Innovative BIM uses to design the new Airport of Mexico City

The design process for the new Airport of Mexico City is challenging due to the extreme soil subsidence, considerable earthquake risks and large unknowns in the hydrological conditions of the site. Several steps were taken to ensure these challenges can be met while adhering to project planning and budget. A major step in overcoming these challenges is the use of Building Information Management (BIM).

In the initial phase of the project BIM processes and uses were identified in joint sessions. For the different disciplines involved (i.e. geotechnics, hydrology, seismic, tunnel design) information flows and applied software were visualized in the flowchart shown in figure 1 below. Based on this flowchart smart solutions for the interfaces between different disciplines were developed.
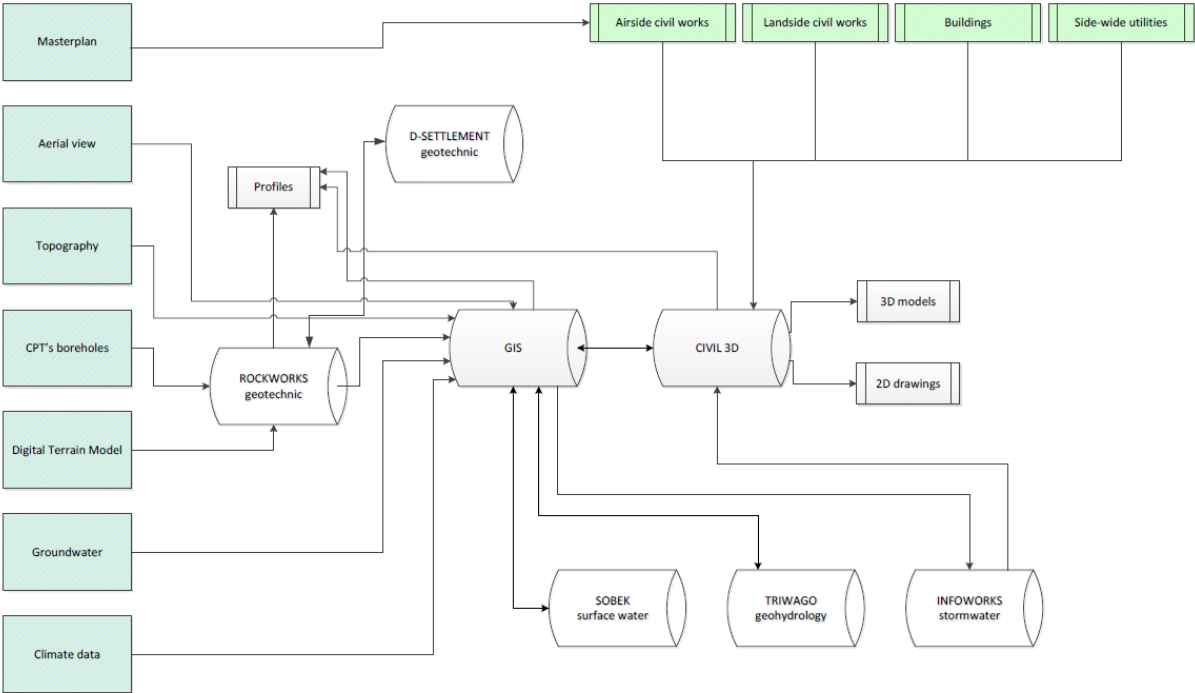

Figure 1: Flowchart showing information flow and software used to identify BIM uses

The geotechnical team, for example, makes use of GIS-based soil layer data to do batch calculations (in D-Settlement). These batch calculations provide the location specific expected settlement and the required preloading. The output is ported back into GIS for presentation in contour maps (see figure 2 below) and 3D models. The workflow has been fully automated: when new soil investigation data becomes available, the settlement calculations can quickly be updated.
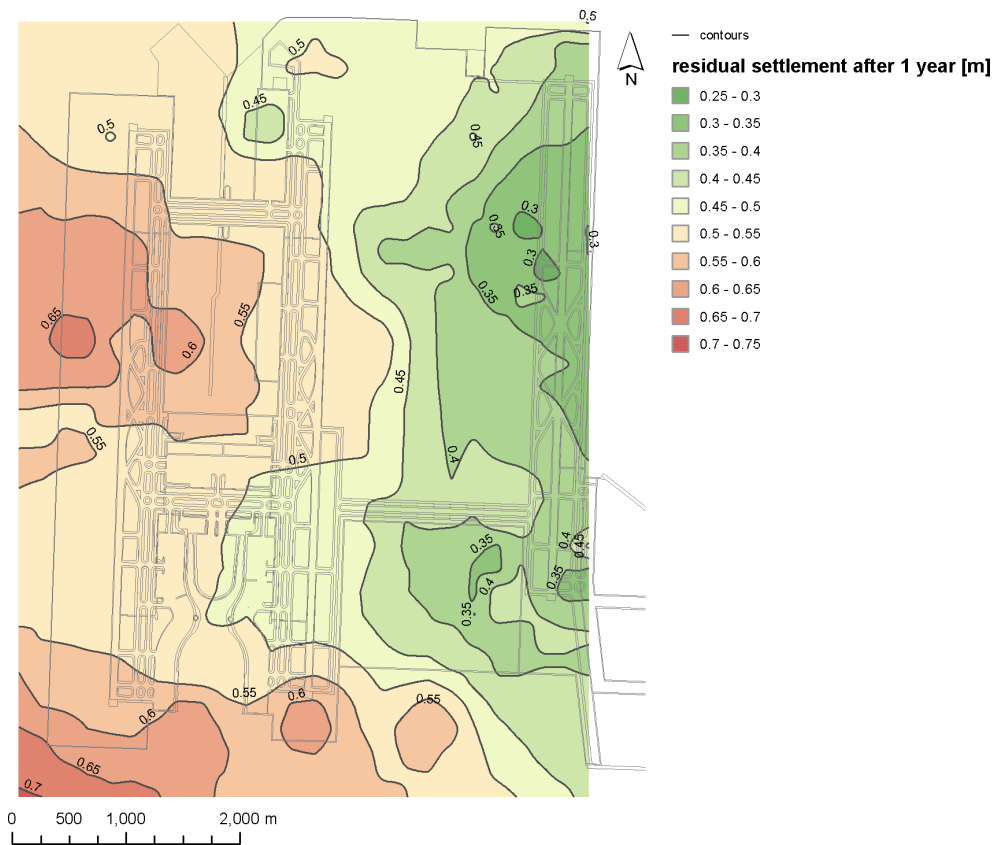
Figure 2 Example of GIS-based settlement calculations

A similar coupling has been set up for the seismic team. A 3D ground model is defined in Rockworks based on available soil investigation data. A fully automated procedure extracts local conditions for earthquake ground response from the model, calculates the ground response in Strata and subsequently returns the Strata output to GIS. Subsequently GIS is used to visualize data for reporting (see figure 3 below) and to provide seismic design input as a database format to the different design teams. The results in GIS are also published in an interactive web-viewer.
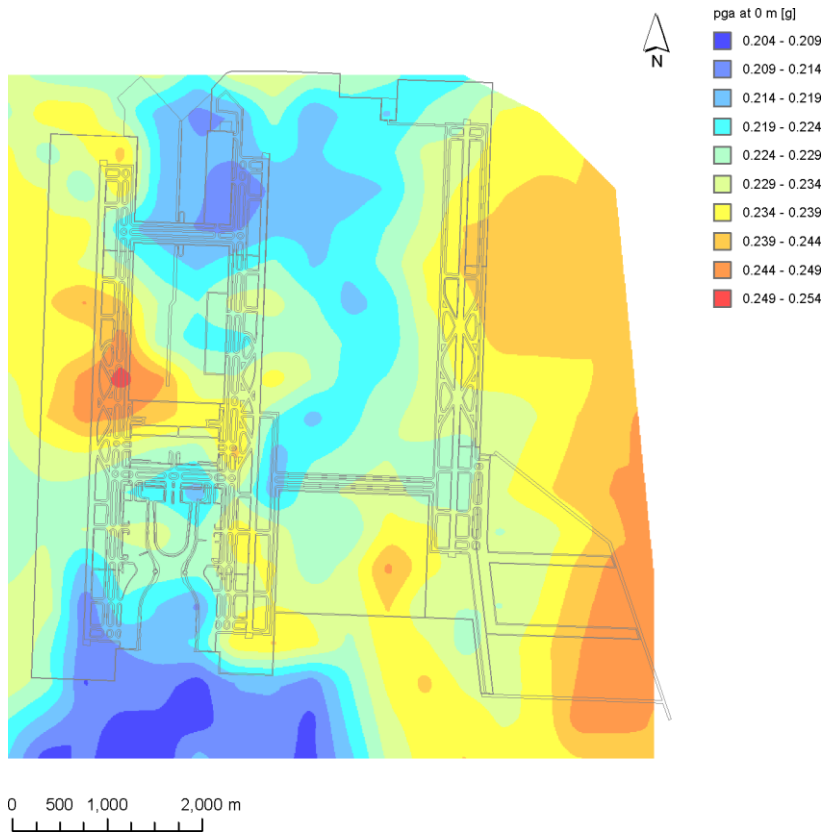
Figure 3 Example of GIS-based site response analysis

The process can be described in three general steps: input data is stored in reusable/interoperable manner, processed by a linked analyses tool and provided back to the central model visualizing all information. These general steps are shown in figure 4 below.
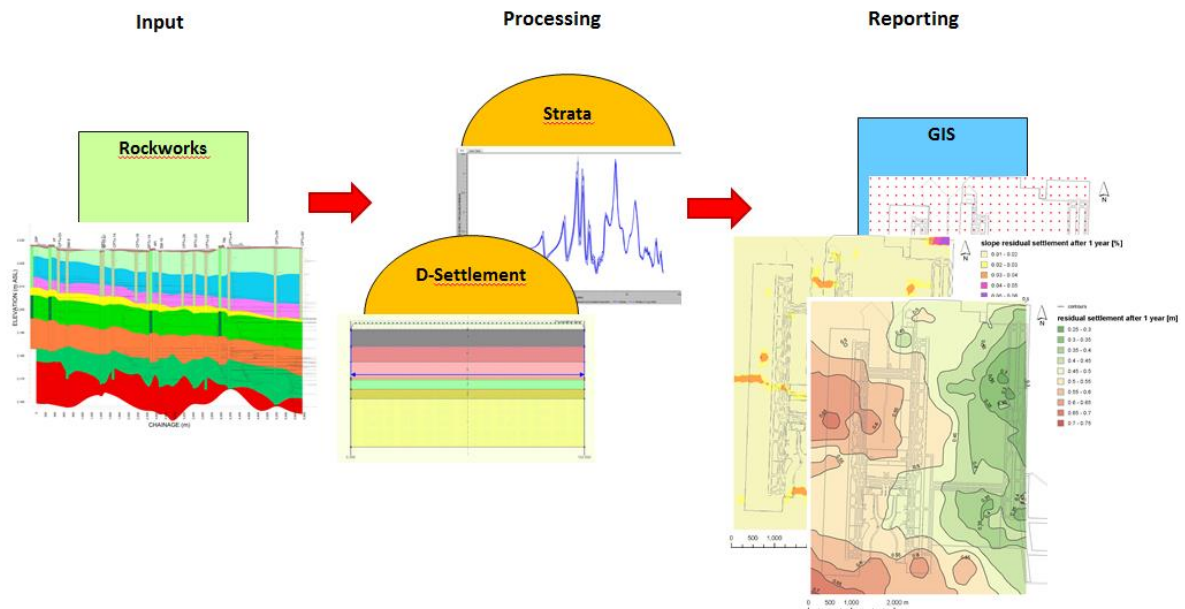

Figure 4: General steps in the information processing

The effort of defining the information flows and BIM uses and the design of the required software interfaces proved to be a profitable effort. This investment early in the project saves a lot of man-hours (weeks) of repetitive engineering tasks. Changes can be adopted quickly without a lot of manual (and boring) rework. These solutions make the project team very happy!

For more information:
Tom van Steijn (tom.van.steijn@rhdhv.com)
Stijn Schoen (stijn.schoen@rhdhv.com)
Floris Besseling (floris.besseling@witteveenbos.com)