

Digital Twin architectures in manufacturing and ISO23247 standard

[anonymised]

1. Motivation for using ISO23247 standard

Be aligned with ISO23247?

What is the value of ISO23247 standard and the Reference architecture with functional view proposed in the standard when realising Digital Twin in practice ? Why architectures need to be compliant with the standard ?

ISO23247_Overview.pdf

GOOGLE DRIVE

Functional view specifying functional abilities to realize the intent of the reference model entity - concept or use of function that comprises the digital twin (hardware) below are list the definitions from the standard for each functional entity (active boxes in figure 1.4 as reference for the questions)

- Data Collecting FE:** Collects data from identifiable manufacturing elements (IMEs).
- Data Pre-Processing FE:** Organizes collected data. Composition of pre-processing include filtering and aggregation.
- Collection/Representation FE:** Collects data needed from IMEs.
- Interacting FE:** Connects the digital twin to the manufacturing environment to deliver the data requested by the device.
- Knowledge FE:** Collects an IME in response to a request from the user entity or the digital twin entity.
- Control/Identification FE:** Identifies an IME so that it can be controlled uniquely and consistently.
- Digital Representation FE:** Shows information from an IME to represent its physical characteristics, behavior.
- Visualization FE:** Presents the data in a way that is easy to understand and interpret.
- Maintenance FE:** Keeps digital twin operational, including monitoring results.

Using Standard allows us to speake about the same task together. We have many discussions in Germany and people use the topic DT by they have different meaning an interpretation of it. This makes the situation for developing concepts, application and... difficult! So we will have a big problem with interoperability!

— ANONYMOUS

DT application on a truck using asset administration shell (AAS). AAS is too detailed as compared to ISO23247 and it is hard to follow. ISO23247 is more abstract yet provides concrete guidelines on functionalities.

— ANONYMOUS

No common solution in Germany. Each company, college or institution has its own architecture, implementation, protocols. That is a big problem.

— ANONYMOUS

2. Functionalities in the standard not implemented by current architecture.

Plug and Play

You considered this FE as absolutely necessary to enable permanent synchronisation of an OME with its DT. From the literature, we observed that this FE was not considered. Do you have any remarks on this?

PE&P is, from my point of view, a topic of applications. How to define and develop the modules to be integrated easily in an applicaiton. The variants of solution is very wide and big. To define a standard will be very difficult.

— ANONYMOUS

Data assurance

Can you explain the relation between model and data with respect to your answer "Data accuracy must be a part of model! Perhaps we will have different variants of a model with different accuracy level!"

We have diffenern variants of a model depended on thair accuracy! E. g. a model of a sensor could have only a structure of it oder the behavior of it oder the reliability of it. All of these variants adress only one modell, but we nee different accuracy based on applications

— ANONYMOUS

3. Functionalities not captured by the standard.

Data Storage

You rated the importance of Data Storage 3/5 in the survey and commented that "Data storage could be outside of a DT (Cloud solution etc.)." From our observation most of the current architecture have a dedicated FE for storage in their architecture, which they further implement in different ways (local, cloud, streaming platform). Why do you think, that cloud solution that provide data storage is outside of the scope of a DT architecture? Which implementation of a data storage functionality can be part of a DT?

From my point of view data storage is a technical issue. We just need an inferface for data storage. It could be impemented on different ways and we do not need a standard in this case.

— ANONYMOUS

Continuous Deployment

You commented that "Maybe CD must be outside of DT (we could also say that CD uses DT!)" Can you explain your answer?

I thin the structure of DT explains how a DT must be structkured and concepted. CD adress more the developing of applications using DT

— ANONYMOUS

4. Other functionalities.

Intelligent Component

What is your definition of intelligent component and how would you map it with the current FE of the standard ?

Digital twin model comprehension: how can a model understand its own boundary? – ANONYMOUS

5.Final remarks

Architecture/model erosion, architecture/model debt, architecture smells
