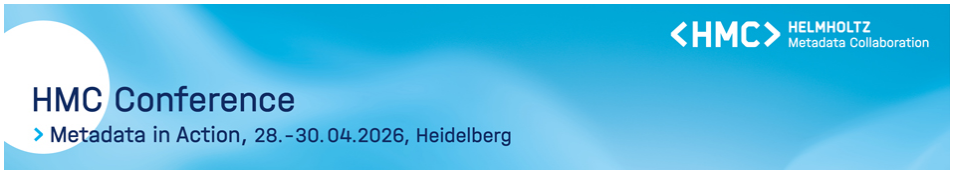

Beitrag ID: **87** Typ: **Talk**

Automated Metadata Acquisition in Energy Research using BPMN-driven Workflows at the Energy Lab at KIT

In energy research facilities, such as the Energy Lab at the Karlsruhe Institute of Technology, the systematic acquisition of high-quality metadata remains a significant challenge because manual documentation can be error-prone and time-consuming. To ensure data findability and reproducibility according to the FAIR principles, we present an innovative approach that utilizes Business Process Model and Notation (BPMN) to orchestrate research workflows and automate metadata capture. By using Operaton as a lightweight, open-source BPMN engine, metadata acquisition can be transformed into an inherent component of the experimental lifecycle. Within the Energy Lab infrastructure, experimental sequences, ranging from sensor calibration to data storage, are modeled as executable BPMN diagrams. These models serve a dual purpose: they provide a visual documentation layer for researchers and act as technical instructions for the Operaton engine. By integrating specialized metadata tasks directly into the automated workflow, the engine extracts technical parameters and provenance information in real-time and maps them to standardized schemas without requiring manual intervention. The initial results demonstrate that this orchestration significantly increases metadata completeness and consistency while reducing the administrative burden on researchers. Furthermore, the graphical nature of BPMN facilitates a crucial bridge between domain-specific research and data engineering. This integration provides a scalable framework for "Metadata-by-Design," ensuring that complex datasets generated within the Helmholtz Association are accompanied by high-quality, machine-readable documentation. Ultimately, the use of Operaton for process-driven metadata acquisition represents a robust solution for the long-term usability of energy-research data.

ONLY WORKSHOPS - Proposed interaction format

Alternative Track

1. Empowering Research Communities: Turning Metadata into Action

ONLY WORKSHOPS - Tentative audience

ONLY WORKSHOPS - Maximum number of participants

ONLY WORKSHOPS - Special technical requirements

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Sitzung Einordnung: TALK SESSION

Track Klassifizierung: HMC Conference 2026 Track Topics: 4. Human-machine collaboration in (meta)data acquisition