TEASER
INDUSTRY 4.0 BAROMETER
Iterative Assessment on the Industry 4.0 Activities in German Industry
Introduction

Dear Reader,

Industry 4.0 is an integral part of our daily project work for well-known automotive and manufacturing companies that operate on a global scale. Yet we have found that there is often no uniform concept of this term, and businesses often lack an overarching strategy. Instead, each department works in isolation, so that synergy effects remain unused, while there are areas of inefficiency in terms of performance and costs.

To help businesses structure the complex field of Industry 4.0 and make efficient use of their potential, we have developed the MHP Industry 4.0 Framework in Operations Performance & Strategy. The framework helps each business in three areas: it allows a step-by-step analysis of each part of the value chain along central drivers of Industry 4.0, it helps businesses identify their requirements for digitisation, and it enables them to achieve their general goal for Industry 4.0.

To enhance our consultancy product, Industry 4.0 Framework with a large amount of empirical data from German industry, we have developed the Industry 4.0 Barometer in collaboration with the Ludwig Maximilian University in Munich. The Industry 4.0 Barometer records the status quo of businesses and then compares it with benchmark figures.

So far there has been no clear idea of the exact position of German businesses on the digitisation of their processes, systems and products. This is true for each business’s own development of digitisation readiness and also for any comparison with customers, partners and competitors. MHP recognised this need in collaboration with the Ludwig Maximilian University in Munich, which then led to the joint creation of the Industry 4.0 Barometer. The Industry 4.0 Barometer records the status quo of businesses and then compares it with benchmark figures.

The latest Industry 4.0 activities are recorded at a substantial depth of technological detail, which is then followed by information about gaps and recommendations for action. The individual data categories are continually updated to reflect the most recent developments. By regularly applying the Barometer, it becomes possible to create a benchmark that allows a comparison with competitors and also to map the businesses’ own development in each category. This leads to a detailed view of the areas where action is required in order to prevent a business from lagging behind its competitors. Moreover, a broad statistical basis increases the validity of the results, so that the conclusions are reliable.

As for our methods and technical approach, this study is based on the MHP Industry 4.0 Framework, which has been designed to help businesses structure the complex field of Industry 4.0 and make efficient use of their potential. The framework was developed in stages, starting with the collection, analysis and thematic clustering of each business’s different requirements on Industry 4.0 solutions. Three main clusters were identified in this way: Technology, Strategy and IT Integration. The structure of the Industry 4.0 Barometer is based on the structure of the Industry 4.0 Framework.
The MHP Industry 4.0 Framework forms a matrix with a horizontal and a vertical dimension. The horizontal perspective covers five stages: Develop, Source, Make, Deliver and Provide, and thus all the central processes along the usual value chain. The vertical dimension, on the other hand, maps the main clusters identified through an analysis of corporate requirements. Each main cluster, in turn, can be divided into subclusters, leading to a considerable level of detail. The resulting matrix then permits a strategic approach to achieving the general goal for Industry 4.0. It involves a systematic and comprehensive view of all aspects of industrial networking and digitisation.

In addition to the Industry 4.0 Framework, MHP also applies a so-called Industry 4.0 Assessment, which maps the matrix structure of the framework. This makes it possible to deliver a specific assessment of a business’s Industry 4.0 readiness in three categories: Technology, Strategy and IT Integration. Readiness is determined through face-to-face interviews with carriers of expertise in each business. The interviews are guided by a catalogue of over 400 questions which then allow a consolidated assessment. The catalogue of questions in the Industry 4.0 Assessment also serves as a basis for the questions that were asked in the Industry 4.0 Barometer.

The results and conclusions of the Industry 4.0 Barometer have two functions: firstly, they are to help participating businesses gain an overview of progress in their Industry 4.0 development and compare themselves with others in the same industry. Secondly, we want to use the Barometer as a tool to develop the Industry 4.0 services of Operations Performance & Strategy. This means, in particular, continually enhancing the Framework with practical data, so that we can help our customers reach their Industry 4.0 goals.
Details of the study

Business size

- 28% small businesses (workforce under 1,000)
- 32% medium-sized businesses (workforce between 1,000 and 9,999)
- 40% large businesses (workforce above 10,000)

Industry membership

- Automotive OEM: 24%
- Automotive suppliers: 29%
- Automotive and mechanical engineering: 13%
- Electrical industry: 8%
- Manufacturing and metal industry: 8%
- Other industries: 16%
- Traffic and transport: 2%

Industry 4.0 Barometer

- 58% of respondents work in business departments.
- 35% of respondents are upper or senior management.
- 44% of respondents have had more than 10 years of professional experience.
- 50% of respondents work for businesses that have existed for over 50 years.
The main objectives are to reduce costs and at the same time increase the quality and speed of the processes.

High levels of dependency between different IT systems are continuing to impede a modular approach to the system architecture.

50% of all respondents are already using sensors in their systems for the transmission of environmental parameters and status data.

28% use partial images and 8% use full digital images of their products, containing process and status data.

59% do not use autonomously organised machines or robots.

71% of respondents say that where their company uses fully or partly automated decisions resulting from artificial intelligence or machine learning, such use is poor.
To be successful, it is essential to have clearly defined goals under Industry 4.0 as well as a strategy to achieve those goals. At the moment, businesses are focusing more on pursuing evolutionary than revolutionary change – a phenomenon which is related to a low view of market dynamics. This does, however, pose the danger of underestimating the disruptive impact of Industry 4.0.

Strategic focus on Industry 4.0
Cost reduction and increase in process quality and efficiency
Development of new market and customer segments
Provision of new services for one’s own products
Development of new business models

![Barometer value](Barometer value)

<table>
<thead>
<tr>
<th>Barometer value</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>4%</td>
<td>34%</td>
<td>62%</td>
<td></td>
</tr>
<tr>
<td>7%</td>
<td>51%</td>
<td>42%</td>
<td></td>
</tr>
<tr>
<td>8%</td>
<td>37%</td>
<td>55%</td>
<td></td>
</tr>
<tr>
<td>11%</td>
<td>43%</td>
<td>45%</td>
<td></td>
</tr>
</tbody>
</table>

Even where Industry 4.0 technologies are more mature, they are still used rather hesitantly in practice at the moment. Most of German industry is currently at an experimental stage.

In particular, technologies are often implemented which aim to expand human capabilities and achieve higher levels of efficiency, quality and flexibility. In the Technology categories, which are based on a large number of high-quality data, the level of distribution is lower. This shows itself, in particular, in the creation of complex data analyses. The level of implementation is lowest in Automation & Autonomous Systems. This is mainly because this area has by far the highest level of innovation compared with the other technologies that were researched.

Aggregated presentation of technology dissemination in German industry

<table>
<thead>
<tr>
<th>Supply chain transparency</th>
<th>Digital twin</th>
<th>Digital working models</th>
<th>Digital production technologies</th>
<th>Big data &amp; data analytics</th>
<th>Automation &amp; autonomous systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not in use</td>
<td>Use is planned</td>
<td>Practical testing</td>
<td>Partial use</td>
<td>Full use</td>
<td></td>
</tr>
</tbody>
</table>
IT and business departments must work together more closely if they want to expand their expertise in each other’s disciplines. IT departments consistently rate their business expertise as higher than acknowledged by the relevant business department, and vice versa. This is an obstacle to improvements in the individual areas and also to innovation in general. However, the discrepancy is hardly surprising, considering that cross-departmental exchange tends to be rated more negatively than positively.

Many respondents note that Industry 4.0 is leading to rising complexities in their IT architecture and to inconsistencies regarding clear roadmaps, software platforms and IT strategies. Businesses see themselves as relatively well placed in the use of standards and IT security. Room for improvement can be seen in the scalability of the IT architecture and in data analytics. The negative assessment of data analytics is primarily due to lack of expertise among the workforce, insufficient data availability and a poor technical infrastructure. The lack of scalability shows, for instance, that cloud infrastructures are still not used very widely.

Aggregated overview of the rated performance of IT departments and systems
- Foster closer collaboration between **IT** and **business departments**
- Strongly encourage cross-departmental exchange of knowledge and interdisciplinary teams
- Expand exchange with external carriers of expertise
- Centrally collect details of all Industry 4.0 **initiatives** and **projects** and, on that basis, develop an agile general goal for Industry 4.0
- Develop implementation management with clearly defined cycles

- Intensify collaboration with strategic partners along the supply chain
- Focus on **added value** of individual technologies and less on using showcases to satisfy innovation policy claims
- Foster the gaining of experience through PoCs and pilot projects
- Conduct application-specific assessments of data material that is already **available** and of data material which still needs to be acquired, and develop digital twins of products

- Define more flexible and open standards and aim instead to obtain 70% solutions that will boost speed
- Specifically analyse the performance and flexibility of IT solutions and technologies through feasibility studies, driven by business requirements
- Define IT architecture roadmap both for the integration of legacy systems and for the flexible integration of the latest technologies
- Conduct feasibility studies with business departments on artificial intelligence
Strategy – conclusion
The effective integration of Industry 4.0 throughout an entire business is always based on a comprehensive strategy. It must include the general goal, roadmap and implementation management.

Technology – conclusion
It is essential to go beyond the threshold of practical testing and feasibility studies and to move increasingly towards the company-wide operationalisation of Industry 4.0 solutions. On average, this has so far only happened for around 36% of respondents in the various Technology categories.

IT Integration – conclusion
The flexibility and innovative strength of a business should be secured through a pragmatic procedure that involves defining flexible architectural guidelines and their verification through piloting on specific business projects.
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MHP Management- und IT-Beratung GmbH

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