

Asset Administration Shell and Open Knowledge Format for Agentic Engineering

Masterthesis

Move fast and (hopefully don't) break things - not Mark Zuckerberg

Motivation

The Asset Administration Shell (AAS) is an established, standardized information model for industrial asset data. It defines formal semantics through ConceptDescriptions, SubmodelTemplates, and standardized submodels, and is designed for machine processability and cross-organizational interoperability. This strength comes at a cost: modeling, maintaining, and extending AAS structures requires expertise in the metamodel and is not primarily designed for direct consumption by LLM-based agents.

In June 2026, Google published the Open Knowledge Format (OKF), a lightweight specification for representing knowledge as a directory of Mark-down files with YAML frontmatter. OKF deliberately forgoes a fixed schema or runtime environment and aims to make context knowledge (process, rationale, documentation) directly accessible to AI agents. The two formats address different, potentially complementary needs: AAS provides structured, validatable facts about assets and their type-instance relationships; OKF provides flexibly extensible, agent-readable context knowledge without formal governance.

For agent-supported engineering processes, the question arises whether and how both formats can be combined without undermining the consistency guarantees of the AAS.

Tasks

- Literature review of existing approaches (knowledge graphs, LLM-wiki patterns, RAG context formats). Position OKF within this landscape.
- Comparison of AAS and OKF in terms of expressiveness, change management, semantics and tooling support.
- Conceptual design of a combination of both formats for an agent-supported engineering process, e.g. as a bridging mechanism: AAS remains the authoritative data source, OKF provides supplementary context knowledge for agents.
- Prototypical implementation and validation on a concrete use case.

Interests and Helpful Knowledge

- 📖 Interest in information modeling and LLM agent architectures, knowledge of AAS or willingness to acquire it quickly, programming skills (e.g. Python)
- 🔧 Hands-On Mindset and a passion for coding and IT systems
- 📚 Lectures CPM, DTE, IPPE, Software Engineering

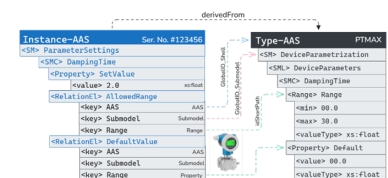


Figure 1: Exemplary Asset-Type and Asset-Instance Model of a pressure sensor

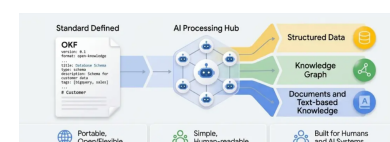


Figure 2: Open Knowledge Format (OKF)



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