FAIR **DIGITAL OBJECTS** FORUM

FDOF Lecture

I4.0 AAS as evolving Industry Standard

Speakers:

Prof. Dr.Ing. Tobias Kleinert, Dr.Ing. Torben Miny (RWTH Aachen)

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https://us02web.zoom.us/j/4093556900

Industry 4.0 Standardisation Work

As any other sector, manufacturing industry is suffering from the increasing fragmentation of the information space they are dealing with. It is the domain of machines and other assets which are relevant to plan, assemble and manage manufacturing processes. A simple example may illustrate the inefficiencies: in a complex automation line one machine is not functioning anymore and needs to be replaced as quickly as possible. Engineers now have to study which machine of which supplier can be used to fill exactly the gap and what the delivery conditions are. This is time consuming work since the specifications need to be "exact" in all dimensions.

The german government started the Industry 4.0 initiative in 2011 to help industry prepare for the upcoming 4th industrial revolution and therefore, first launched a broad reference architecture called RAMI 4.0. This then led to a wide range of activities to turn this reference architecture into working modules. The most important is the I4.0 Asset Administration Shell (AAS) which describes all characteristics and functions of an asset, in general a component for a manufacturing line or process plant. One can call it the metadata description of the asset or even better the digital representation of the asset as a digital twin. AAS has been worked out in detail, is being tested also by industry, brought in as an international standard and is on the way to become the standard for European production and process industry. RWTH Aachen University was from the beginning one of the key players in designing and implementing AAS.

In a recent collaboration FDO experts and the RWTH experts got together to understand each other's models and to see how integration of "digital objects" can be achieved. At the modelling level we see many similarities: Both approaches relay on detailed metadata descriptions which in the case of AAS are much more standardised to improve interoperability between machines and components. While we use FDO Records for biding purposes, the AAS model uses standardised "registries". Despite some differences we found that it should not be too difficult to develop adaptors since for sure some or many industry people will use AAS to manage digital assets such as files.

We believe that it is an excellent opportunity to look in the standardisation efforts in industry, learn from them and interact with them. Industry needs excellent and detailed specifications and tested code to invest and here I4.0 including the AAS modelling did an excellent work. Detailed information can be extracted for example from the following documents:

- https://www.plattform-i40.de/IP/Redaktion/DE/Downloads/Publikation/2019-usage-view-asset-administration-shell.html
- https://www.plattform-i40.de/IP/Redaktion/DE/Downloads/Publikation/Functional-View.html

Speakers

Tobias Kleinert
With a background in manufacturing industry, he then moved into the field of automation and process computing. As an expert in industrial automation he worked on projects led by BASF where they collaborated with many well-known companies such as Siemens, ABB, Emerson, etc. as well as with a variety of university institutes. He then got into the research department from BASF studying model-based control and security systems, assistent systems applying Bayes networks and plannable hybird systems. Since 2020 he is professor at the RWTH Aachen University at the Chair of Information and Automation Systems for the Process and Material Technology where amongst others he is continuing the leading work on defining and applying the Industry 4.0 Asset Administration Shell (AAS) which is predecessors at the same institute started.

Torben Miny
Since he started his work in 2016 with the first reference implementation in cooperation with the ZVEI in Germany, he is one of the key developers and experts of the I4.0 AAS approach. He worked in different standardization committees and large collaborative projects, in which he played a major role in shaping the development of the AAS and its specifications. In 2022 he completed his PhD in the field of AAS and has been working as a senior researcher at the RWTH Aachen University at the Chair of Information and Automation Systems for the Process and Material Technology since then.