

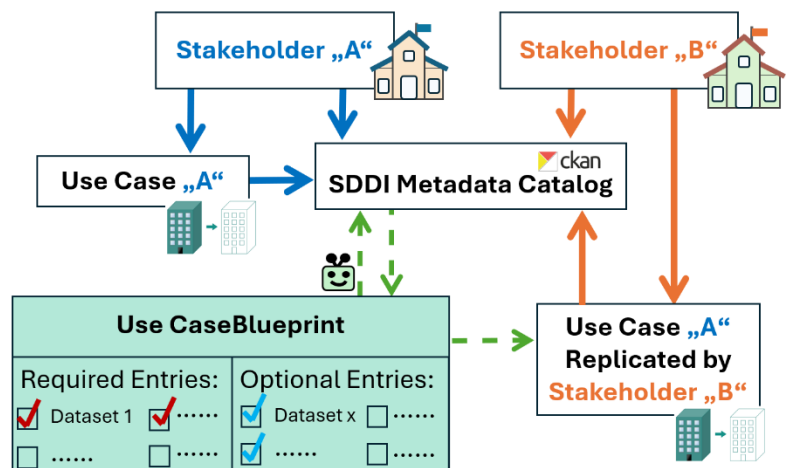
## Proposed topic for Master's thesis

# Enhancing Replicability in Urban Digital Twins Through a Use Case Blueprint Framework

The Smart District Data Infrastructure (SDDI) catalog allows managing heterogeneous datasets and further digital resources that are required for the realization of Urban Digital Twins (UDT). Despite its technical capabilities and flexibility, the catalog remains challenging to use, particularly for municipalities that need to register, structure, and reuse catalog entries for concrete application scenarios without extensive technical expertise.

One key usability challenge is the lack of structured guidance on which catalog entries are required for a specific UDT Use Case scenario, such as an early warning application for flooding or temporary road closure and detour planning. Without such structured guidance, it is difficult to systematically replicate UDT use cases across municipalities or to assess whether an existing UDT setup can be transferred to a new context with minimal adaptation. As a result, similar Use Cases are often modeled repeatedly, leading to increased effort for users and a lack of knowledge transfer between municipalities or municipal departments. To address this challenge, Use Case Blueprints are introduced as a mechanism for enhancing replicability in UDT. The blueprints are envisioned as a conceptual template for specifying UDT use case scenarios. They define the mandatory and optional digital resources (e.g., datasets, services, simulation models) required to implement a specific use case. The creation of Use Case Blueprints is supported by AI-based tools that assist in identifying and structuring these digital resources. In addition, a blueprint is intended to serve as a checklist for municipalities to consult before creating or registering a use case in the catalog. This checklist enables municipalities to identify which digital resources can be reused and which still need to be created or procured to implement a specific application scenario, thereby supporting the replication of existing use case scenarios and the estimation of implementation effort in the local context.

The objective of this master's thesis is to conceptualize, structure, and evaluate the idea of Use Case Blueprints as a means to improve the replicability of Use Case scenarios in the context of UDT. The thesis aims to clarify how Use Case Blueprints should be defined and structured to support the systematic transfer and reuse of UDT application scenarios across municipalities. An implementation based on the SDDI catalog software, developed by the Chair of Geoinformatics, will serve as a proof of concept.



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