

# Synchronization of information flows of Digital Twins in construction

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## Summary

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*The purpose of this research is to investigate the opportunities and challenges for improving data-based information flows of digital twins in construction and to develop theory as well as corresponding practical processes, decision tools and policy guidance. The research will address the following research questions: What are the best international practices and research in synchronization of information flows for digital twins in private and public sectors of construction? To what extent can public sector digital innovation platforms implement central technical solutions for decision makers in construction? How can Geographic Information System (GIS) and Building Information Modelling (BIM) be used simultaneously throughout the construction life cycle? What changes in information flow management should be done on the governmental level and how to measure the impact of these changes?*

Research field:	Building and civil engineering and architecture
Supervisors:	Prof. Dr. Raido Puust Prof. Dr. Irene Lill
Availability:	This position has been occupied.
Offered by:	School of Engineering Department of Civil Engineering and Architecture
Application deadline:	Applications are accepted between June 01, 2023 00:00 and June 30, 2023 23:59 (Europe/Zurich)

## Description

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BIM in building design, construction and facility management is widely used in construction industry. Public sector has recently understood the benefits of BIM and BIM-based permit processes are being developed or already adopted in several countries. Meanwhile, most of the construction related decisions are still made based on 2D drawings, based on non-machine-readable DOC and PDF formats. Therefore, there are several complications of using trustworthy uninterrupted information flow during entire construction lifecycle starting from planning, throughout construction stage, maintenance and up to demolition. Technologically, for more than 10 years there has been an opportunity to use digital tools capable of being compatible with both GIS and BIM datasets and transmitting 3D geometry with attribute data attached to them in open data formats as an output.

The purpose of this research is to investigate the opportunities and challenges for developing the synchronized information flows for digital twins including corresponding theory, practical processes, decision tools and policy guidance.

### Supervisors:

Main supervisor: Prof. Dr. Irene Lill  
Co-supervisor: Prof. Dr. Raido Puust

### Responsibilities and (foreseen) tasks

- Conduct a systematic review of the extant literature on dataflows for digital twins in construction.
- Develop a conceptual framework for synchronization of dataflows for digital twins in construction.
- Identify potentially relevant and accessible case studies.
- Collect data and conduct case studies.
- Refine theoretical framework for synchronization of dataflows for digital twins in construction.
- Develop practice and policy guidance.
- Contribute to the organization of research and practitioner events where the research findings are presented.

### Applicants should fulfil the following requirements:

- A master's degree - preferably in built environment-related discipline
- A clear interest in the topic
- Related research (including publication) experience
- Excellent proficiency in English
- Strong and demonstrable writing and analytical skills
- Capacity to work both as an independent researcher and as part of an international team
- Capacity and willingness to assist in research organization tasks relevant to the research and the dissemination and exploitation of its results.

The candidate should submit a research plan for the topic, including an overall research and data collection strategy. The candidate may expand on the listed research questions and tasks and suggest additional, specific focuses for the research.

#### **We offer:**

- A 4-year PhD position in Estonia's leading technical university.
- The chance to pursue high-level research in a dynamic, technologically advanced context.
- Opportunities to participate in conferences, study visits and networking internationally with researchers from leading universities and research institutions in the fields of resilience, sustainability and the built environment.

#### **About the department**

The **Building Lifecycle Research Group** approaches the building lifecycle as a whole, integrating the construction process and its outcomes with management strategies, technologies, building materials, economics and facilities management. Recent research has included:

- Multiple criteria analysis of BIM-based Building Permits;
- BIM-enabled construction education;
- Developing and providing BIM-related know-how;
- Energy saving and the renovation of buildings;
- Disaster resilience of the built environment;
- Regulation of construction activities and the creation of standards for the Estonian construction industry;
- Surveys on the building life cycle and technical conditions of housing;
- Utilization of oil shale waste materials in the production of building materials.

#### **Additional information**

For further information, please contact Prof Irene Lill [irene.lill@taltech.ee](mailto:irene.lill@taltech.ee)



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