

A network diagram with nodes and connecting lines, set against a dark teal background.

Thoughts on Manufacturing Digitalization



Recently I was invited to meet the new CIO of a multinational high-tech manufacturer which is a long-term client of ours. We provide the company IT services in the area of manufacturing, planning, and logistics.

What is Digitalization?

We started the meeting with CIO and his management team with a presentation about our services and consulting philosophy.



Solution-oriented

We deliver solutions



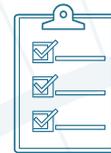
Dialogue-oriented

We listen and understand



Inspired

We love what we do



Sophisticated

Recognizable added value for your company



Innovative

Discovering new paths together



Deep process knowledge in the industry



Technology-savvy



Committed to the Sustainable Development Goals



When I presented the last slide with the graphic above, the CIO asked the following question:

"You presented some very interesting facts about your IT consulting services, your special expertise in terms of industry business processes, and your consulting mindset. But what about Digitalization? I didn't see that on your slides. I meet smart and confident consultants from various IT service providers these days, and every one of them tells me something like "We'll help you digitize!" and so on. Why don't you offer that?"

After a few seconds of silence, I replied that we don't emphasize the word because it doesn't reflect our daily business and it doesn't make sense to simplify the fact with just one word for marketing purposes.

We digitize every day when we struggle for months to define the field content of a single RosetteNet EDI message between multiple business partners, or when we still have to set up file transfer processes on brand new manufacturing equipment and RS232 interfaces to 30-year-old equipment. In addition to these technical challenges, digitalization is all about collaboration and methodology.

After the management team agreed, the discussion turned to the internal cooperation between the IT department and its client, the business. Businesses demand fast and flexible solutions but are often unwilling to spend the time required to cooperate in each iteration. External suppliers offer enticing applications that promise quick and easy implementation, making IT management a constant balancing act. As a result, many projects never go beyond prototype status, wait a long time for final UAT, or even when launched, remain isolated solutions that are not integrated with business processes.



However, I pointed out that the day-to-day struggles do not mean looking into the future, and defining the right strategy for technology management should be neglected. Some topics should be on the agenda of every IT department in the manufacturing industry, and I gave some examples.

Cloud Computing in Manufacturing

AWS recently joined the OPC Foundation and announced that it will offer several cloud-based services for direct OPC UA communication. We have all noticed for some time that the old paradigm of "on-premises" hosting of IT is becoming less and less important in operations. I remember a discussion with a colleague about 15 years ago when I worked for a big automation equipment supplier. I was still young, and he told me that browser-based solutions would never be used on the shop floor because they were not stable enough compared to thick-client-based applications. I didn't believe him and implemented a browser-based solution that surprisingly worked.

Today, complex MES solutions are deployed centrally for multiple plants and operators work with UX-optimized browser-based front-ends on multiple devices. Even though this does not work in some cases due to strong OT (Operation Technology) dependencies or results in sophisticated edge devices with offline capabilities, the general trend is recognizable. The next steps are scalable SaaS (Software as a Service) concepts ranging from small to large services. A large step into the future is SAP's cloud-based MES called SAP Digital Manufacturing Cloud. For example, a recent service we implemented on the SAP cloud platform involves authenticating a truck driver and using artificial intelligence pattern recognition to guide him to the right gate by photographing his ID into the camera. Technologies for data integration between companies, such as blockchain or the Gaia-X ecosystem, a European cloud initiative, are areas concircle is working on.



CAD/PDM is being offered as a cloud service that promises to free IT from processing terabytes of data. The fact that players such as AWS are going one level deeper into the automation layer, shows where this path is heading. The question is whether traditional market players understand the implications of this development.

IT + OT = IoT?

A few days before this meeting, I participated in a discussion where we focused on a promising research project that several machine manufacturers, their machine operating clients, and university institutions had started. The topic of the project revolves around cross-company Big Data in manufacturing, and at this workshop, we specifically discussed the role of edge devices.

We began the discussion with an architectural concept that reminded me of one I developed 20 years ago when I was a researcher at university. The picture is as follows: The PLC or controller in the machine interfaces with the edge device, the edge device communicates with the MES, and more recently the edge device also transmits data to the cloud. Instead of OPC DA, we are using OPC UA today. We are doing the same thing today as we did with OPC DA.

With this traditional picture in mind, I gave the example of an innovative machine component manufacturer that plans to include a microcontroller into its product that provides connectivity to the edge and supports smart energy management solutions. How should this smart device be integrated?



The machine manufacturer has stated that all these devices must be connected to the central machine control, although he admitted that this central control is already overloaded and the central function - the control of the machine - is at risk. Where do you transmit the data? Will it still be the central controller and thereby a more powerful device? What about the edge device next to the machine? Or should we consider a good old-fashioned database for plant historians? Or maybe directly to the cloud? And where should we aggregate and store the data? Does the AI work only in the cloud or also locally at the edge, which seems reasonable? Let's see if our project provides useful answers.

It is already clear that the digitization of production in the future is not just about the existing organizational gaps between IT and OT. Nor is it a matter of fighting with every equipment supplier to get at least a signal that the machine is productive. What is needed are new forms of collaboration between the equipment manufacturer, internal OT/IT, and external service providers. A new architecture is being developed to also support the eventual monetization of manufacturing data.

A fascinating journey has just begun.



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