

Use Case 01b: Factual geological and geotechnical data

Purpose

It needs to be clarified to which extend factual geological and geotechnical data are exchanged in IFC format. The content of original datasets is highly depending on applied methods, regional standards, etc., and a complete representation in IFC is impossible.

Placeholder elements with links to databases, documents and other formats should be used, and interfaces to existing standards like GeoSciML, AGS, RESQML should be supported.

As a base for any geotechnical model used in the project, a common conceptual geological model is required. This evolving model will be refined and updated throughout the life of the project, while geotechnical models are developed (**Use Case 2a, b, c, 12b**).

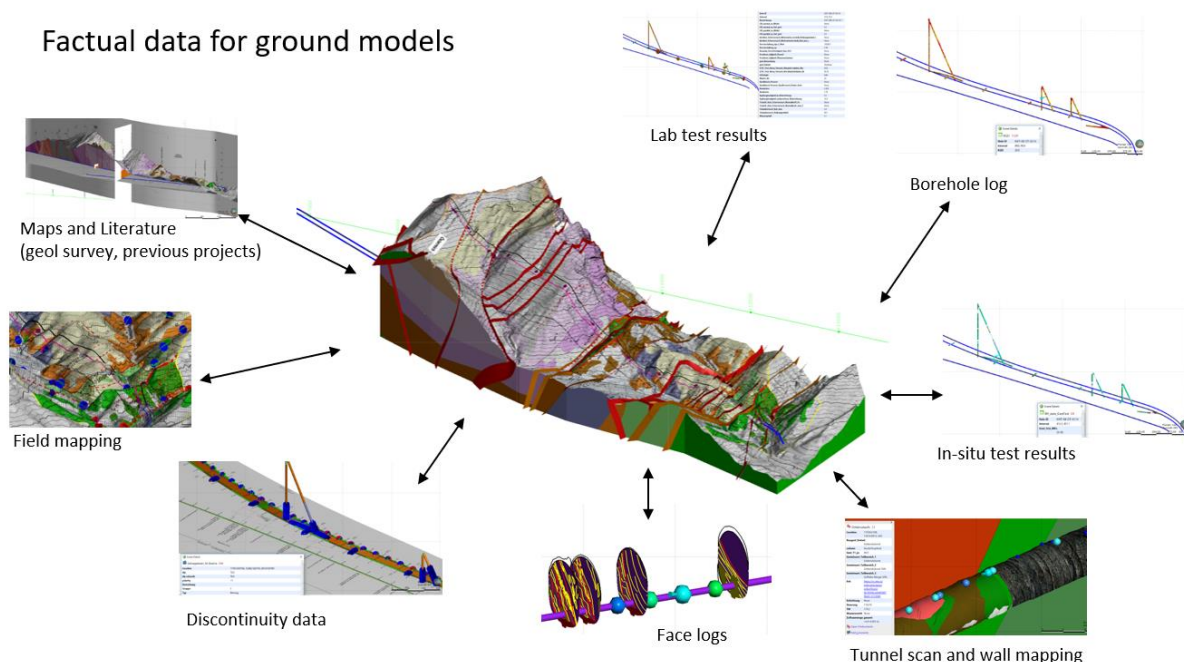


Fig.1: Examples of factual data for geological and geotechnical models (UC 1b and 15b), © iC

Geological documentation during construction and the exchange of the produced data is described in **Use Case 15b**.

In addition to the “Geology-oriented data”, other content like topography, existing and planned buildings, underground networks/installations, excavation design, ... are relevant for the geological interpretation.

The exchange scenario to be supported is: Exchange of factual geotechnical, geophysical and geological data, from native software of data collection and databases to the work environment where geotechnical models are developed. To describe the uncertainty of geological and geotechnical models, the geometry of factual data must be represented.

Requirements for IFC-Tunnel:

The factual data can include, e.g.:

- Boreholes (general info to borehole, borehole log, geological description: link to database. Allow regional and generic PropertySets. Related formats: AGS, RESQML,...)
- Geotechnical test data (lab and insitu): link to database. Allow regional and generic PropertySets. Related formats: AGS
- Geophysics: interpreted geophysical models
- Field mapping: typically in GIS, related format: GeoSciML
- Hydrogeological monitoring points/wells: At least “placeholders” for piezometers, linked to database
- Geochemistry: Lab tests, existing maps and models, relation to GIS and databases
- Existing thematic (3D-) model from geological surveys, other projects etc.: geology, bedrock surface, weathering, ... Related format: GeoSciML?

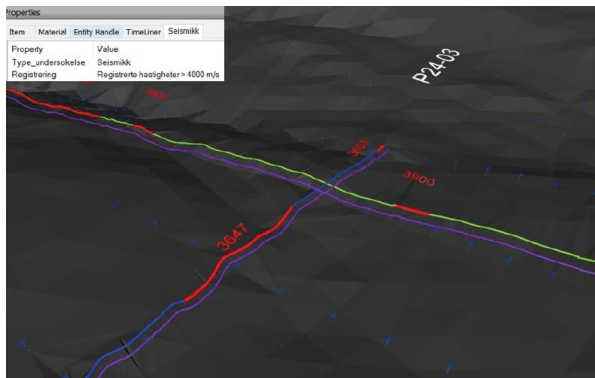


Fig.2.: Seismic survey in geological model FRE16
(Digitalisation in Norwegian tunnelling, Publication No.28, Norwegian Tunnelling Society 2019, p.23)

Linkage is needed to:

- Link to original database or documents (existing reports, maps, ...)

Required attributes for uncertainty evaluation:

- Methodical constraints and statistic scatter
- Accuracy of localisation/geometry: e.g. borehole deviation
Density of existing factual data (e.g. boreholes).

Geometry:

Borehole data can be described by lines and solids (cylinders)

Lab- or in-situ test data (including geochemistry) can be represented by points, lines or solids

Geophysical data can be represented by lines, surfaces, solids and block models

Geological models boundary can be described by GIS data, surface models, solid models or block models.

Field mapping is usually provided in GIS (2D geometry including attributes) or raster images (map layout)

Semantics:

All entities must be consistent with the existing geological and geotechnical engineering standards (GEOSciML, ISO etc.).

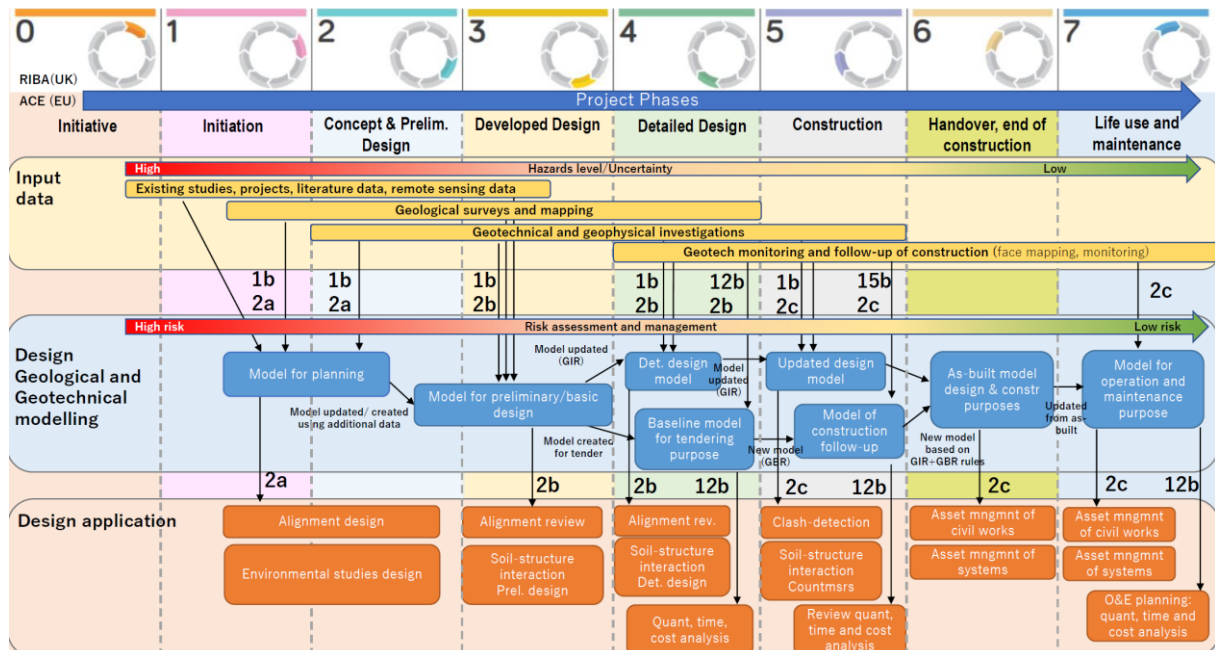


Figure 3: Process map of geotechnics-related use cases