

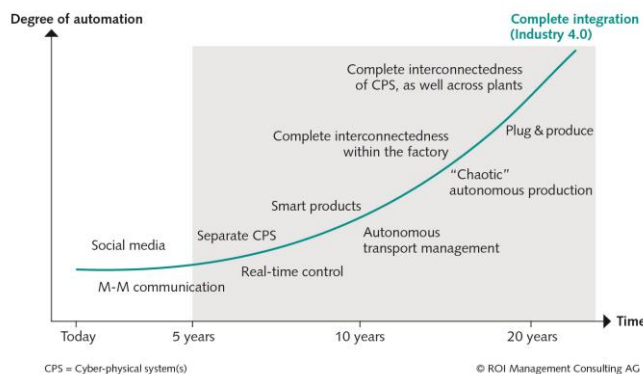
Analysis by ROI Management Consulting AG

Industry 4.0: Future Trend Scenarios through to 2034

Businesses must keep an eye on the possible consequences of Industry 4.0

Munich, 02/06/2014 – Industry 4.0, the all-embracing cross-linking and integration of man, machine and systems, promises great potential. At the same time it remains unclear how future developments will actually unfold. In its latest analysis, ROI Management Consulting AG paints two distinct scenarios for the future together with their effects on the continuing role of manufacturing execution systems (MES), which today are of key importance in the IT structures of manufacturing companies.

The current debate about Industry 4.0 is dominated by pilot projects and the development of long-term visions. According to ROI's assessment, we will have to wait another ten to twenty years to see the comprehensive deployment of cyber-physical systems (CPS) and extensive networking. The reasons for this are, in particular, the high degree of heterogeneity, a lack of integration and communications standards and the high investment requirements for new machinery, production facilities and IT structures. For this reason it will be industry-specific development paths that lead to the extensive implementation of Industry 4.0 – especially in



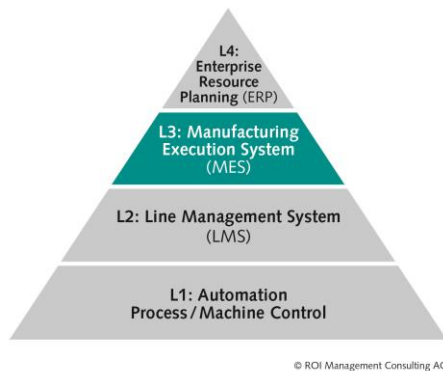
the areas of produce-to-order manufacturing and multi-model serial production for high-value products. In contrast, part systems will continue to shape industries characterized by low production fluctuation and low-value products in the coming years. Overall it can also be assumed that the individual elements of Industry 4.0.t will be realized successively on a larger scale in later stages.

Fig. 1: The path to Industry 4.0

Transformation of the automation pyramid?

In the opinion of ROI, manufacturing execution systems (MES) will continue to play a central role in production control over the next five years. They will, however, need to meet additional requirements such as the provision of data for new business models and the online exchange of information with other operational systems. ROI sees two different scenarios for the long-term development of MES:

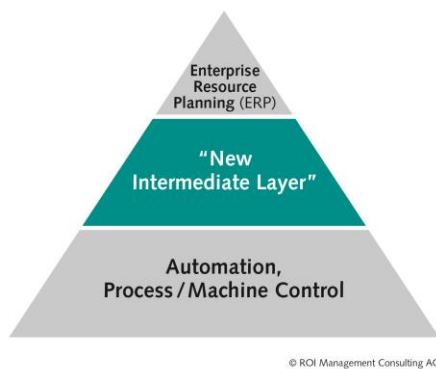
- Scenario 1 (period 5 – 20 years):



One possible scenario, assuming that the implementation of Industry 4.0 proves complicated, is that MES retains an important planning and control role, and the familiar structure of the automation pyramid remains. The consequence of this will be to increase horizontal and vertical integration as part of conventional development. It is conceivable in this situation that the standards for communication between the machine and MES layers are strengthened over the long term.

Fig. 2: MES with continuing major significance

- Scenario 2 (period 5 – 20 years):



Assuming comprehensive growth for Industry 4.0, a second scenario is imaginable in which MES no longer has any major significance in the long term. The consequence will be a change in the familiar automation pyramid. Only two layers of the original four remain: ERP and the machine layers. In this model, both layers are integrated into a comprehensive networking infrastructure. A new 'intermediate' level develops and serves, for example, as a data repository from which CPS and smart products receive their information.

Fig. 3: Autonomy & self-control through CPS intelligence (elimination of MES)

"Research findings show that the path towards the complete implementation of Industry 4.0 is far from linear and clearly mapped out," explains ROI Management Board member Hans-Georg Scheibe. "The next few years will be characterized by fundamentally different scenarios as well as by solutions and degrees of implementation that are distinctly different in terms of sector and business model. This is the reason why businesses on the one hand need a strategic vision for the introduction of Industry 4.0. On the other hand, they need to retain a high degree of flexibility in order to be able to benefit from technological developments and to quickly adapt their roadmaps."

Images for printing can be downloaded from:

<http://www.roi-international.com/management-consulting/dialogue/press/picture-archive.html>

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With over 1,000 successful projects, ROI Management Consulting AG is one of the most prominent specialists in the planning, development and management of global value chains. ROI supports large corporations and leading family-led companies, especially with the integration and optimization of development, production and logistics, in supply chain management and in the company-wide implementation of lean management principles.

ROI has won numerous major awards for its highly implementation-oriented projects. The company has more than 80 employees at its locations in Munich, Beijing, Prague, Vienna and Zurich and is represented by partner offices in Italy, France, United Kingdom, Thailand, India and the USA.

Press contact:

Ester Lowak

ROI Management Consulting AG

Nymphenburger Strasse 86

D-80636 Munich

Phone +49 89 12 15 90-0

Fax +49 89 12 15 90-10

E-Mail presse@roi.de

Internet www.roi.de