



Key components of the SATO Platform

The Self-Assessment Towards Optimization (SATO) project aims to create (among other goals) a platform that will improve the energy efficiency of buildings by collecting data from various sources, sensors, and devices and using this data to create a digital twin of buildings. This digital twin provides contextual information that enables the SATO platform to assess the building's energy performance and autonomously identify opportunities for improvement and optimization.

One of the critical layers of the SATO platform is the middleware layer, which is a set of software tools that are responsible for ingesting, enhancing, and standardizing data to provide semantic and syntactic interoperability for the remaining processing and service components of the platform. The SATO project addresses interoperability mainly through a Data Catalogue component and an enriched Context Information Model (CIM). While the former harmonizes the data from multiple IoT platforms, the latter maintains valuable contextual information about all entities within the SATO platform, including buildings, zones, rooms, systems, devices, sensor measurements, assessments, services, and actuations, as well as their relationships and properties.

The CIM consists of an NGSI-LD (Next Generation Service Interface Linked Data) broker, an information model with a standardized API that can be used for publishing, querying, and subscribing to context information. The development of the SATO CIM is fundamental for the remaining operations of the platform, including the computation of Key Performance Indicators (KPIs) and Assessments, the registry of control actuations from the Self-Optimization Services, and supporting the SATO REST API that sends data to various other components. Additionally, the CIM is initially populated with information from a BIM model (Building Information Modelling), if available. Then, it is continuously updated as new data becomes available, allowing the SATO platform to systematically assess and identify new opportunities for optimizing the building.

In addition to the NGSI-LD broker in the CIM, the SATO platform extends pre-existing ontologies, such as the SAREF (Smart Applications REFerence ontology). The extensions aim to increase expressiveness for various purposes: context awareness, data integration, machine interpretability, direct representation of physical and conceptual connections, and the possibility of replicating some aspects of the developed assessments and services. These features allow the creation of new unforeseen applications that seamlessly know how to explore the underlying information model.

Overall, the SATO platform uses a combination of cutting-edge context-aware technologies and data analysis techniques to propose novel approaches for improving the energy efficiency of buildings.



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