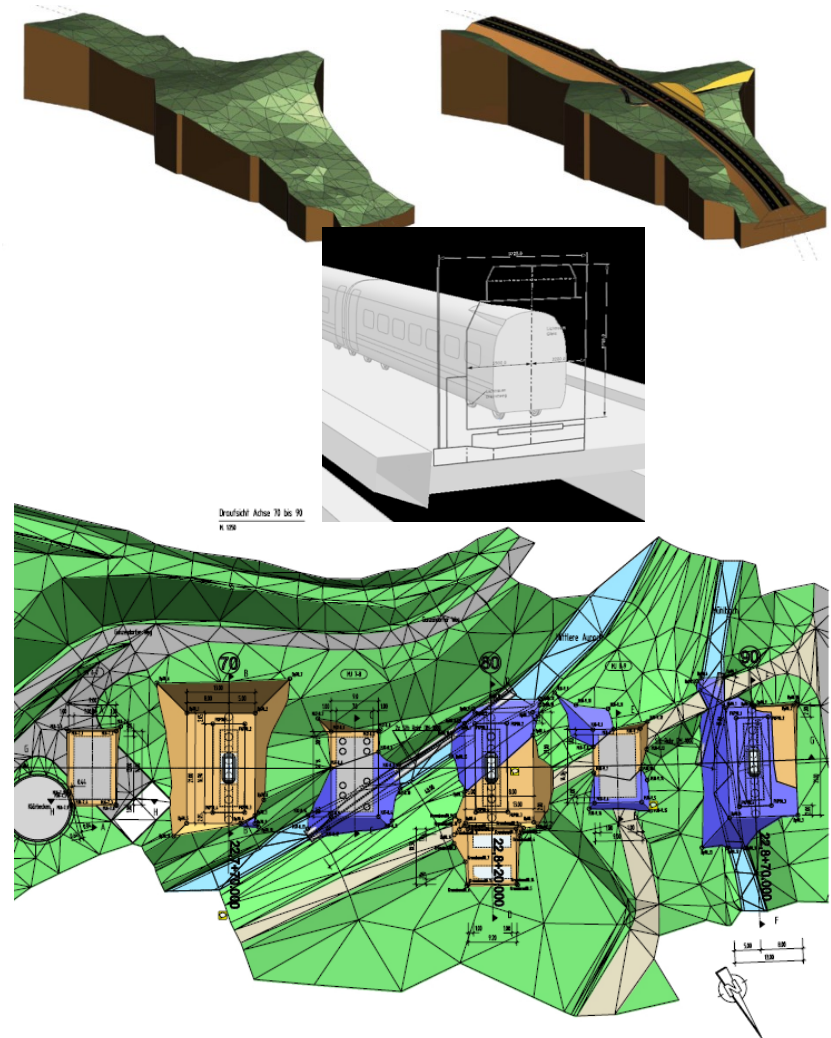
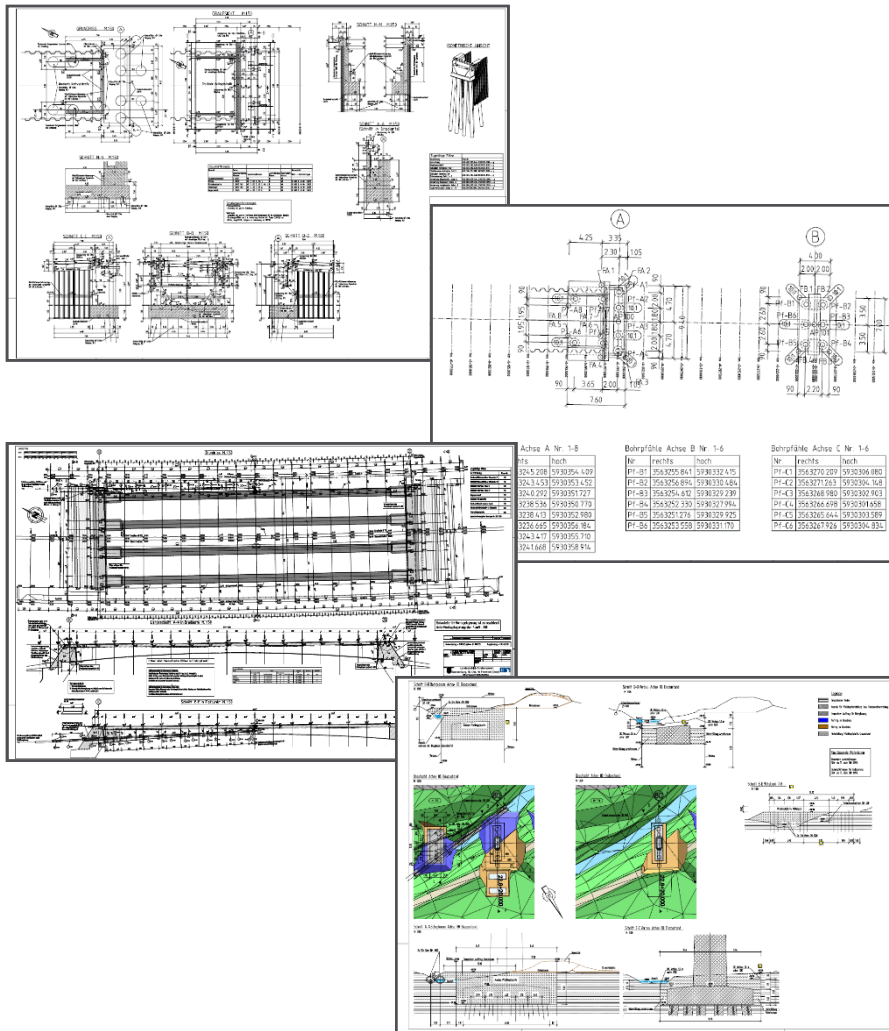
Starting with the cross section variant -> by using a DGM -> Visualization on-site in Google Earth



Visualization of individual variants, cost estimate, variant matrix in model with an integrative process

100% design

Construction of the structure-> digital site model-> Cut or dam-> structural clearance reveiw-> drawing creation



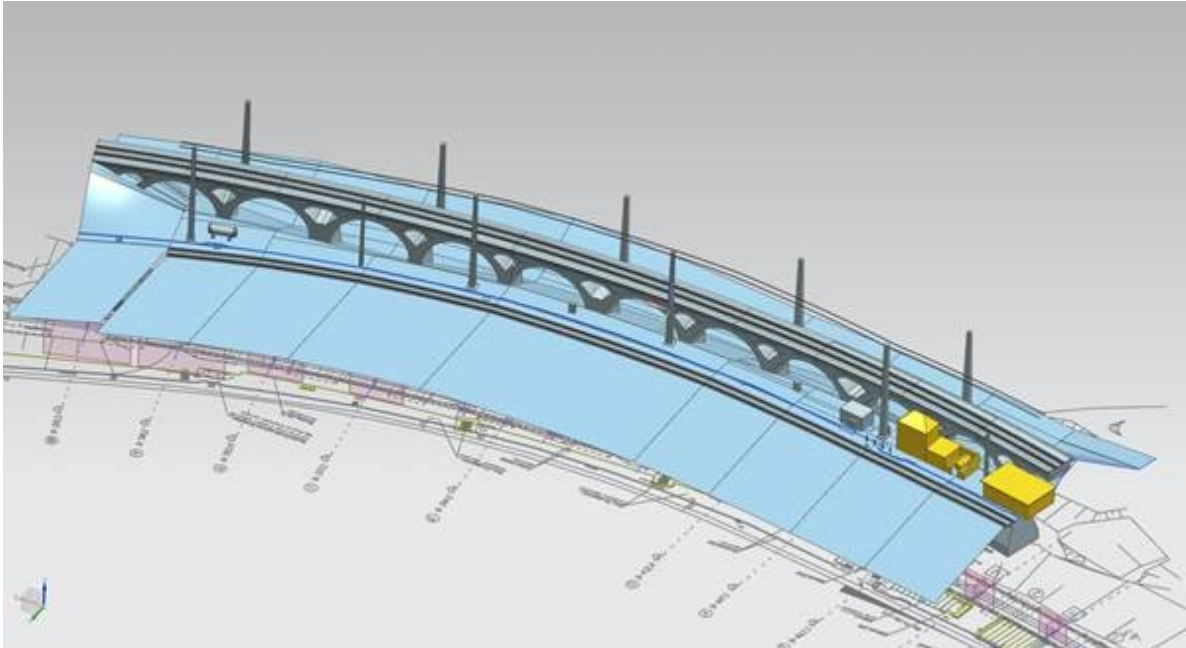
Construction substitute planning-> construction plans all in one model with an integrative process





## EXCURSION RETROFIT PROJECTS

Challenges. Solutions. Experience.

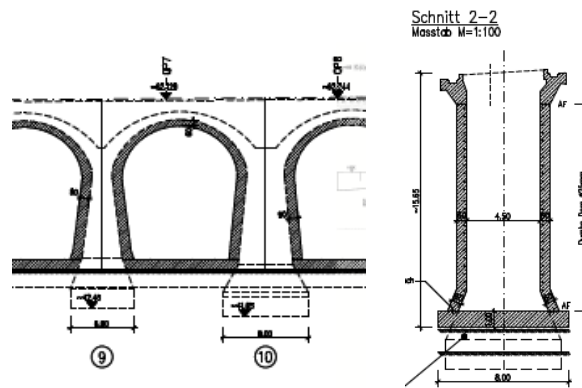


## EÜ vault row Innere Kanalstraße

**DB-route 2630 Köln Hbf. main station.-Koblenz-Bingen (Rhein) Hbf. main station**

Production of 10 flat founded reinforced concrete arch shells-separated from each other via expansion joints.

By means of the selected solution of a surface foundation the existing support structure is put into operation through longitudinal forces via the “rigid compression” in longitudinal track direction.



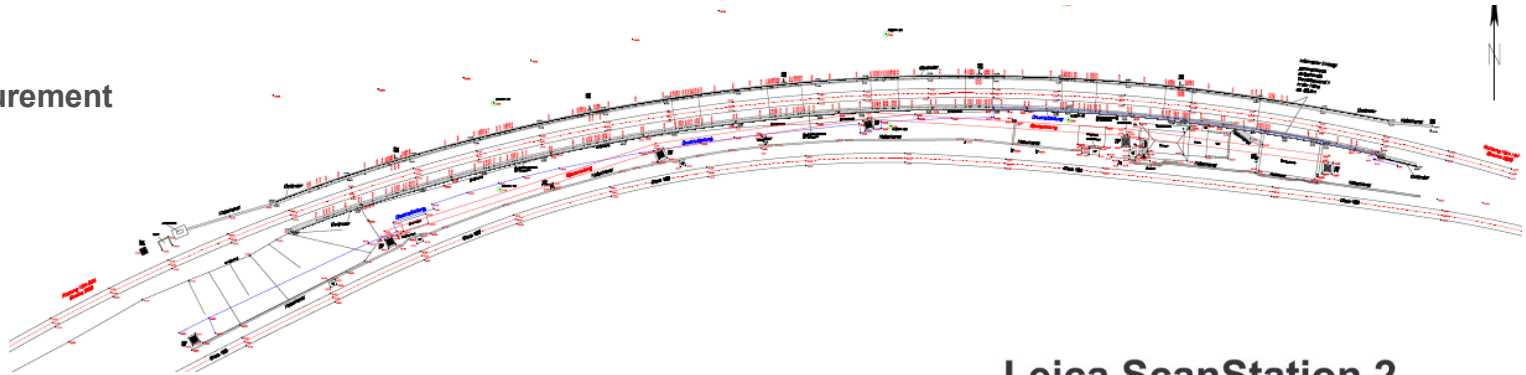
The individual “arches” are independent for themselves as well as stable in their portfolio structure.

3D Scan extension of the support structure

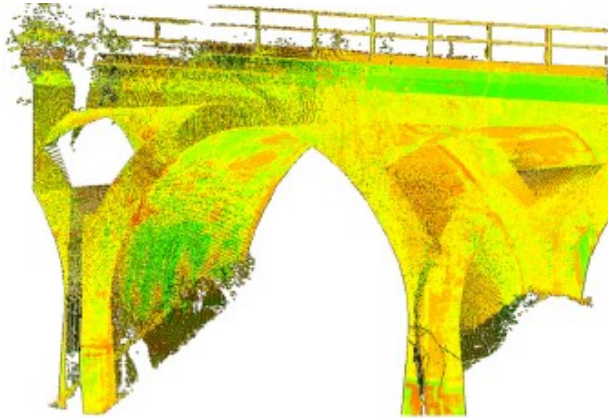
3D Planning of the new vaults  
Discharge of the sound planning form a 3D model

# Geometry taking

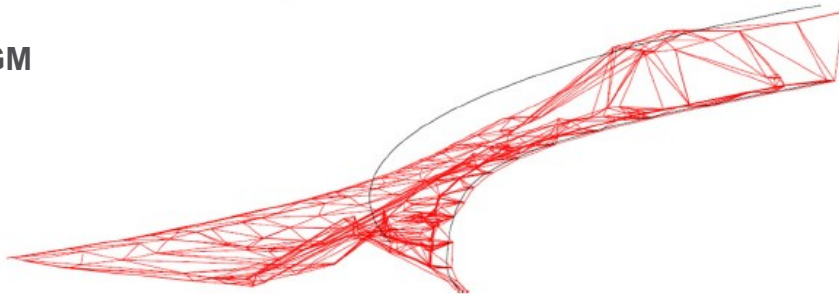
Measurement



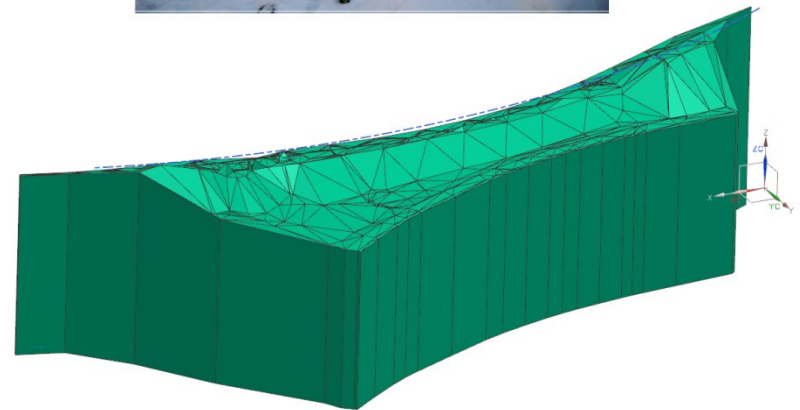
3D Scan

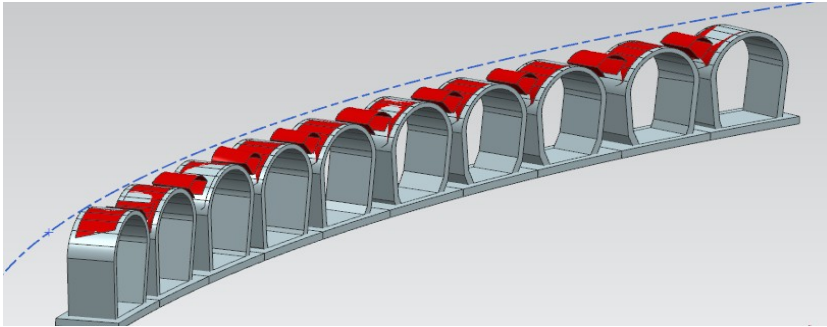


DGM

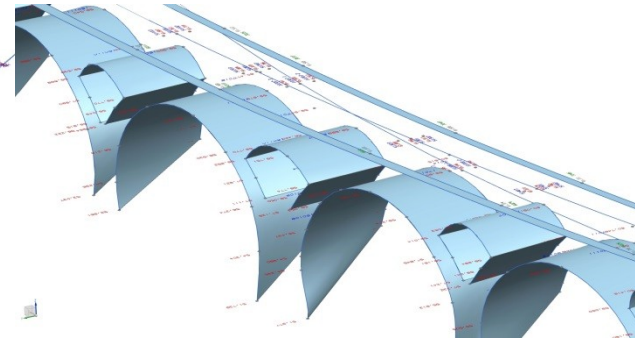


Leica ScanStation 2

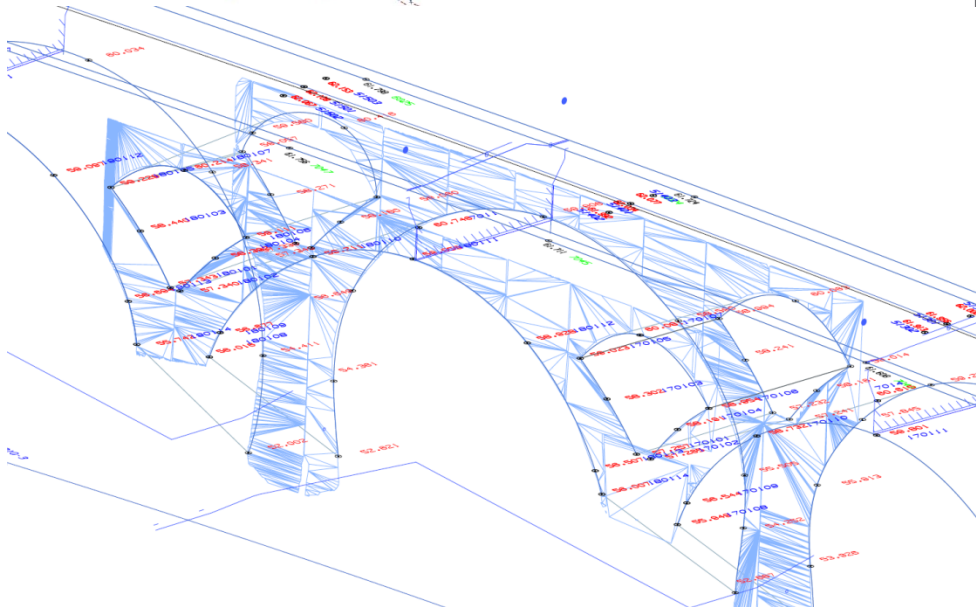




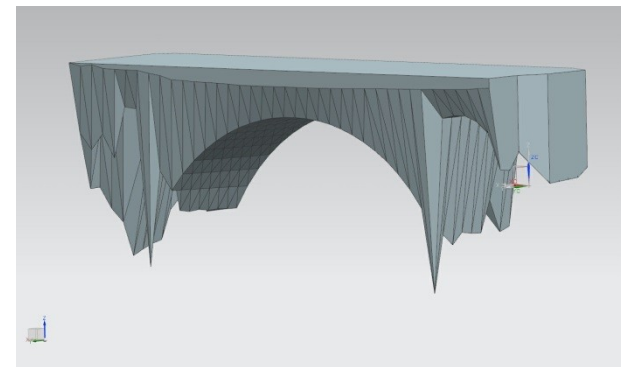
Comparison (read) portfolio tp new building



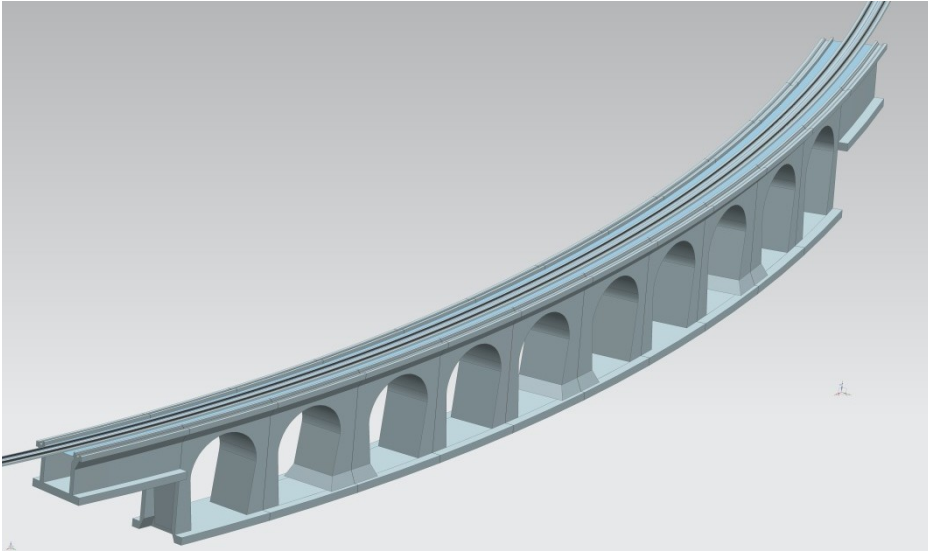
Result: measurement portfolio vault



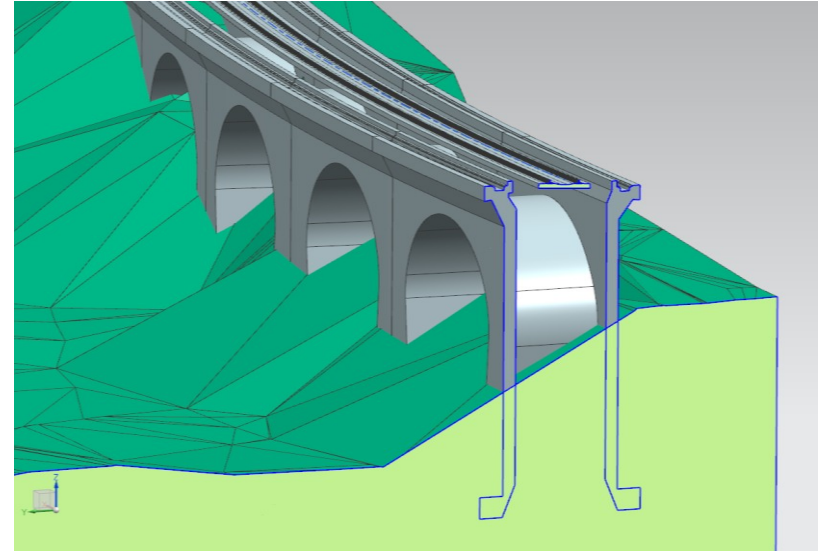
Comparison 3D Scan with measurements



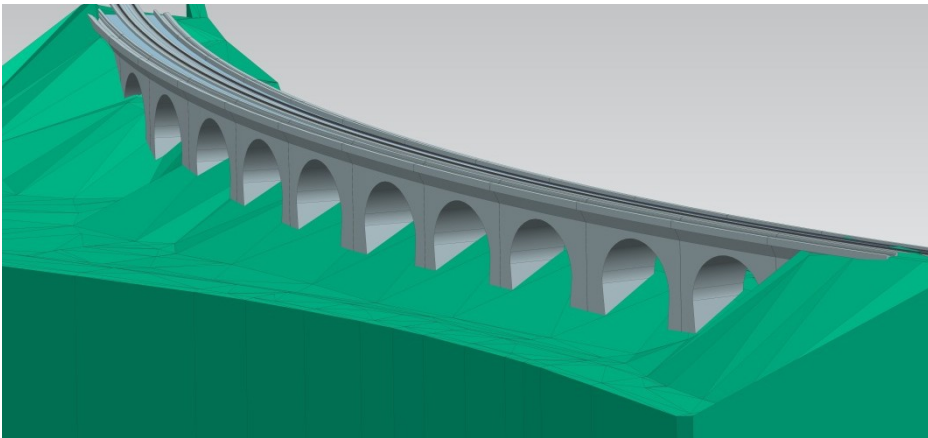




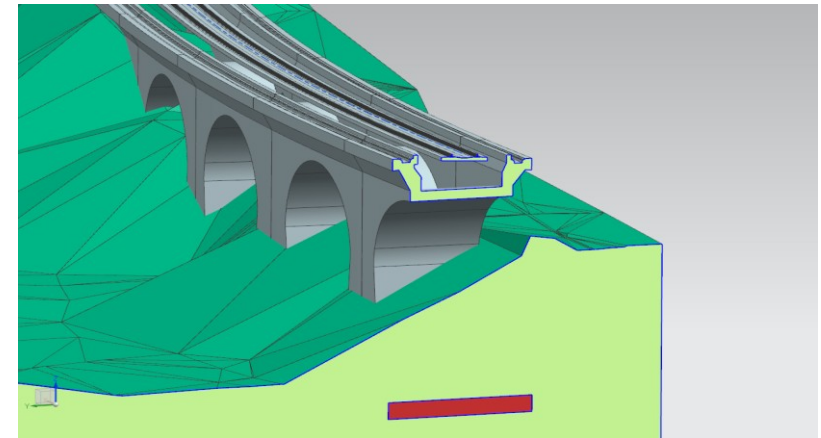
3D model of new bridge construction



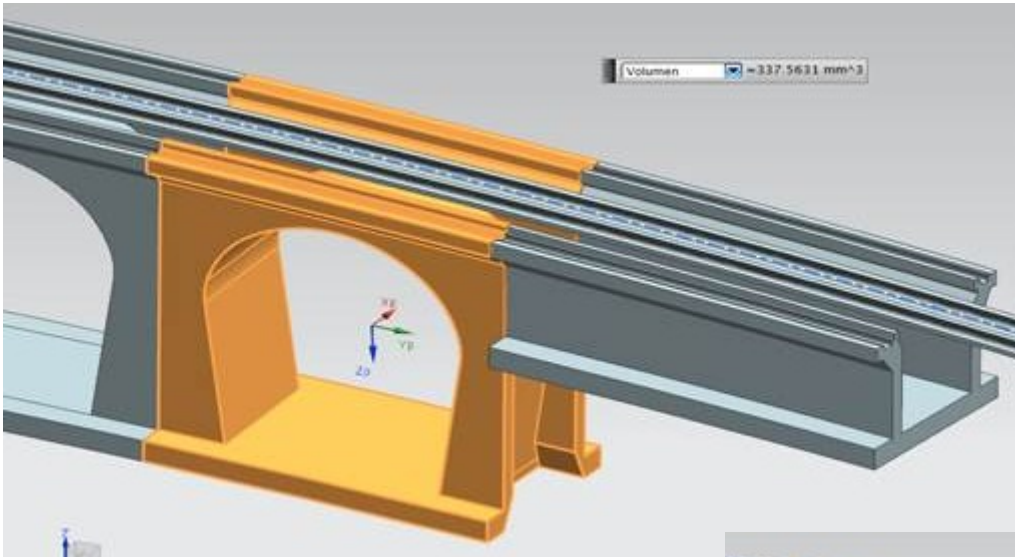
3D model cross section of expansion joint



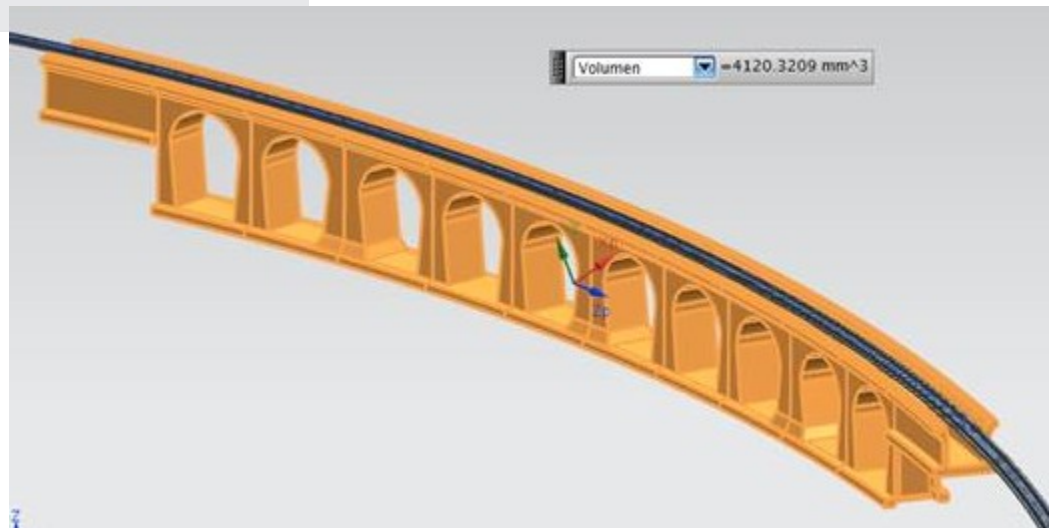
3D model of new bridge construction incl. DGM



3D model with cross section of center of the sheet

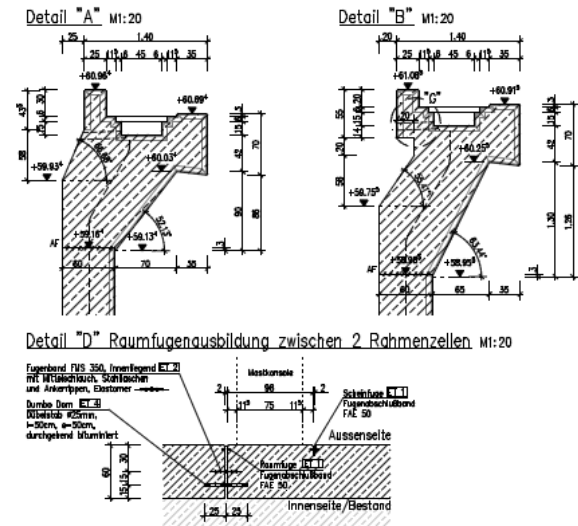
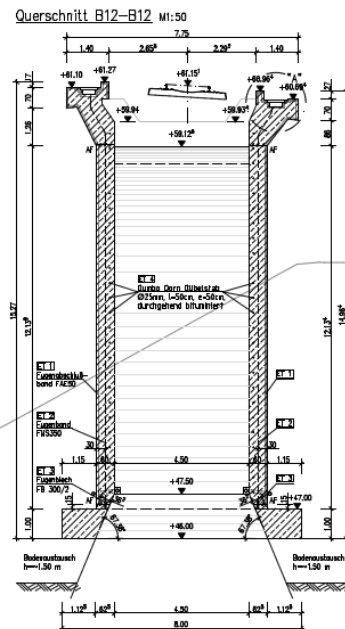
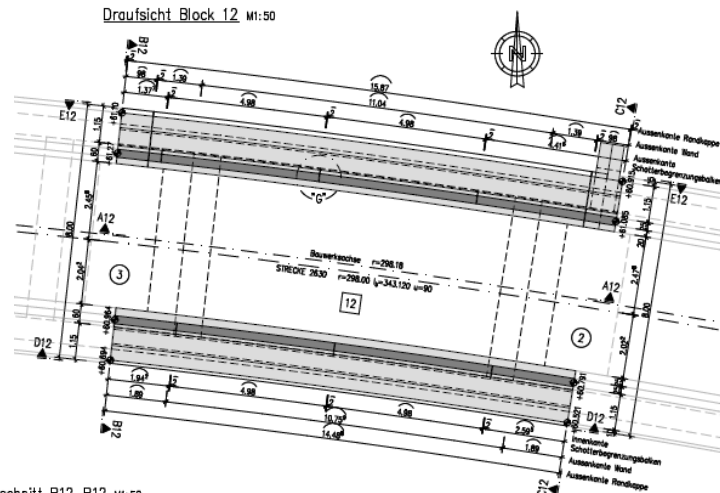


3D Model quantity survey arch12



3D Modell quantity survey of overall bridge construction

**OBERMEYER**





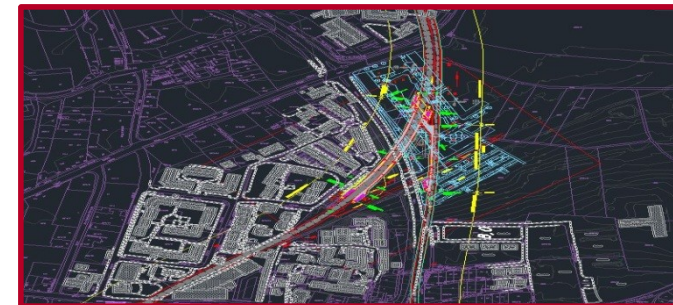
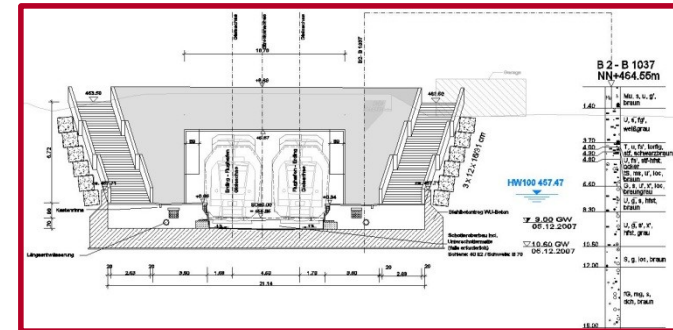
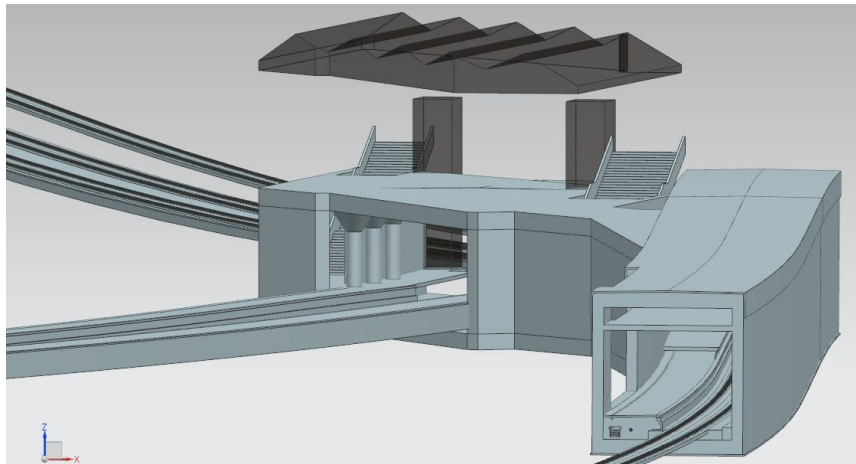
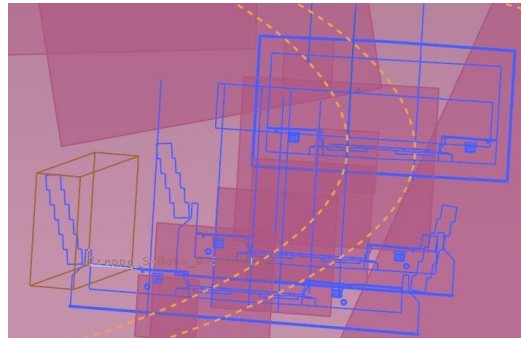
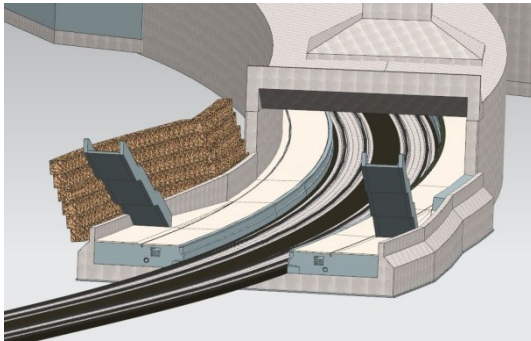
FROM LINE TO STATION

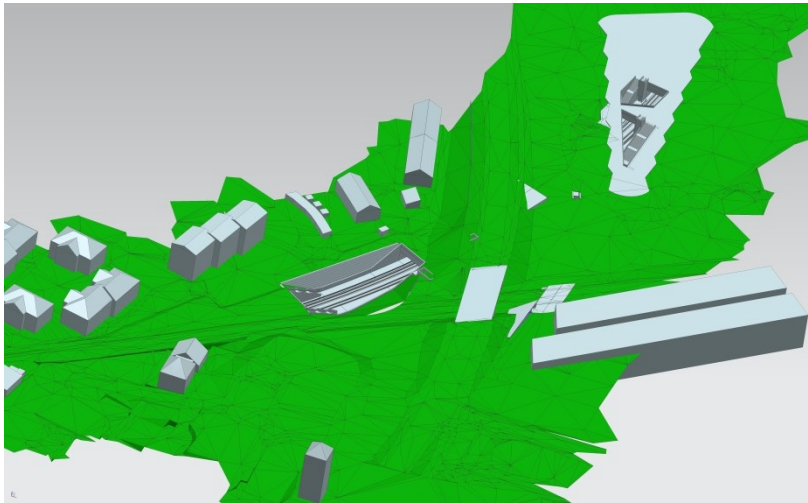
Challenges. Solutions. Experience.



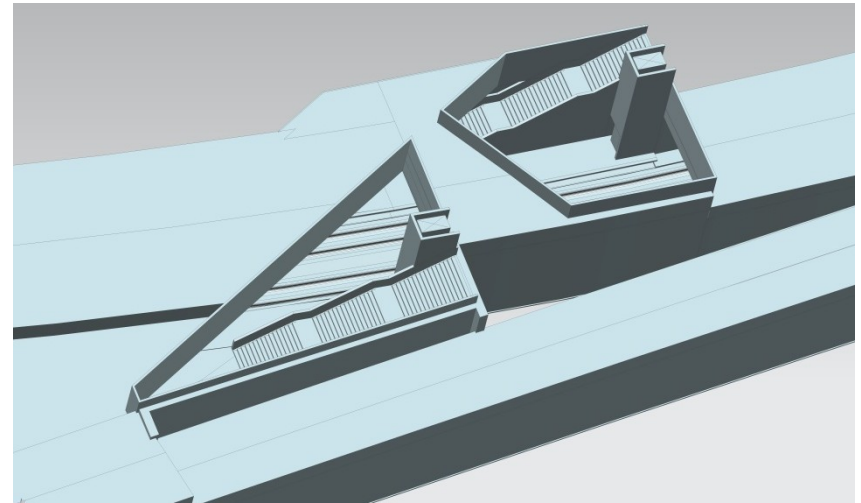
## Modelling Objectives:

- Adaptable 3D-model of tunnel and station building
- Parametric adjustment of the cross section
- Automated route changes
- Drawing creation

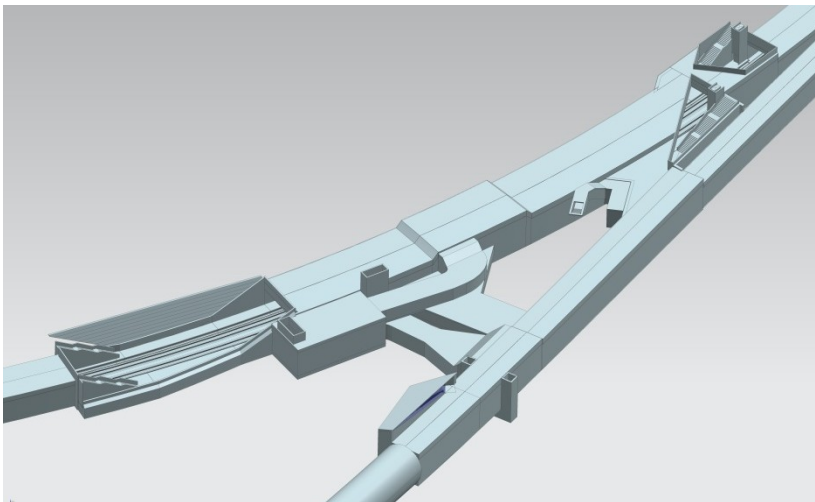




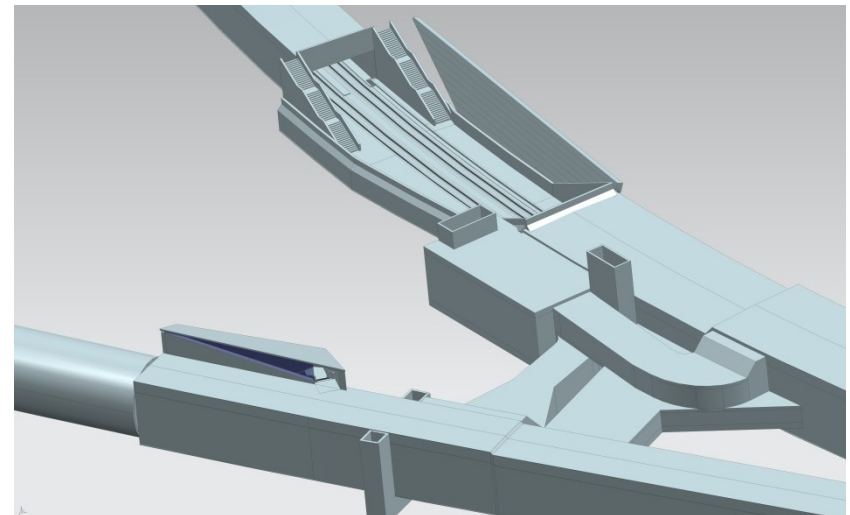
Station without building development and DGM



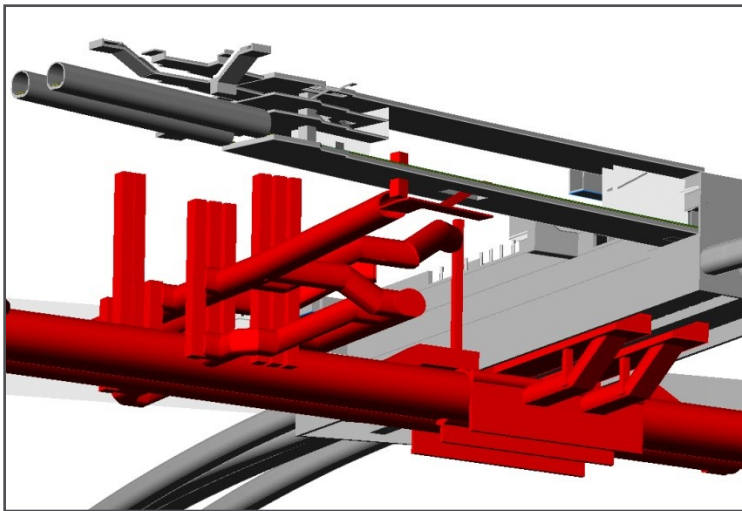
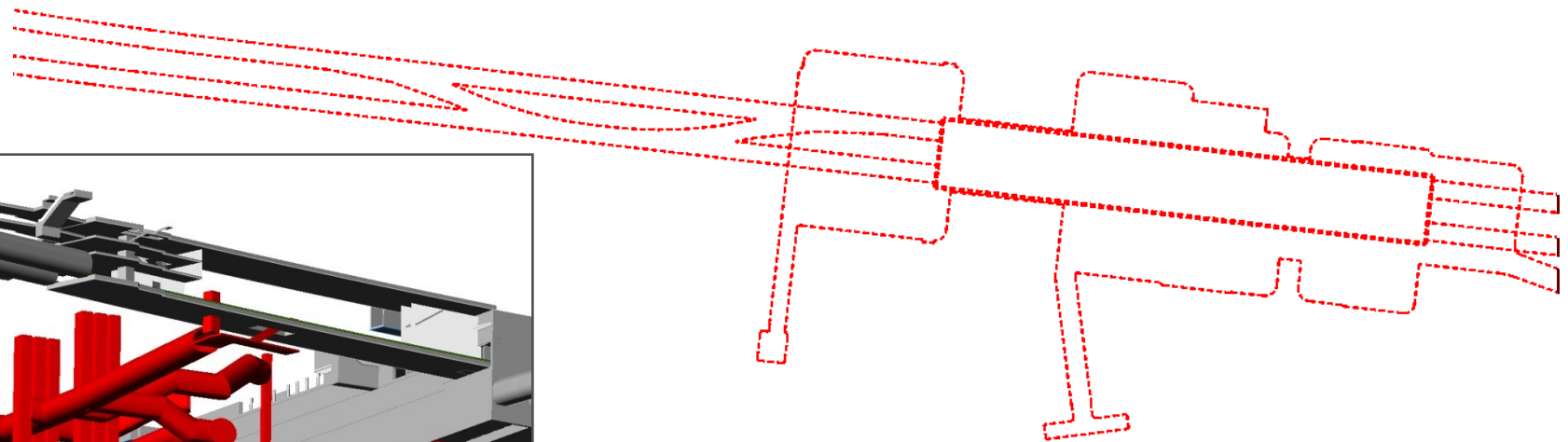
Detail access 1

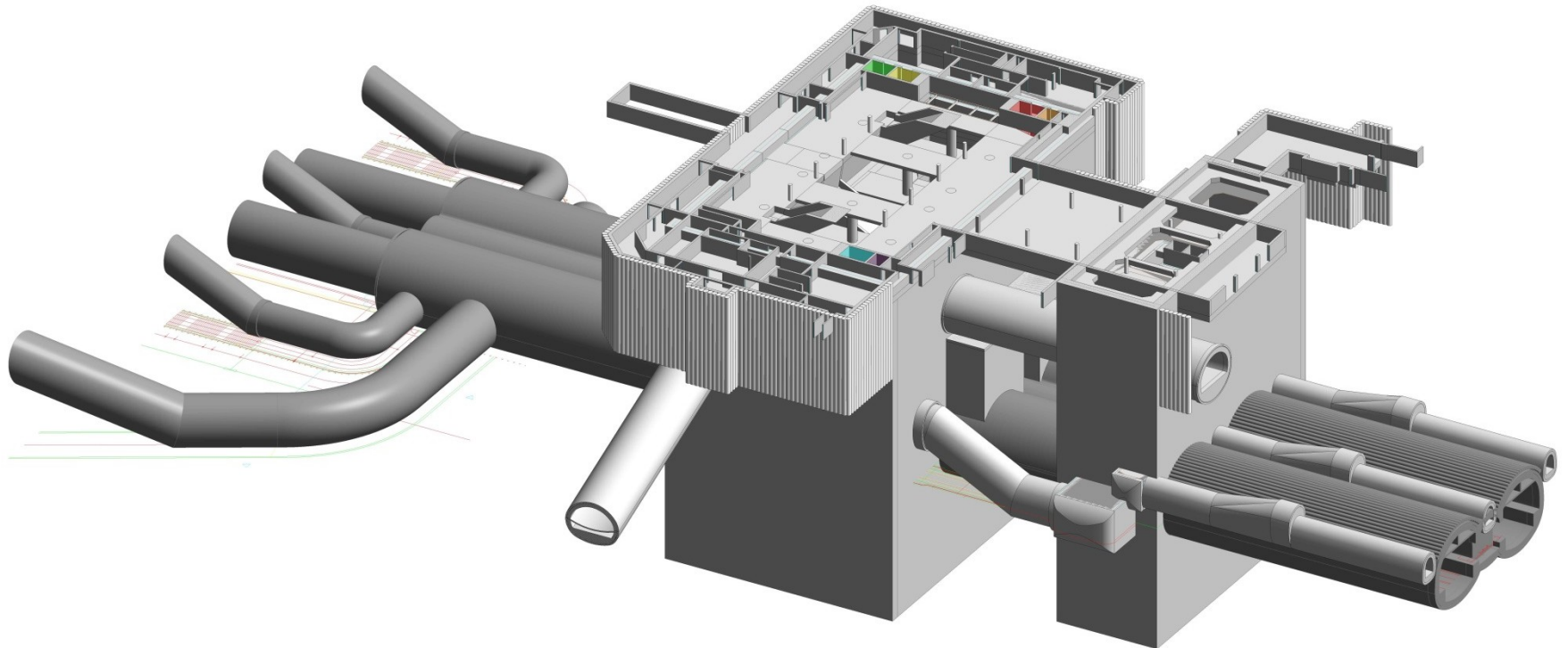
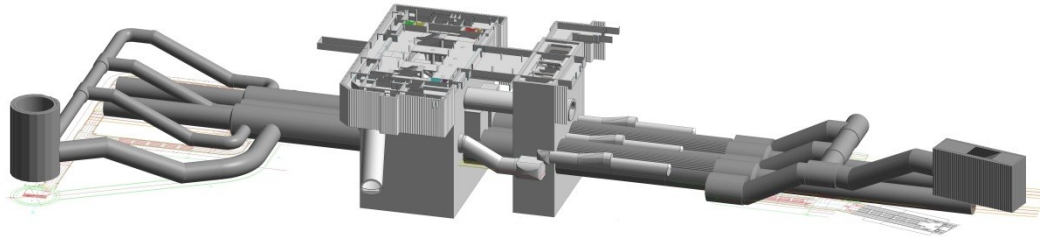


Station with previous building development and DGM



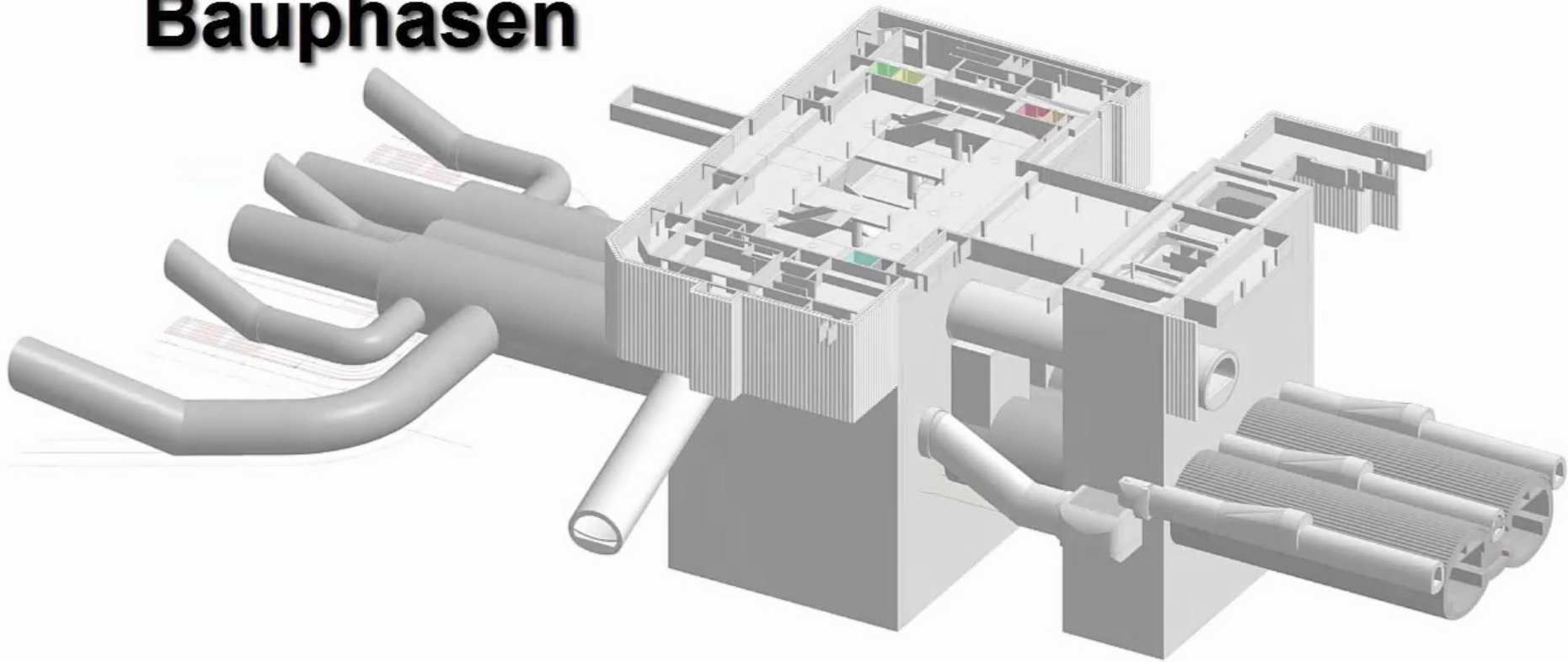
Detail access 2



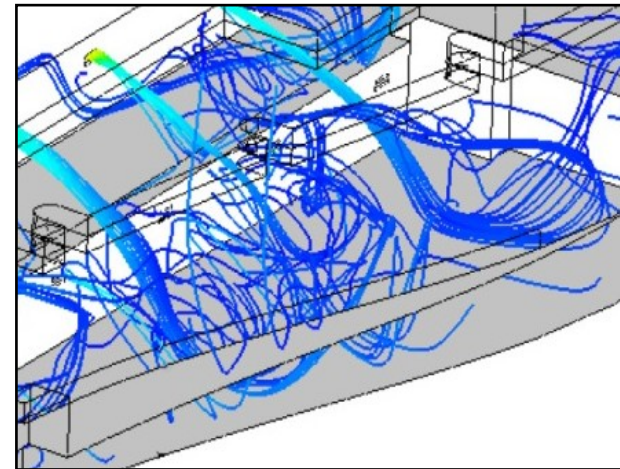
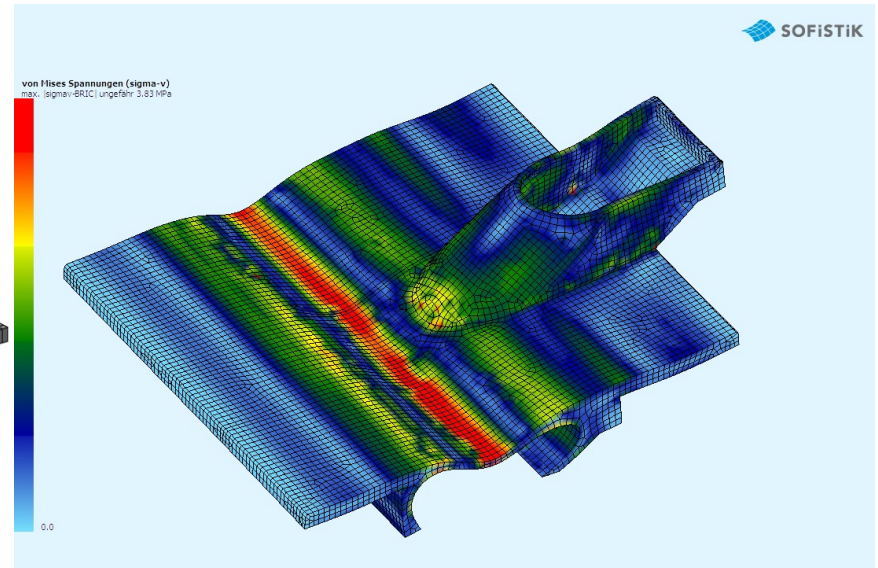
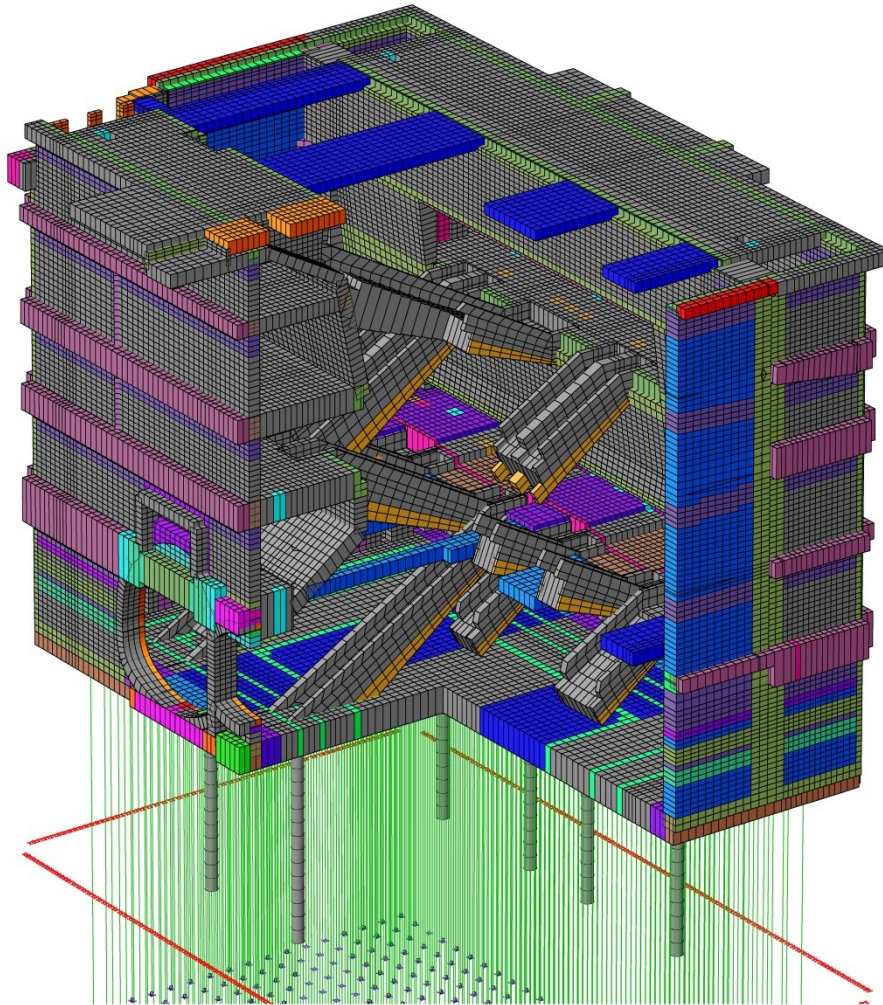




# Hauptbahnhof Bauphasen

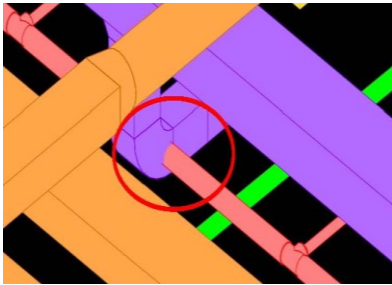


Construction Course Simulation

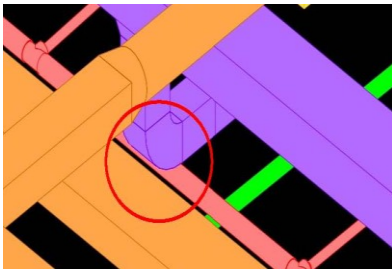




# CLASH DETECTION



vorher



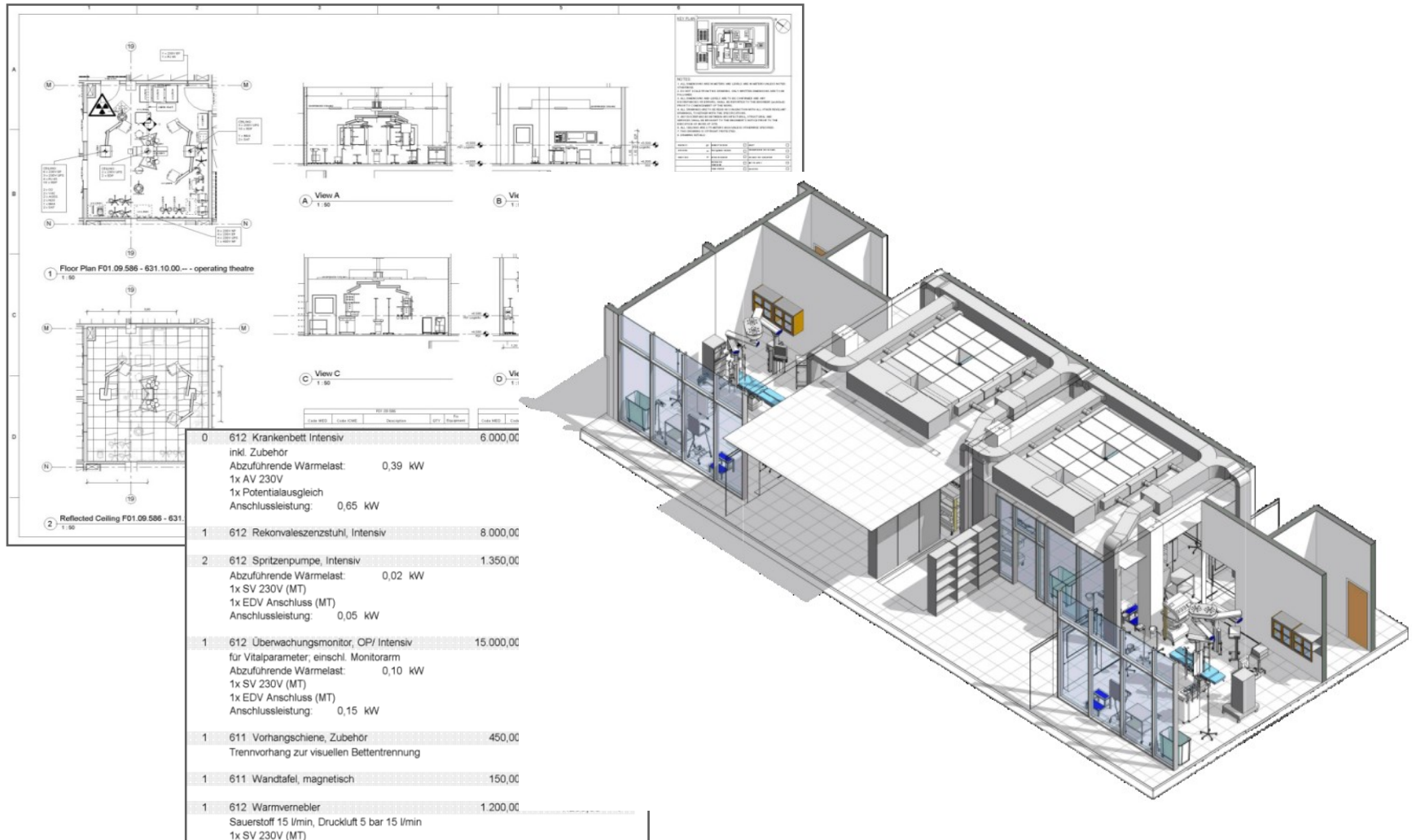
nachher



- Geometrical coordination during the planning process
- Software supports to handle critical interfaces = “collision test”
- Collision solution for all trades
- Harmonization in the future maintenance and in operation – revision openings (geometrical) and downtimes (facility management)
- **Testing** collision solution/ coordination process

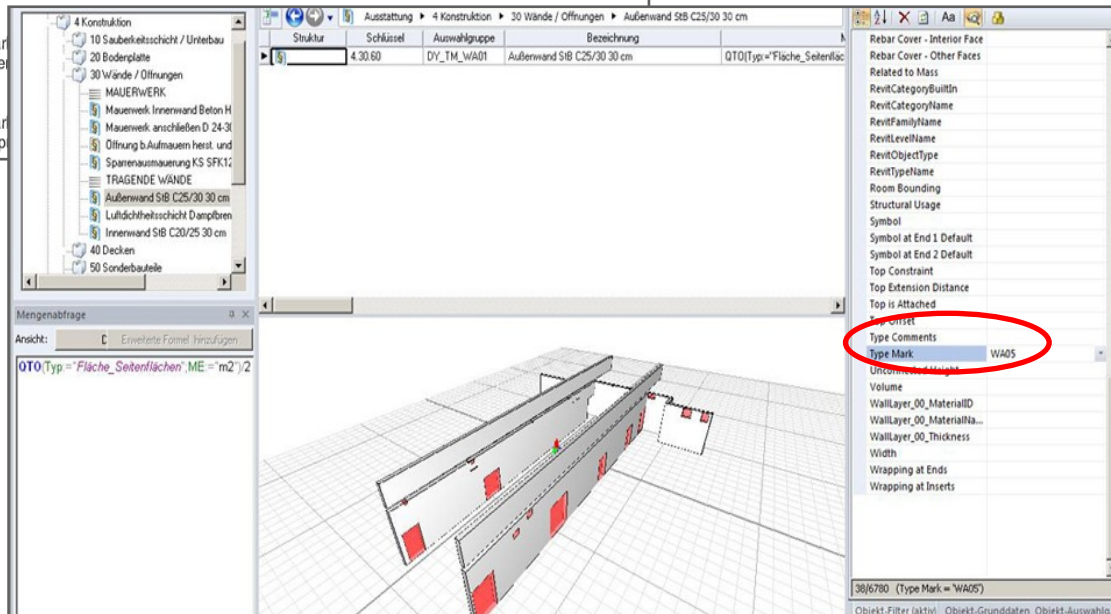
CLASH DETECTION MATRIX			ARC	STR	MECHANICAL														PLUMBING				ELEC	MED				
			Special walls, fire, lead, MRI cage, cold room, Suspended Ceiling	All structural elements	Chilled water pipework 100mm or above	Chilled water pipework below 100mm above 20mm	Heating pipework	Refrigerant pipework above 20mm	Fuel pipework above 20mm	Medical gas pipework above 20mm	Supply ductwork	Return air ductwork	Extract ductwork	Exhaust flues	Fan coil units	Extract fans	Air handling units	Air Tube Pipework and equipment	Sprinkler pipework 100mm or above	Sprinkler pipework below 100mm and wet risers	Domestic hot and cold water pipework	Irrigation pipework above 20mm	Rainwater pipework above 50mm	Plumbing pipework above 50mm	Cable tray above 100mm	Cable trunking above 100mm	Electrical control panels / distribution boards	Ceiling mounted Elements (Service pendants, exam lights, exhaust canopies and lab + kitchen)
ARCHITECTURE		Architectural Elements	no CR																									
	01	Special walls (fire, lead, MRI cage, cold room)																										
STRUCTURAL	02	Suspended Ceiling	n																									
	03	Structural Elements	CR01	no CR																								
MECHANICAL	04	All structural elements	001-c	002-c																								
	05	Chilled water pipework	CR02	CR05																								
	06	Chilled water pipework 100mm or above	003-b	017-b	047-b																							
	07	Chilled water pipework below 100mm above 20mm	004-c	018-c	048-c	071-b																						
	08	Heating Pipework	005-b	019-b	049-b	072-b	084-c																					
	09	Refrigerant Pipework	006-b	n	050-c	073-c	n	n																				
	10	Fuel	007-c	020-c	051-b	074-c	085-c	093-c	n																			
	11	Fuel pipework above 25mm	007-c	020-c	051-b	074-c	085-c	093-c	n																			
	12	Medical Gas	008-b	021-c	052-b	075-c	086-c	094-c	n	n																		
	13	Medical gas pipework above 20mm	008-b	021-c	052-b	075-c	086-c	094-c	n	n																		
	14	Ventilation	009-b	022-c	053-a	076-c	087-c	095-a	102-b	107-b	115-a																	
	15	Supply ductwork	010-b	023-c	054-a	077-a	088-b	096-a	103-b	108-b	116-a	123-a																
	16	Return air ductwork	011-b	024-c	055-a	078-a	089-b	097-a	104-b	109-b	117-a	124-a	128-a															
	17	Extract ductwork	012-b	025-c	056-a	079-a	090-b	098-a	105-b	110-b	118-a	125-a	130-a	134-a														
PLUMBING	18	Exhaust flues	012-b	025-c	056-a	079-a	090-b	098-a	105-b	110-b	118-a	125-a	130-a	134-a														
	19	Equipment	013-c	026-c	057-a	080-b	n	089-a	n	111-b	119-b	126-a	131-a	135-a	138-a													
	20	Fan coil units	014-c	027-c	058-a	081-b	091-b	100-a	n	112-b	120-a	127-a	132-a	136-a	139-a	141-b												
	21	Extract fans	014-c	027-c	058-a	081-b	091-b	100-a	n	112-b	120-a	127-a	132-a	136-a	139-a	141-b												
	22	Air handling units	015-c	n	n	082-c	n	n	n	113-b	121-a	n	n	n	n	142-c	144-c											
	23	Air Tube Conveyance	016-b	028-c	059-a	083-b	092-c	101-c	106-c	114-c	122-b	128-b	133-b	137-b	140-b	143-b	145-c	146-c										
	24	Air Tube Pipework and equipment	016-b	028-c	059-a	083-b	092-c	101-c	106-c	114-c	122-b	128-b	133-b	137-b	140-b	143-b	145-c	146-c										
	25	Sprinkler / Fire Fighting Pipework	CR03	CR06																								
	26	Sprinkler pipework 100mm or above	026-b	036-b	060-a	147-a	154-b	160-a	167-b	173-b	178-b	185-b	192-b	199-b	206-b	212-b	218-b	224-b	230-b									
	27	Sprinkler pipework below 100mm and above 20mm	030-c	n	061-b	148-c	n	161-c	n	n	186-c	193-c	200-c	n	n	n	n	n	n									
	28	Dry risers and wet risers	031-b	037-c	062-a	149-b	155-c	162-a	168-c	174-c	180-b	187-b	194-b	201-b	207-c	213-b	219-b	225-b	231-b	283-b								
	29	Domestic water	032-c	038-b	063-a	150-a	156-c	163-a	169-c	175-c	181-b	188-b	195-b	202-b	208-c	214-b	220-b	226-b	232-b	284-a	289-b	293-a						
	30	Domestic hot and cold water pipework	032-c	038-b	063-a	150-a	156-c	163-a	169-c	175-c	181-b	188-b	195-b	202-b	208-c	214-b	220-b	226-b	232-b	284-a	289-b	293-a						
	31	Irrigation	033-c	039-b	064-a	151-b	157-c	164-a	170-c	176-c	182-b	189-b	196-b	203-b	209-c	215-b	221-b	227-b	233-b	285-a	289-b	293-a	296-b					
32	Irrigation pipework above 20mm	033-c	039-b	064-a	151-b	157-c	164-a	170-c	176-c	182-b	189-b	196-b	203-b	209-c	215-b	221-b	227-b	233-b	285-a	289-b	293-a	296-b						
33	Rainwater Pipework	034-c	040-b	065-a	152-b	158-c	165-a	171-c	177-c	183-b	190-b	197-b	204-b	210-c	216-b	222-b	228-b	234-b	286-a	290-b	294-a	297-b	299-b					
34	Rainwater pipework above 50mm	034-c	040-b	065-a	152-b	158-c	165-a	171-c	177-c	183-b	190-b	197-b	204-b	210-c	216-b	222-b	228-b	234-b	286-a	290-b	294-a	297-b	299-b					
35	Plumbing	035-c	041-c	066-a	153-a	159-c	166-a	172-c	178-c	184-b	191-b	198-b	205-b	211-b	217-b	223-b	229-b	235-b	287-a	291-b	295-a	298-b	300-b	301-b				
36	Plumbing pipework above 50mm	035-c	041-c	066-a	153-a	159-c	166-a	172-c	178-c	184-b	191-b	198-b	205-b	211-b	217-b	223-b	229-b	235-b	287-a	291-b	295-a	298-b	300-b	301-b				
ELECTRICAL	37	Tray	CR04	CR07																								
	38	Cable tray above 100mm	042-c	045-c	067-a	156-b	162-c	168-c	174-c	180-b	186-b	193-b	200-b	206-b	212-b	218-b	224-b	230-b	282-a	286-b	290-b	294-a	297-b	299-b				
	39	Trunking	043-c	046-c	068-b	157-b	163-c	169-c	175-c	181-b	187-b	194-b	201-b	207-c	213-b	219-b	225-b	231-b	283-b	n								
	40	Cable trunking above 100mm	043-c	046-c	068-b	157-b	163-c	169-c	175-c	181-b	187-b	194-b	201-b	207-c	213-b	219-b	225-b	231-b	283-b	n								
MEDICAL EQUIPMENT	41	Steel Wire Armoured (SWA) cables	044-c	n	069-c	236-a	241-a	246-a	249-a	250-b	253-b	256-b	259-b	262-c	264-b	266-b	268-b	270-b	304-b	307-b	310-b	313-b	316-b	319-b	322-b	n	n	
	42	Electrical control panels / distribution boards	044-c	n	069-c	236-a	241-a	246-a	249-a	250-b	253-b	256-b	259-b	262-c	264-b	266-b	268-b	270-b	304-b	307-b	310-b	313-b	316-b	319-b	322-b	n	n	
	43	Elements	no CR	CR08																								
	44	Ceiling mounted Elements (Service pendants, exam lights, exhaust canopies and lab + kitchen)	n	n	070-b	271-b	272-c	273-b	274-c	275-c	276-b	277-b	278-b	279-b	n	280-b	281-b	n	282-b	323-b	324-b	325-b	326-b	327-b	328-b	329-b	330-b	n
COUNT			332																									

- Predefining the matrix and the criteria for collision testing
- Coordination of all trades
- Monitoring progress



Kurztext Leistungsverzeichnis					
Projekt:	19427	Kunduz Rettungszentrum			
LV:	1	OP Anbau an RZ Kunduz			
OZ	Leistungsbeschreibung		Menge ME	Einheitspreis in EUR	Gesamtbetrag in EUR
04.03.0020.	DIN276	342 Nichttragende Innenwände			
	Type Mark	WA03 Wand Mauerwerk 25 cm			
		Mauerwerk anschließen D 24-30cm	24,775 m	9,20	227,93
04.03.0030.	DIN276	344 Innentüren und -fenster			
	Type Mark	794 Leistung außerhalb Revi..			
		Öffnung b.Aufmauern herst. und überde..	1,000 St	77,29	77,29
04.03.0140.	DIN276	344 Tragende Innenwände			
	Type Mark	WA05 Wand Stahlbeton 30 cm ..			
		Innenwand StB C20/25 30 cm	414,098 m2	125,20	51.845,07
04.03.0150.	DIN276				
	Type Mark				
	Öffnungen				
08.01.0030.	DIN276				
	Type Mark				
	Trockenp				

- **Examining final design**
- Direct connection of qualities and their characteristics
- **Evaluation of tender documentation**





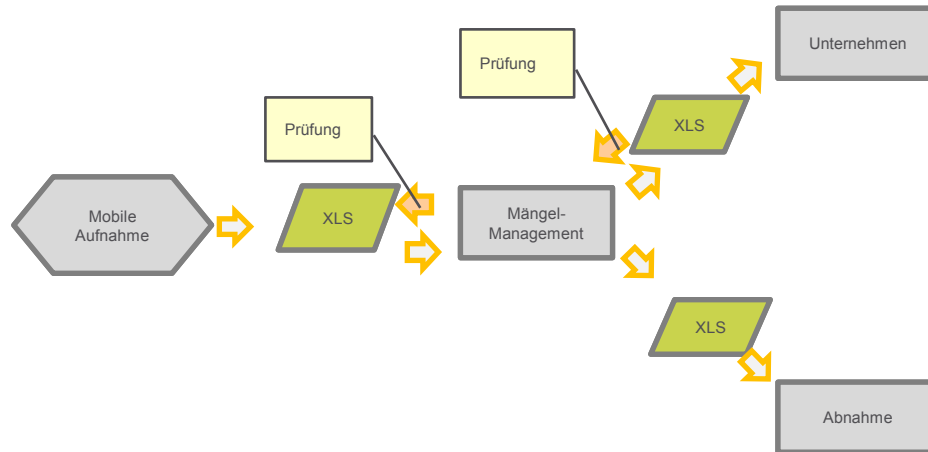


## BIM AT THE BUILDING SITE

Challenges. Solutions. Experience.



Mängelaufnahme auf der Baustelle,  
Tablet und OPB App

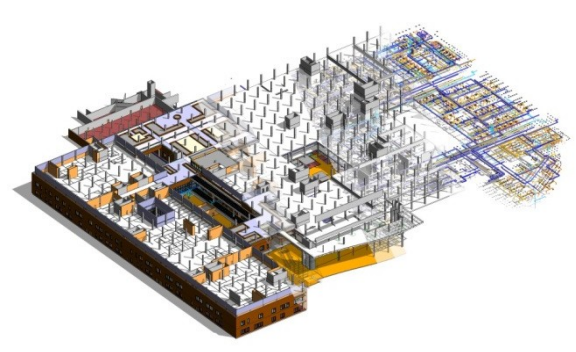


Defect Management Process



Analysis, evaluation





East Elevation photograph



QUESTIONS?

Challenges. Solutions. Experience.