

# Terraintwin - Microservice Architecture for the Integration of Geodata (GIS) and Building Models (BIM) Using Link Models

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## SUMMARY

BIM-GIS integration is a long-standing research topic because a complete mapping of information between the domains is not possible. Since the domains partly describe the same objects, e.g. buildings, an integration of both domains is a desirable goal. This necessity also arises from the fact that the BIM and GIS worlds are increasingly converging in reality. However, the different view on real world objects causes conflicts, which have to be solved by integration.

Due to the emergence of new technologies, new possibilities arise to perform integration between BIM and GIS data. One of these new technology areas is the Semantic Web. Although its basic technologies have existed for more than 20 years, they get more and more importance with the interconnection of the world, and this is also true for BIM-GIS integration.

Most approaches in BIM-GIS integration are based on converting data from one data format into a data format from the corresponding other domain. This always results in the loss of information due to the lack of interoperability. Instead of a pure data integration, we also want to include an integration on the application level with our approach in order to minimise information loss due to conversion.

In the presented research discusses the idea of a modularised system architecture for the integration of geospatial data and building models, which are linked together using Semantic Web technologies. Several modules of different domain-specific applications are packed as Docker containers and provided in a microservice architecture. For the communication between the applications Application Programming Interfaces (API's) are designed. The geometries of the BIM and GIS data are stored in domain-specific databases, e.g. PostGIS and BIMserver. The integration of the heterogeneous data is accomplished by a link schema and link instances. All links are

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collected in a graph database with further information. Eventually the endpoint provides cross-domain queries with the query language SPARQL.

The concrete outcome of the presented research are software components of the microservice architecture “TerrainTwin”, however the methods used, design decisions made and functionality achieved are shown with examples in this paper.

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