

# Success Factors for a Digital Twin of Subsurface Utilities - Experiences from the Comparison of Singapore and Zurich

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**Key words:** Digital cadastre; Geoinformation/GI; Land management; Digital Twin; Utilities; Underground

## SUMMARY

Above-ground space is scarce in many cities and must therefore be used optimally. A frequently used possibility for this is the relocation of utilities and other infrastructures, e.g., roadways to the underground. Reliable information about underground utilities can help planners, land managers, facility owners and other stakeholders make better informed decisions and streamline work processes. However, in many cities, underground infrastructures are not documented in sufficient quality or are not accessible to all stakeholders.

In the city of Zurich, the utility cadastre was initialised in 2001. As a result, digital data has been available in a uniform format and in a defined structure across all asset types for almost 20 years. The utility operators guarantee the timeliness and accuracy of the data, so that many applications can be undertaken based on the data of the utility cadastre without additional investigations.

In the highly densified city of Singapore, using the underground space efficiently and thus gaining high-quality above-ground space is particularly important. A unified data basis in terms of a digital representation of the underground, though, is not yet available. In 2017, the Singapore Land Authority has thus initiated a project "Digital Underground" in collaboration with the Singapore-ETH Centre, and initially also Geomatik + Vermessung Stadt Zürich, to analyse technologies and challenges, demonstrate tools, and develop workflows for the creation of a digital twin of subsurface infrastructures. During the project, it became clear that the technical challenges are manageable but are likely not the main, or at least not the only, success factors for the development and long-term operation of a digital twin of subsurface utilities.

This paper presents the elements for a successful implementation of a joint digital twin of all subsurface utilities, based on the experiences from the city of Zurich and the "Digital Underground"

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