

# Automatic Change Adoption and Repair Strategies in the Context of Model Co-Evolution

## Masterthesis

«We can't become what we need to be by remaining what we are» - Oprah Winfrey

## Motivation

Asset information models undergo changes throughout their entire lifecycle, for example through extensions, maintenance, or fault correction. Different systems, tools, and stakeholders access the same model or derive dependent artifacts from it, such as configurations or control logic. If the model is changed without these dependent systems being informed, a silent inconsistency arises without being detectable by the affected systems.

Two complementary notification mechanisms address this problem for different types of change: the Model Change Notification (MCN) communicates structural changes to the model itself. The Product Change Notification (PCN) communicates changes at the value level, such as updated parameter or specification values, without the structure of the model changing. Both initially only ensure that a change becomes known, not how a dependent system should react to it: whether a change can be adopted directly, requires adaptation, or leads to a conflict that necessitates targeted repair is currently decided manually on a case-by-case basis, and the requirements for a suitable strategy differ depending on whether the change is structural or value-related. A systematic foundation that maps the change information communicated via MCN and PCN to concrete adoption or repair strategies is missing for automated or agent-supported processing of such changes.

## Tasks

- Literature review of change adoption and repair strategies in related fields (model co-evolution, model-driven engineering).
- Comparative analysis of how strategies for structural changes (MCN) and value changes (PCN) differ or can be handled jointly.
- Formalization of the identified strategies as decision rules or procedures that select a suitable strategy based on a received MCN or PCN.
- Prototypical implementation and validation on a concrete change scenarios.

## Interests and Helpful Knowledge

-  Interest in information modeling and industrial automation, knowledge of Asset Administration Shell (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

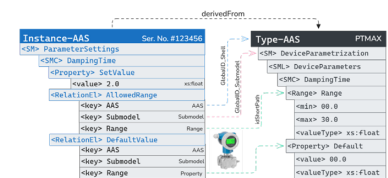


Figure 1: Exemplary Asset-Type and Asset-Instance Model of a pressure sensor

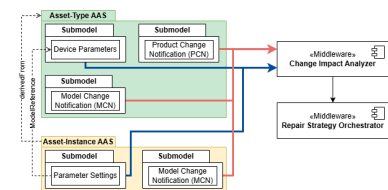


Figure 2: Local Change Handling Services in an AAS Ecosystem



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