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The Data-driven Enterprise

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5G

The next generation of wireless connectivity, 5G, is becoming a hot topic in industry. However, there are still many myths and misconceptions surrounding the new wireless technology. By enabling machine-based communications, 5G's capabilities go far beyond mobile broadband.

// FOCUS – BEST PRACTICES

43 BaSys4Dash

The aim of the `BaSys4Dash´ research project is to develop a partially automated, dashboard-based decision support system for two user companies. The BaSys 4.0 software system provides the basis for the partially automated evaluation of processes and the visualization of information on dashboards that is tailored to the situation and application at hand.

56 MarryIT

The aim of the research project is to support SMEs by providing a methodically guided as-is analysis and evaluation of the current IT-OT integration status.

59 EDI-Multiply

The aim of this sub-project is to achieve a multiplier effect in terms of potential business connections.

// SPECTRUM – THINK TANK

MarryIT: A methodical guide to individualized
digital transformation to achieve
value-enhancing goals

Tailored Recommendations for the Efficient Integration of Shop Floor and IT Systems

Manufacturing companies face the challenge of coordinating the digital transformation of their system landscapes so as to achieve the best possible benefits. As shop floors and IT systems have typically evolved over time, the opportunities provided by the legacy systems in place are not always readily apparent. A large number of use cases can already be implemented with little additional expenditures, in contrast to comprehensive, costly new acquisitions. Here, it is key to systematically determine the need for action based on the systems currently in place and on the objectives defined.

The aim of the 'MarryIT' research project is to support SMEs by providing a methodically guided as-is analysis and evaluation of the current IT-OT integration status. IT-OT integration describes the degree of interconnection between shop floor systems (OT systems such as MES, production machines, sensors, scales, scanners, etc.) and 'office floor' systems (IT systems such as IoT platforms, ERP, PLM, supply chain management systems, etc.).

I n times of digitalization and Industry 4.0, companies are faced with the challenge of meeting the demands of digital transformation, which include achieving a value-enhancing integration of systems at a reasonable cost. Even in only moderately complex system landscapes, there are vast amounts of data sources that can be collected and leveraged for numerous use cases. Given the vast number of options, it is difficult to focus digitalization efforts on those measures that offer the greatest added value for the company in question. Implementing all potentially available options – if at all possible – does not provide sufficient added value given the effort this requires.

The centralized integration of a company's IT and OT landscapes provides the basis for digital transformation in production. Due to factors such as a company's industrial sector, corporate strategy, and available technologies, its existing landscape is highly individualized – as a result, there is no "one fits all" solution. What is required for effective transformation is structured, methodical support that starts with the as-is situation of a company. In the MarryIT research project, such a methodologically informed basis is being developed. The aim is to identify the integration potential available in a company. The available possibilities for integration are evaluated in terms of their specific benefits and, based on this analysis, tailored recommendations for action are derived. The need for such a methodology is due to the various problems outlined below.

At the beginning of the transformation process, companies are often faced with the challenge of identifying which of their IT and OT systems are already ready for integration. In the process, many companies are unaware of the potential benefits they can already achieve with their existing resources and that it often takes little effort to realize the desired outcome. The problem is that there are many generic solutions available on the market, and that the capabilities within the company are not fully transparent. Manufacturing companies in particular are affected by this problem due to historically grown and non-transparent IT/OT landscapes.

For example, a company's machinery may consist of many old machines that cannot be seamlessly digitally connected. A possible solution would be to purchase a more modern machine; however, the problem can be easily remedied by a so-called retrofit, i.e. to equip the machine with the technology required for digital integration. This retrofit achieves the desired goal and often saves substantial time and money. As this example illustrates, it is worthwhile to analyze the current state of one's own landscape before initiating digitalization activities.

There are numerous use cases and benefits that can be leveraged through digital transformation. Given the multitude of possibilities, companies often have difficulties to decides which use cases are relevant and feasible. To provide transparency about the possible use cases for companies, an overview of the potential benefits that can be achieved by specific use cases has been created. These benefits fall into the following categories: Saving costs, saving time, and enhancing quality.

A possible objective could be, for example, to provide customers with better support for service requests. By collecting product-specific data on the shop floor with the help of a Digital Twin, a company would be able to immediately identify the components the customer's product is made of and thus which measures to take to solve the problem. This would increase the quality of responses to service requests and save processing time.

Non-transparent IT/OT landscapes make it difficult for companies to identify exactly what adjustments to make in order to achieve the benefits aimed at – as a result, it becomes difficult define clear steps for action. Such steps typically require significantly less effort than any non-targeted conversion or new acquisition of systems. Upgrading to a more comprehensive overall system only makes sense if it supports the achievement of highly relevant benefits. Comprehensive digitalization, performed as an end in itself, often indicates a lack of insight into the capabilities of existing systems and into what systems would be required to achieve the goal in question.

The 'MarryIT' research project provides a structured approach to the problems and requirements outlined above. The analysis of the IT-OT integration measures that
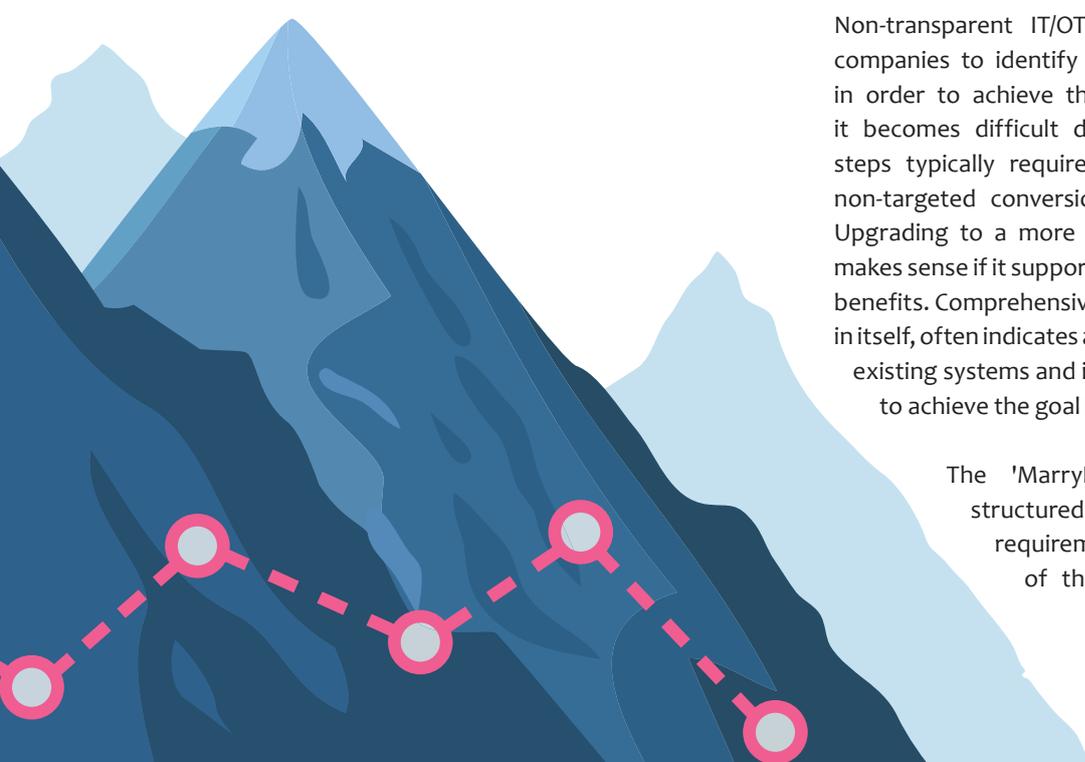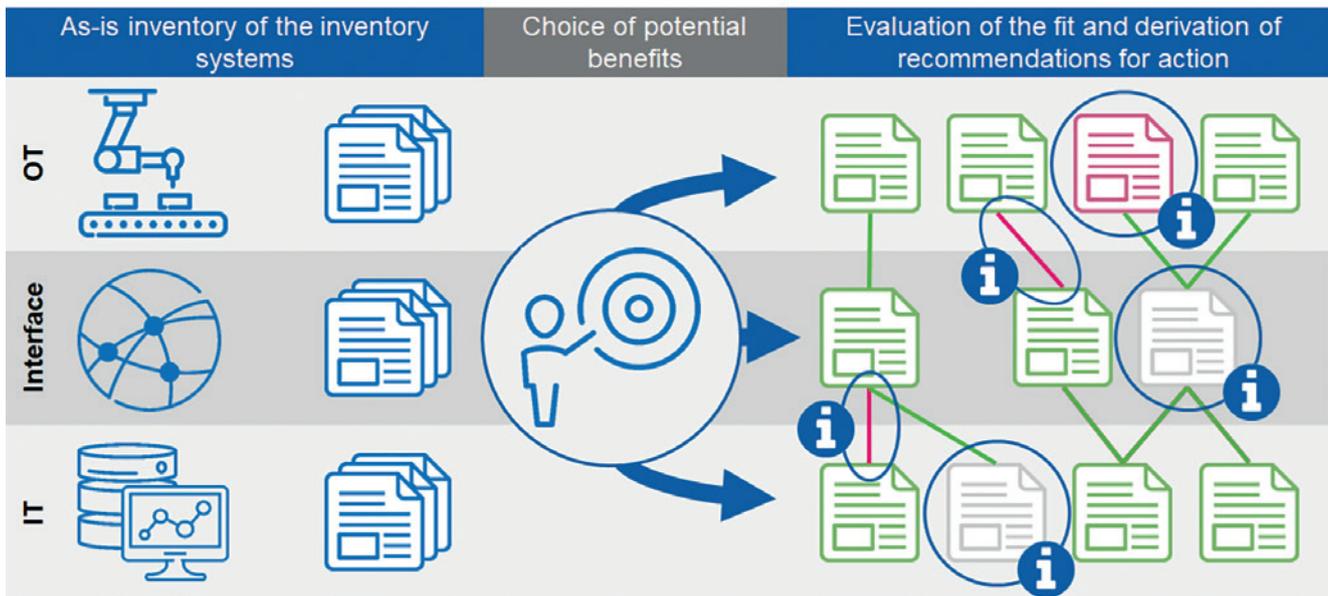
Figure 1: Systematic approach for taking stock of and evaluating components via system profiles. The aim is to derive concrete recommendations for action for a tailored IT-OT integration process (own representation).

are actually required is pursued in a bottom-up approach. Based on the existing functionalities in IT and OT as well as the current degree of interconnection, the effort required to realize a multitude of potential benefits is estimated. In contrast to what generic solutions can offer, here, specific recommendations for necessary action are derived on the basis of the as-is landscape.

In a first step, an inventory of IT systems, OT systems, and already existing IT-OT interfaces is created and analyzed. For all components of the inventory, a profile is created, which lists their relevant attributes. The attributes include the type of data exchanged, the system functions, the technical specification of the physical interfaces, and the properties and capabilities of the digital communication interfaces. Then, from a large number of proposed potential benefits, those are selected that best meet the specific objectives of the digital transformation process.

In the evaluation phase, the as-is profiles created are compared with the requirements of the potential benefits to be achieved. The requirements describe the necessary functionalities within the system landscape without dictating a specific solution in terms of the characteristics and selection of components. Based on this matching process, the clear recommendations for action can be derived and the effort estimated.

The 'MarryIT' research project is currently testing the evaluation methodology developed. In this test phase, the methodology to determine the potential benefits of digital transformation is applied by various manufacturing companies. Interested companies that would like to benefit from an evaluation of their systems landscape are invited to exchange information with us as part of the research project and to participate in the test phase.

Interested companies are welcome to contact the project coordinator Max-Ferdinand Stroh or visit our project website for more information.

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