Challenges of enterprise interoperability in industry

Jaekel, Frank-Walter

[a] *Fraunhofer Institute Production Systems and Design Technology, Pascalstr. 8-9, Berlin, D-10587, Germany*

1. Introduction

The application of digital technologies such as the industrial Internet of Things (IIoT) is expanding rapidly in production enterprises. Challenges arise, for example, in relation to services whose behavior is not fully understood or in respect of data ownership. This encounters risks such as

- Unexpected and unknown data transfer,
- Automatic legally binding transactions,
- Unclear data ownership,
- Challenging decisions about standards and selection of digitalization paths,
- Dependency on selected methods to manage interoperability,
- IT product issues directly effecting the manufacturing process,
- Security and robustness in general.

A lack of interoperability can stop an effective service and product provision of an enterprise. Decisions of the use of inadequate standards and methods can result in high losses of investments. Therefore, effects of arising frameworks such as OPC-UA needs to be analyzed and finally related to existing and future production systems.

Underestimating the security of IT interfaces can lead to the loss of knowledge advantages, but also to the risk of attacks. An example of this is the reduction of security so that systems with different security levels can work together in production. This makes security a high challenge for the digitalisation and internet of things in the production.

The workshop with about 20 participants collects interoperability challenges and approaches related to industrial applications in the context of digitalization and smart production systems. The aim is to sketch and discuss a number of technologies in terms of their importance for the successful creation and implementation of interoperable industrial solutions. The workshop took the form of five presentations followed by a virtual roundtable discussion of questions selected by the audience.

2. Presentations and Questions Discussed

The five presentation covers technology, methodology, interface, security and trainings aspects related to digitalization and interoperability challenges in industry. The authors of the five papers presented the following topics:

1. Patrick Gering presented the collection of information from production through the rapid integration of sensors as well as the associated data management within the scope of the topic "Digitization Building Block for SMEs".
2. David Chen focused on the progressing work in enterprise modelling related to common ontologies across enterprise modelling methods in the topic “Mapping IEM to Enterprise Modelling Ontology”.
3. Frank-Walter Jaekel provided a view on the arising technologies concerning industrial interfaces between equipment, enterprise applications and IT infrastructures such as Web platforms and clouds in the topic “OPC-UA based IIoT and CPS interoperability validation”.
4. Marija Jankovic presented the importance and application of security in the industrial domain especially in terms of build-in security and interoperability in the topic “Evaluating and Improving the Internal Security of OPC-UA based Software Applications”.

Proceedings of the Workshops of I-ESA 2020, 17-11-2020, Tarbes, France
EMAIL: Frank-Walter.Jaekel@ipk.fraunhofer.de

5. J. Mathis Rieckmann illustrated The dissemination and enhancement of knowledge about digitalization and smart companies, in particular how a company can take advantage was illustrated in the topic “Learning Factory for Digitization of Enterprises”.

The discussion of the topics focus on standardization harmonization, selections of the right approach for interoperability, real time processing and standards as barriers or chances for innovation. This has been discussed already during the presentation sessions. Related to these discussions the audience selected a set of question for further discussion:

- Establishing interoperability for IIoT e.g. in a single lifecycle process such as manufacturing it is already a significant challenge. What are the implications for extending its scope to the entire product lifecycle?
- Will digital twins change how we think about enterprise interoperability?
- What is required to establish Digital Twins as an interoperability driver?
- What are the limits of OPC-UA in industrial practice? Are there use cases where alternative approaches are more appropriate?
- Is industry 4.0 already implemented or does it appear as an incrementally approach in different forms of occurrence?
- Is security a barrier and why it seems not "relevant" in the commercial sector e.g. for mobile phones?
- How to overcome the gap of information in data mining because of human action or action?

The questions express the heterogeneity in the industrial world concerning interoperability and digitalization as well as the arising of the topic digital twin. They also illustrate the need of further consideration to get an overall understanding of needs and demands to express and instantiate benefits from the new digital and smart technologies.