BIM Implementation for the German Railway
What does it mean for the surveyor?

DB Engineering & Consulting | Dr. Manthe | I.TPU(T) | Helsinki | 28.05.2017
Topics

- general information about the German railway
- BIM and the process of implementation
- What does it mean for surveyors?
  - Digitalization
  - Generalization
  - Information linking
  - Collaborating
  - Data storage
  - Information update
Business Units

- DB Arriva
- DB Cargo
- DB Schenker Logistics
- DB Vertrieb
- DB Services
- DB Systemtechnik
- DB Bahn Regional
- DB Bahn Long Distance
- **DB Netze Stations**
- DB Netze Energy
- **DB Netze Track**

Other participating interests of Deutsche Bahn AG

- DB BahnPark GmbH
- **DB Engineering & Consulting**
- DB Immobilien
- DB International at a glance
- DB Vertrieb
- DB Zeitarbeit GmbH
- Deutsche Verkehrs-Assekuranz-Vermittlungs-GmbH
- Infra Silesia S.A.

http://www.deutschebahn.com/en/group/business_units/
DB Netze Stations
- **DB Station&Service AG**
  - responsible for operating over 5400 railway stations
  - nearly 1300 station buildings
  - 80 per year results about 67.5 years for all

DB Netze Track
- **DB Netz AG** - track infrastructure as the mobility base
  - responsible for the rail infrastructure
  - service provider for the currently 380 railway undertakings
  - route network comprising over 34,000 km
  - About 40,000 trains per day
  - 4.5 Billion € business volume in year 2015

DB Engineering & Consulting
- offers technically sophisticated and customized infrastructure, mobility and transport solutions in Germany and around the globe

- **Engineering**
  - Design
  - Project management and project control
  - Realization management and construction
  - Design review and acceptance test
  - Environment, geotechnics and surveying

- **Consulting**
  - Business consulting
  - Operations and maintenance
  - Logistics
At the end of 2017 190 BIM-Projects will be in execution (DB Netz AG & DB Station&Service AG)

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At present, DB Station&Service AG has 85 projects in execution, 160 by the end of the year.

Learn together - take chances!

2015: first BIM Specifications & evaluation of the piloting phase

2016: 63 BIM projects are successfully advertised in open competition

2017: All new projects of DB S&S are generally processed with BIM-methodology

First digital, then real build!

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Three companies work in the same structures at the implementation of BIM

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Strategy of the DB Netz AG for the BIM implementation in 3 Steps till 2020

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What does it mean for us?

- **Cyclone**
  - Asset data
  - Project management
- **Recap**
  - Point clouds
- **ProVI**
  - Historical data
  - AutoCAD
    - Civil Map3D
    - Alignment data
    - Digital terrain model
    - CAD-data
- **Navisworks**
  - Parametric 3d model
- **Infraworks**
  - Collaboration software
- **SharePoint**
Requirement: on the collaboration with data

- Simple and fast data exchange
- Role based data access
- Central data management
- Single source of truth
- Versioning of data

Existing software solutions in the company

- SharePoint: Internet application
  Easy access to information

- Vault: distributed data storage for data with referenced content and files

- Revit: Application for generalization and designing
  Allows you to work synchronously in a model file
Properties of historical data

- Been incomplete
- No naming convention
- No metadata, which describes the Content
- Different sources
- Duplicates
- Topicality is unclear

SharePoint document database with Metadata entries for each file

- Column for metadata entries
- Filter with respect to the metadata

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Basic surveying
requirement from Station&Service AG:
- scale between model and real object should be 1:1

Requirement from DB Netz AG
- Every Information has to be in the DB system DB_REF

Requirement form the workflow with laser scan data
- Avoid large numbers with many digits

Solution
- Definition of an building site system
- based on given transformation parameter between DB_REF and ETRF89 and the codes of the European Petroleum Survey Group (EPSG)
System ETRS89

Multi-directional transformation without pass points

Building site system

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Surveying for preliminary design

- Terrestrial laser scanning
- Data acquisition multicopter

Providing the data as ReCap files for modelling and TruView for communication with project partners.
Information linking: CAD-drawing with point cloud
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- Detail drawing used to create a Revit family
- Point cloud as frame for the object

Detail drawing of an bridge element

Revit model with bridge elements

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Information linking: model with detail-drawing over SharePoint
Information linking: Link between model and measurement protocol via SharePoint
Collaboration: in Revit

- One template for all
- Everyone is only responsible for their own model
- In Revit all data has to be in the same coordinate system
- No translation of model parts
- Shared parameters should be used if it make sense
Collaboration: with Navisworks
Collaboration: with Navisworks to make decisions
Clash detection Navisworks
Information update: ground-penetrating radar
Summary:

- Different tools and applications are accessible but we are just at the beginning.

Some key words for the future:

- Distributed Data storage
- Databases and Application interfaces
- Web services, integration GIS and BIM
- Streaming of data and Information
- Joining the object information out of BIM with the resource information out of Enterprise resource planning (ERP) tools
- Sensor information and communication
- Predictive Maintenance
- Measurement update

Needed:

- People familiar with the technic in that field
- Surveyors skills in dealing with data
Thank for your attention!