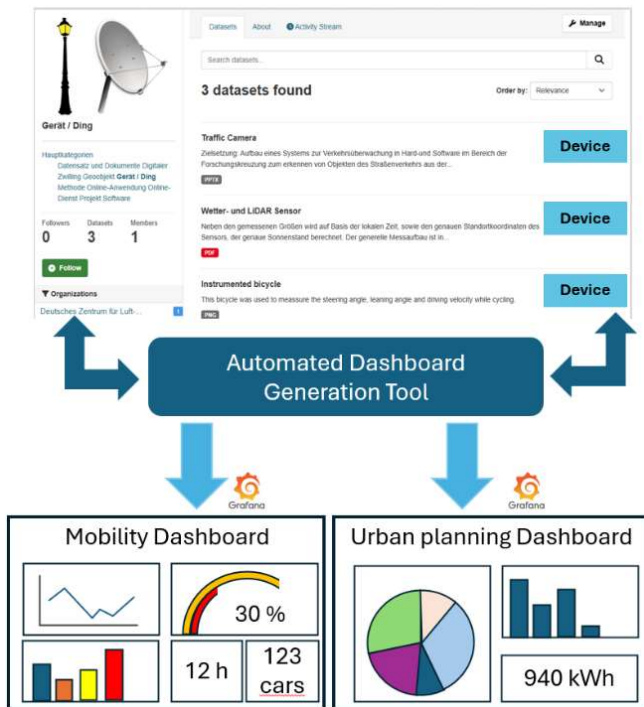


Proposed topic for Master's thesis

Automating the Generation of Domain-Specific Grafana Dashboards Using Metadata from a Urban Digital Twin Catalog



Modern data-driven infrastructures rely on data catalogs to manage heterogeneous datasets and further digital resources. While data catalogs enable structured registration, discovery, and governance of digital resources, the transition from cataloged data to operational monitoring and visualization environments remains largely manual. The registration of a new sensor or dataset in a domain-specific data catalog currently requires the manual creation and configuration of corresponding monitoring dashboards. This includes defining panels, queries, visualizations, alert rules, and layout structures. Such manual processes are time-consuming and require technical expertise. Moreover, they limit scalability and hinder the rapid deployment of standardized monitoring solutions across different applications, including Urban Digital Twins.

To address this challenge, this thesis will investigate automated dashboard instantiation based on structured metadata from SDDI¹ data catalogs and sensor data properties (e.g. sensors in Munich and Hamburg IoT platforms). The primary objectives are to conceptualize, develop, and evaluate an automated methodology for generating domain-specific dashboards based on the metadata stored in urban data catalogs. When a sensor is added to the SDDI catalog and assigned to a specific domain, the developed methodology will automatically select the appropriate dashboard template and generate a fully configured dashboard instance, for example, in Grafana. Additionally, the thesis will analyze the metadata structures required for automated dashboard generation and define a reusable template model for domain-specific dashboard blueprints within Grafana.

Supervisors Joseph Gitahi, Marija Knezevic
 Office 0107, 0107
 Phone +49 89 289 22531, +49 89 289 22974
 E-mail joseph.gitahi@tum.de, marija.knezevic@tum.de

¹ <https://www.asg.ed.tum.de/gis/projekte/sddi/>