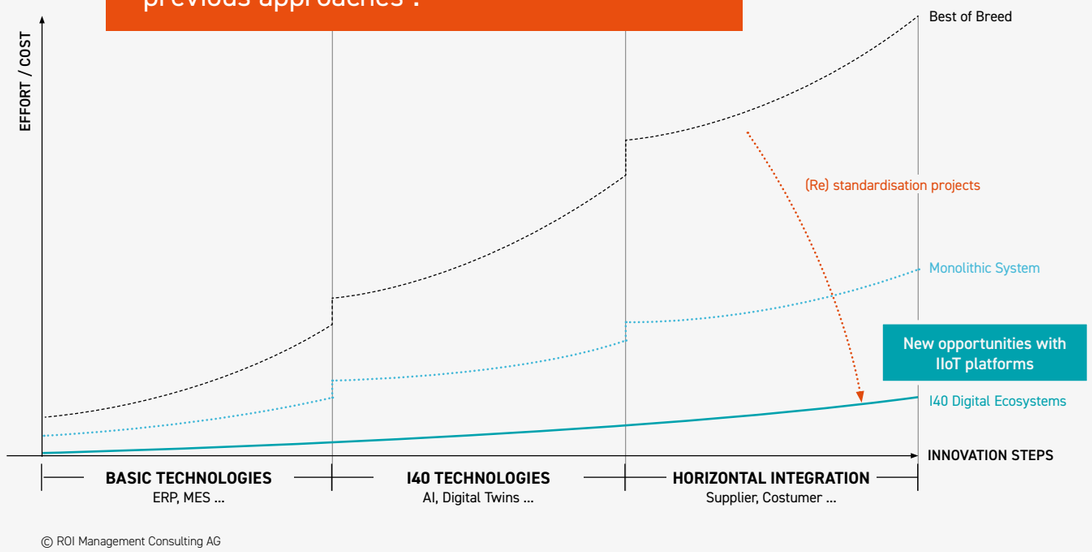
FROM MES TO PRODUCTION PLATFORMS

Interview with Gernot Schäfer, Partner, ROI-EFESO

To achieve best operating conditions in production, MES solutions must become app clusters on integrated IIoT platforms - with profound consequences for architecture, data management and operating models.

> "New IIoT platforms form the basis for an I40 Digital Ecosystem that eliminates the effort and cost traps and cost leaps of previous approaches".



DIALOG: Mr. Schäfer, what changes in the MES environment do we have to prepare for?

GS: The decisive keyword is Best Operating Conditions (BOC). This is about the question of how to monitor the ongoing production process and optimise it on the basis of relevant parameters. In other words, as much data as possible about quality and specifications, supply chain, production processes, physical conditions of material, machines and environment must be collected, correlated and interpreted. On this basis, different parameters can be continuously adjusted, especially in real time, and a self-optimising process can be initiated using cognitive systems. The result is an AI-based control loop that is designed to achieve an optimal operating state, i.e. the best operating conditions. MES solutions must be geared towards this task in the future.

DIALOG: How significant is the progress that can be achieved?

GS: A good example is the reduction of rejects or start-up optimisation. These topics are very important in the context of best operating conditions due to the small batch sizes and the large number of specifications. If you reduce the four to six weeks that are necessary to run in the machines and set the tools to two weeks, then that is not only an enormous cost saving in the production start-up, but also improves the market position.

DIALOG: Doesn't the scenario outlined go well beyond the classic MES?

GS: Exactly. If you want to make production self-optimising, the data, data spaces and data models of the MES are not enough. You need diverse structured and unstructured data on every area of production, on every process, every machine and every factory floor, which come from MES and ERP solutions, QA systems and other data sources - and not only from your own production environment, but also from suppliers.

DIALOG: What consequences does this development have for the architecture of MES and what role do AI systems play in this?

GS: AI is the key to recognising correlations in the overall picture in real time and to identifying optimisation approaches. Such complex interrelationships are not accessible with the classic analysis procedures, methods and tools, as these only focus on individual reports that are drawn from databases. For the integration of MES into such AI-based control loops, digital twins are necessary that go far beyond the actual MES. The AI engine must be able to access a complete data pool, if possible, in real time. It is therefore not enough for the MES solution to simply have interfaces to ERP systems in order to pass on production order progress or to machines in order to control them. The MES must be integrated into a platform that organises the overarching data management of structured and unstructured data beyond the MES world and forms the basis for the use of AI-supported solutions. Further microservices, i.e. industrial apps, will be integrated into these IIoT platforms, which fulfil specific tasks, e.g. for material sequencing, material disposition, real-time location, or camera systems that, supported by AI solutions, examine the material and derive quality indicators. In this way, company-specific production worlds are built, whereby the orchestration of the platform, processes and data flows between the individual apps is of central importance. MES are thus becoming app clusters on integrated IIoT platforms, which means that interoperability, connectors and interfaces must be reflected in the architecture of MES systems.

DIALOG: Such a platform then resembles an app store for smartphones, doesn't it?

GS: At first glance, yes. The big difference is that the apps for weather forecasts, hotel bookings, share prices or news are not connected at either the process or data level. In production, it's different. Here we need a common data model for product and process twins and have to synchronise the data completely with each other - in a matching process that also has to be modelled. Here we are already talking about a different level of complexity and a different know-how that is necessary.

DIALOG: Has the market already followed the trend towards production ecosystems around MES? already followed?

GS: There is a movement away from monolithic solutions in the direction of so-called Manufacturing Integration Platforms (MIP). They enable customers to integrate individual apps in order to build up individual architectures. Even large providers see the need to build their solutions modularly in order to allow apps from special providers, for example for topics such as AI-based optical defect detection. For the customer, this makes the architecture design more demanding, as individual IIoT stacks have to be built: Layers, connectors, databases, data modelling. Infrastructural requirements must also be created, whereby the topic of edge computing plays an important role, because with these data volumes, appropriate latency times can only be realised in distributed computing clusters. At the same time, however, solution development, implementation, operation and further development will become much easier compared to conventional architectures. It can be assumed that there will be three types of providers in the future: First, those that can offer total platforms that include both the classic MES modules and the IIoT platforms. Some of them will also provide the orchestration layer itself. On the other hand, there are those who will focus on special topics, whether quality inspection, scheduling procedures or coordination of AGV swarms. They will focus on individual microservices. And finally, there will be providers who will provide the platform and the orchestration layer, but have the apps delivered to them. This requires a certain market power and position, which is mainly held by the large OEMs and the global cloud services providers.

DIALOG: What competences are necessary to safely shape the change from classic MES solutions to integrated, modular production worlds?

GS: You have to combine methodological, technological and production expertise. That is the prerequisite for knowing which data you can typically get from certain types of machines and how the technical integration is done, how the solution stack can be built so that the interaction works smoothly. And one should know the market well in order to bring together the right apps for the production platforms and ensure that adequate service is guaranteed on the part of the providers.