

Digitization Principles for Application Scenarios towards Digital Twins of Organizations

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In today's agile business ecosystems, digital twins and especially digital twins of organizations allow for adaption through dynamically evolving models depicting organizational aspects such as production processes, data flows, human actors and interactions [1]. The establishment of such digital twins of organizations either considered on their own or as part of a digital twin ecosystem is not trivial. Therefore, a hybrid modelling approach is utilized. Meta modelling [2] and meta model merging patterns [3] are applied to integrate heterogeneous perspectives and domain models. Two main research questions with respect to digitization towards digital twinning are discussed: First, which digitization principles are appropriate for DTOs? Principles ranging from "counting" to "estimation" are introduced to fill digital models, which serve as a foundation for digital twins, with data. As a starting point, potential digitization principles for relevant characteristics of BPMN – "Modelling Method for Business Processes" and KPI – "Modelling Method for Key Performance Indicators" models are considered. Second, which digitization principles are appropriate for which organizational patterns? In order to ease the selection of suitable digitization principles for specific application scenarios, digitization principles are associated with organizational patterns like but not limited to construction processes, assembly processes or production processes each of them with domain-specific characteristics. A prototype building upon three building blocks (a) physical experimentations in the OMiLAB Innovation Corner [4] using physical assets such as paper figures, edge devices or sensors, (b) domain specific services considering software related aspects such as timeseries databases or simulation algorithms, and (c) modelling methods enabling the integration of physical and digital components is developed. The Graphenstone pilot from the European Change2Twin project [5] serves as an evaluation sample for an application scenario in the paint production domain. A comparison of what the pilot company intends to achieve by digital twinning and what is possible by introducing digital services is conducted. The outlook presents how artificial intelligence may be introduced for the prototype building blocks to leverage the paint production pilot and further on to be applied onto other application scenarios.

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