
TOPCON

GEO|Design+BIM, 1-2 November 2018, Amsterdam

Virtual Design and Construction in Infrastructure Projects

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Viasys VDC Ltd. / Topcon Positioning Group

TOPCON at a Glance

Establishment

1932

History

Affiliated Company

27 countries/
86 companies

Topcon Group

Net Sales

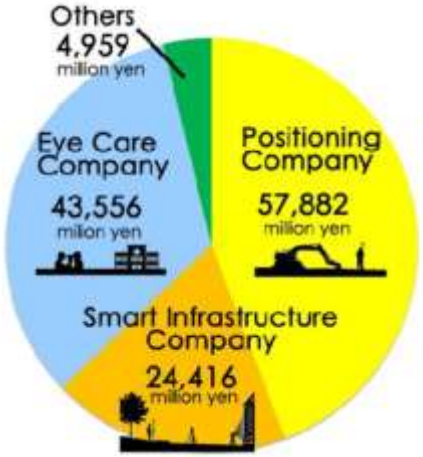
130,735
million yen

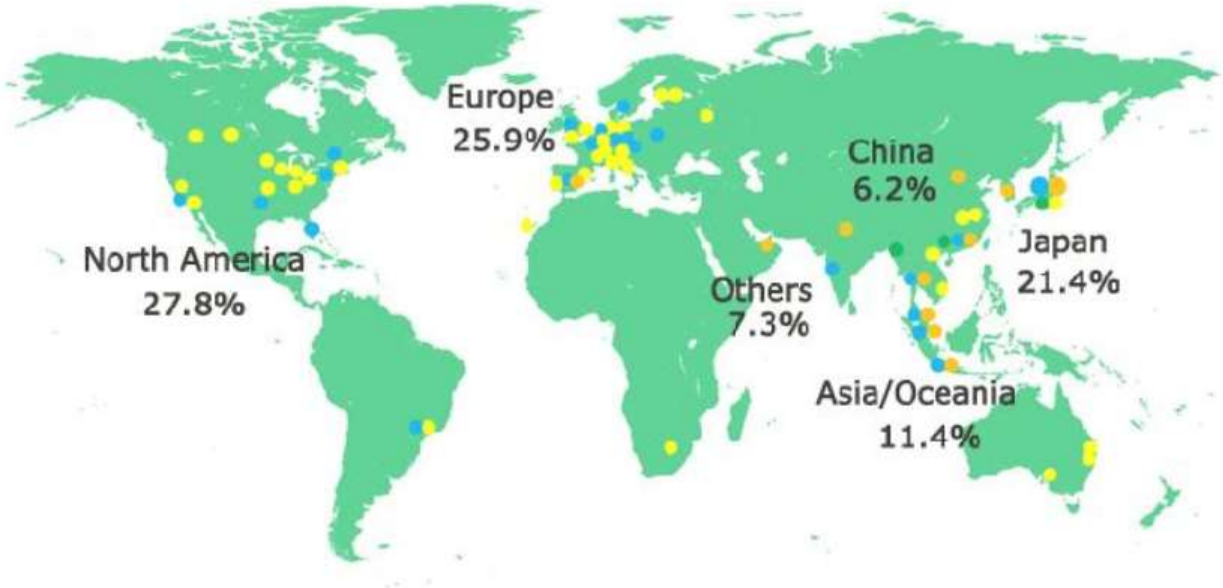
Financial Highlight

Employees

4,459

Topcon Globally





Virtual Design and Construction

MAGNET

Design review

Site planning (5D)

BIM collaboration

As-built modelling

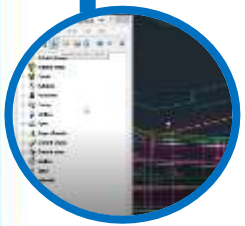
Digital management of maintenance data

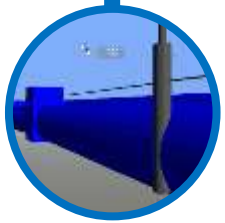
PLANNING

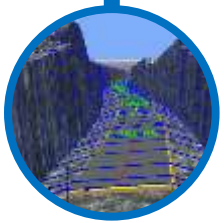
CONSTRUCTION

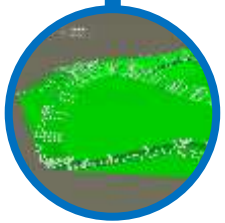
INSPECTION

DELIVERY & MAINTENANCE









2D to 3D

Risk analysis

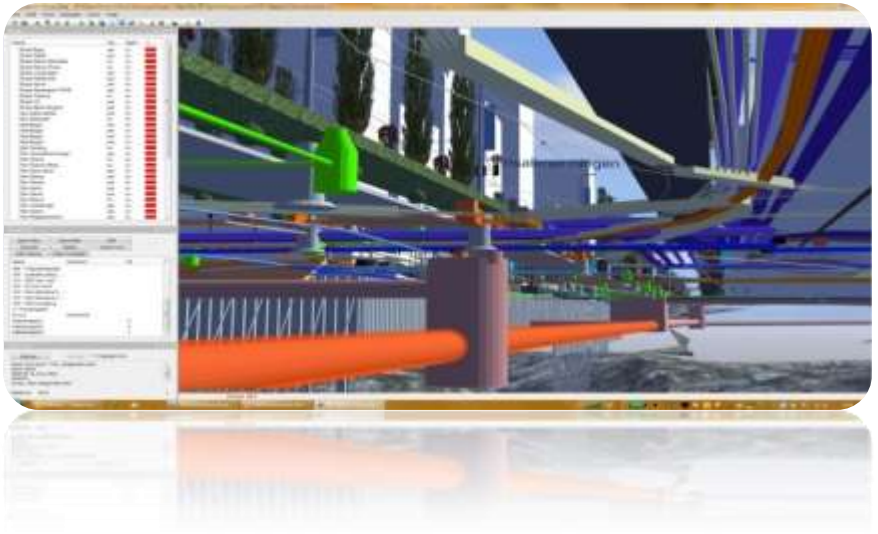
BIM on the jobsite

Survey to BIM

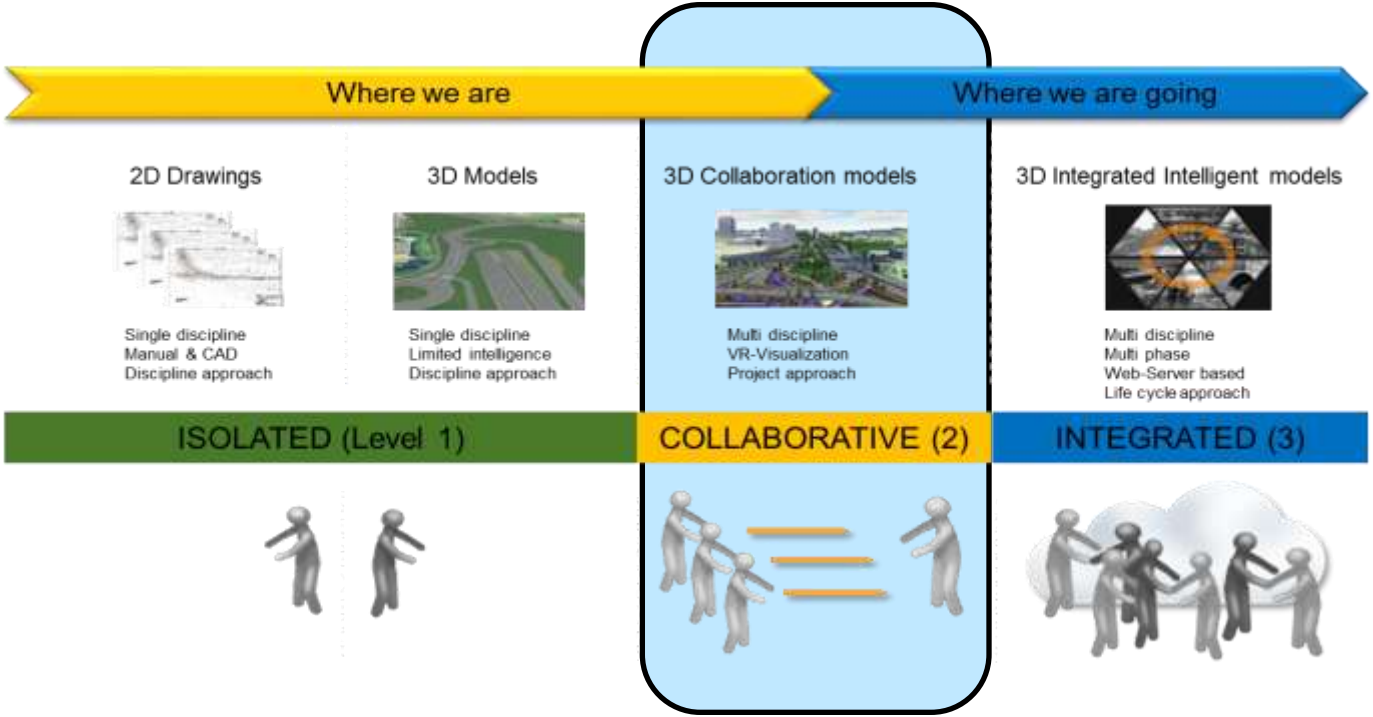
BIM in Construction - Benefits

- It facilitates efficient collaboration and the use of Alliance/IPD,
- less CO2 emission,
- more sustainable construction,
- better construction procedures,
- better data and information flow,
- better quality,
- cost savings,
- shorter project timelines,
- efficient model-based maintenance, and
- faster commissioning

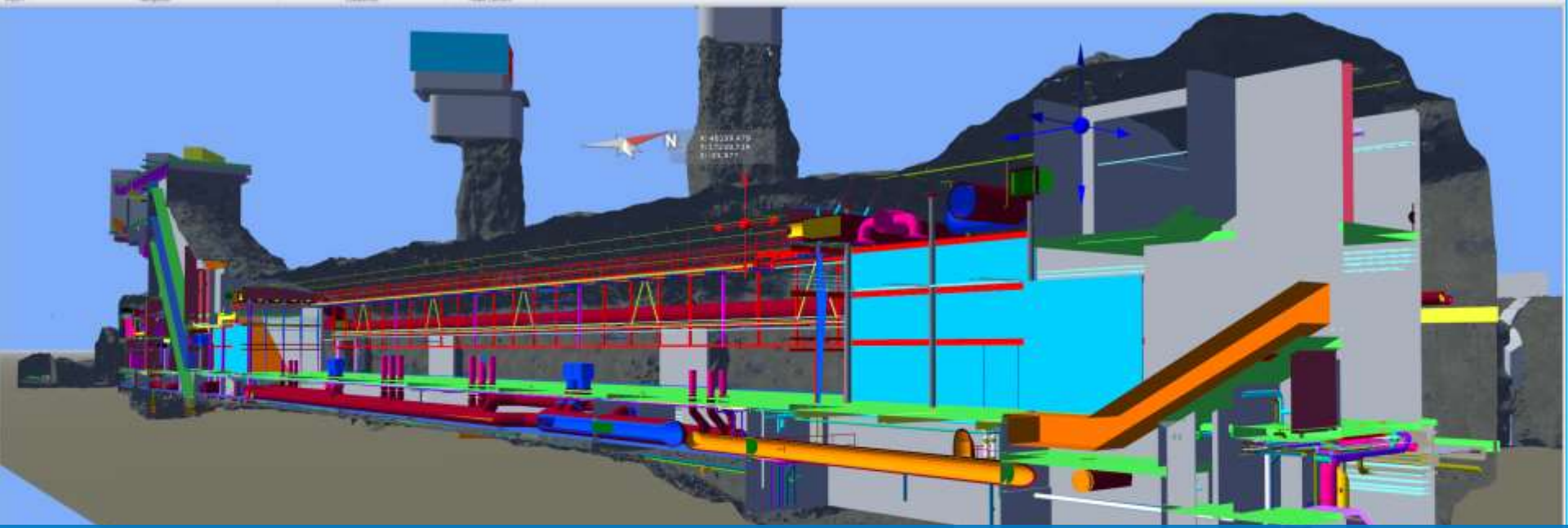
(AGC BIM Guide 2006; Arayzi, et al. 2011; Ashcraft 2008; Attarzadeh et al., 2015; Azhar et al. 2008; Berg 2012; Eastman et al. 2011; Grilo & Jardim-Goncalves 2010; Khosrowshahi 2012; Parve 2012; Sacks et al. 2009; Succar 2009; Nath et al., 2015; Wong & Fan 2013; Vähä et al. 2013).



BIM on maturity level 2



Model Collaborate Analyze Simulate

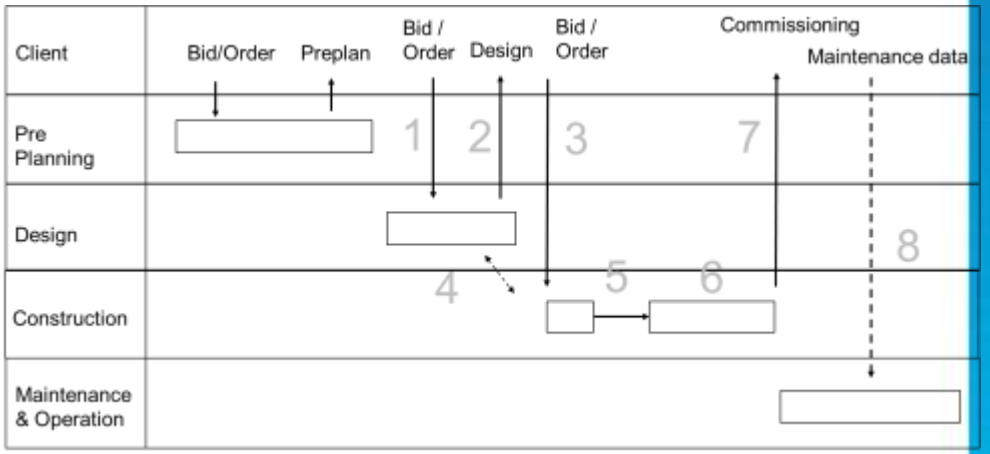


Combined model: Infra + Building + GIS + As-Builts

(Project: Helsinki – Espoo west metro, Länsimetro Oy, Finland)

Value stream in the DBB-project

1. The preplan documents are the basis for the design bid
2. Design stakeholder delivers project data to the client
3. Client gives the design information to the construction companies for bidding
4. *There is a possibility to get design information straight from designer to constructor, but liability issues reject the amount and quality of the data*
5. Construction bidding team delivers the information to construction team
6. Construction company have subcontractors

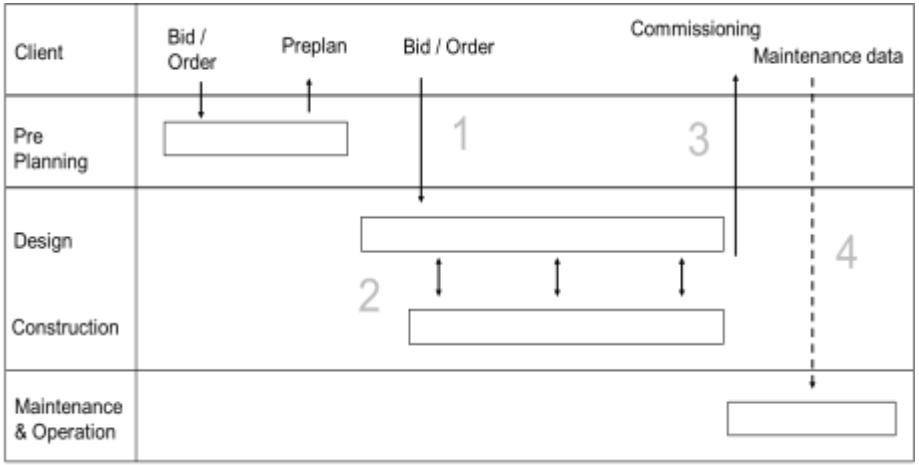


7. Constructor delivers the agreed as-built information to the client

8. It was unclear what is the data need for the maintenance phase

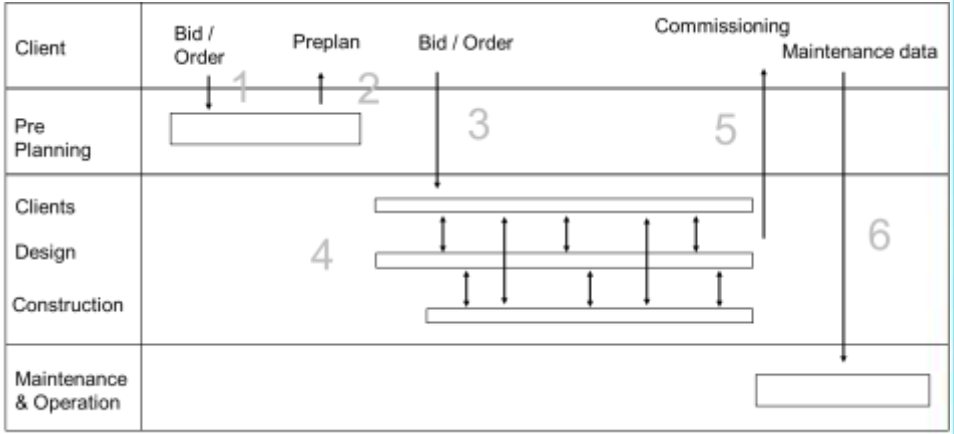
Value stream in the DB-project

1. The preplanning results are used as the basis for the bid of design & Built project.
2. *Designers and constructors work parallel.*
3. Design&Build consortium delivers the agreed as-built information to the client
4. *It was unclear what is the data need for the maintenance phase*



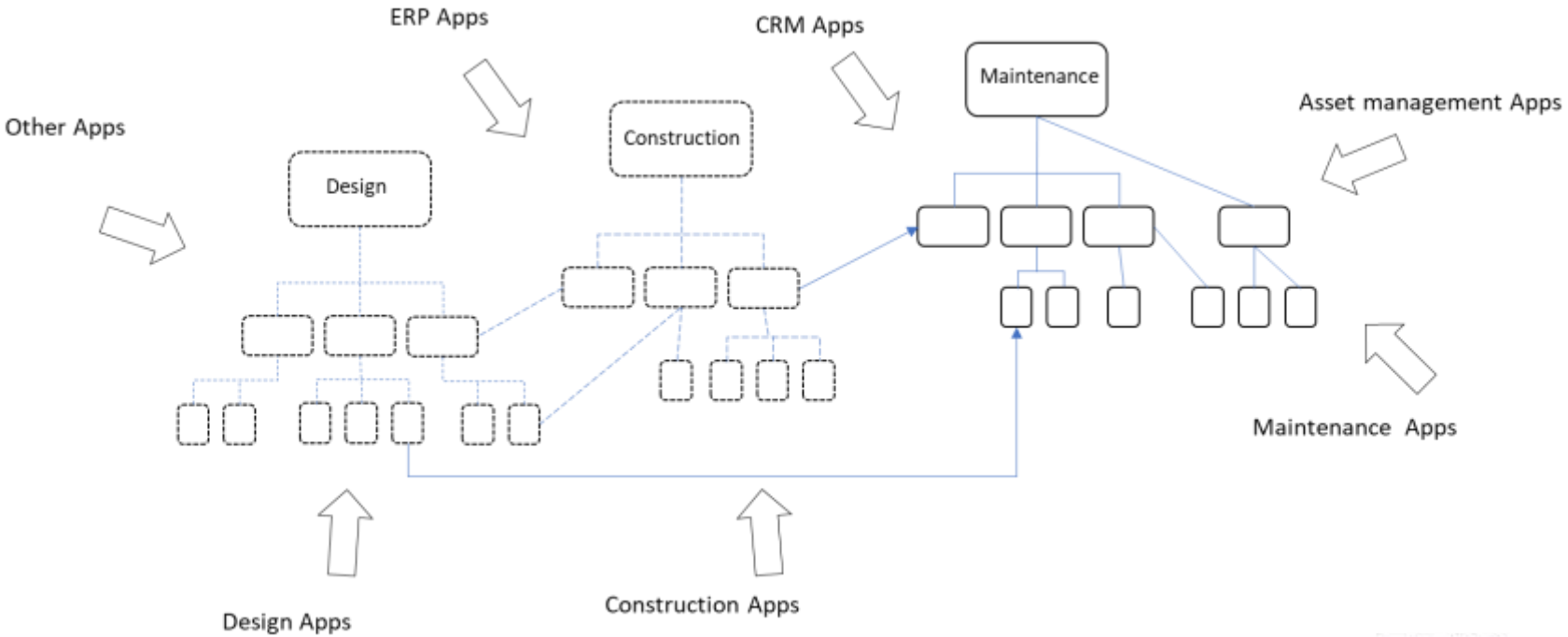
Value stream in the Alliance project

1. Client orders preplanning of the project (1,2)
3. Client chooses the best consortium based on i.a. expertise and team working skills.
4. *All stakeholders (Client, Design and Construction) work as equal partners towards the project goals.*
4. Because the clients are part of the alliance team, it is even possible to go back to final engineering plan result, if needed to improve the outcome.
5. Alliance-consortium delivers the agreed as-built information to the client.



6. FTA has detailed instructions about as-built data to be provided to the maintenance operator. *Maintenance operator is not yet chosen.*

Product Data Model for Maintenance



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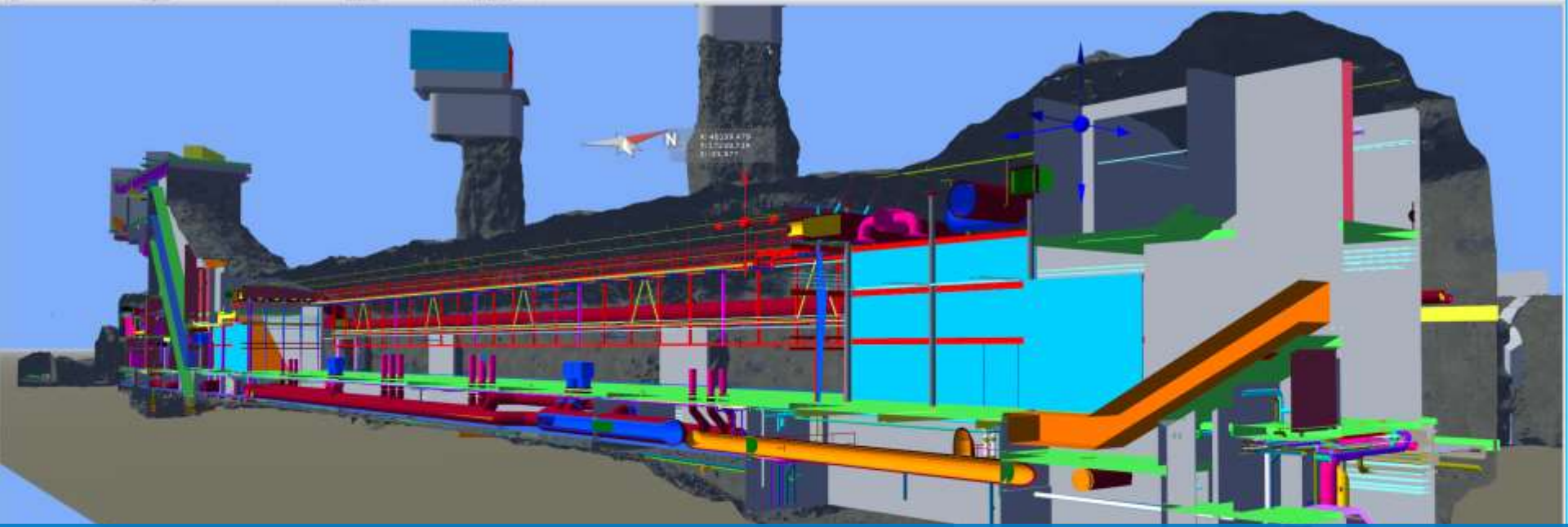

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Virtual Design and Construction in Infrastructure Projects

During the past few years, the construction industry has been actively focusing on improving productivity with new model-based technology solutions. The proper use of Building Information Modelling (BIM) technologies greatly improves risk management of construction projects with frequently reported benefits such as cost reduction, increased control, significant time savings and minimization of waste throughout the project lifecycle. Virtual design and construction tools, such as the MAGNET software family, help businesses to turn 2D drawings into high-quality constructible models, eliminate clashes and design defects and to monitor the project progress even in 4D and 5D views by including project schedule and costs. Furthermore, MAGNET software enables mass optimization, production of machine control surfaces and – with the help of UAV surveys and laser scanning - the creation of as-built 3D models that when combined with the initial design models allow project management to review the quality of work.