



I4.0 / IoT

Industrie 4.0 / Internet of Things Vendor Benchmark 2016

Germany

Whitepaper

based on the results of the Industrie 4.0/IoT Vendor Benchmark 2016

by

Experton Group AG

Munich, Germany

Authors: Arnold Vogt, Dr. Henning Dransfeld, Dr. Michael Weiß and Holm Landrock

Copyright

This analysis has been prepared by Experton Group AG. The information and data contained herein were gathered conscientiously and with the utmost care. Nevertheless, we cannot guarantee their exhaustiveness and accuracy. Nobody should take action, based on this information, without expert advice and an in-depth analysis of the individual situation.

All rights to the content of this analysis are reserved by Experton Group. For privacy reasons, the data and information remain the property of Experton Group. Reproduction – even of parts thereof – may only be made with the written permission of Experton Group AG.

Table of Content

1. Executive Summary	5
2. Definition of the Topic	6
3. Basis of This Study	7
3.1. Methodology and Analysis Design.....	7
3.2. Selection of Market Categories.....	9
3.3. Key Evaluation Criteria.....	10
3.4. Analysis Design	11
4. IoT Platforms	13
4.1. Definition.....	13
4.2. Vendor Selection.....	14
4.3. Focus of Assessments	15
4.4. Market Situation.....	16
4.5. Vendor Evaluation.....	17
5. Industrial Big Data Analytics	21
5.1. Definition.....	21
5.2. Vendor Selection.....	21
5.3. Focus of Assessments	22
5.4. Evaluation of Vendors	24
6. Authors and Contacts	28

Table of Figures

Figure 1: I4.0 & IoT definitions	6
Figure 2: Experton Group Market Insight Quadrant.....	7
Figure 3: IoT platforms connect things with applications and user devices	13
Figure 4: Benchmarked IoT platform providers	17
Figure 5: Benchmarked vendors of industrial big data analytics	24

1. Executive Summary

- **Industrie 4.0** has a basic focus on the production process within a "smart factory", while the **Internet of Things** focuses on the utilization phase of digitalized and connected devices and products.
- The I4.0/IoT **market** is still in its infancy. Market segmentation is difficult, because offerings of solution vendors (HW & SW) and service providers (consulting houses & system integrators) strongly overlap; also, there are many partial solutions and demand for consulting is high.
- Most of today's real **use cases** have a focus on remote monitoring and remote control scenarios.
- As of today, users are pursuing a bottom-up approach out of their respective lines of business (production, logistics, customer service) to look for full-service providers to digitalize individual steps of their value chain. In the future, they will increasingly pursue strategic top-down approaches.
- **Solution vendors and system integrators** have built up partner networks to be able to offer complete solutions and position themselves as full-service providers.
- Many small **IoT platforms** have evolved, which are used by the vendors themselves in their role as full-service providers and/or are offered to other full-service providers, based on the white-labeling model (platform for platforms).
- According to Experton Group estimates, more than 100 IoT platforms are already available today worldwide, and in 2016, additional renowned providers will enter this market. On the other hand, we also expect a first selection and **consolidation wave** in 2016/2017.
- In the future, most vendors will be full-service providers that implement customized solutions, based on **standard IoT platforms** (rather than their own platforms).
- New, innovative offerings have been developed to reduce I4.0 & IoT complexity; examples include Axoom, Forcam, M2MGO and nemetris.
- For the **industrial analytics** category, a clear division into pure consulting houses (consulting including system integration) and pure product vendors (ISVs, independent software vendors) is not possible at the moment. Currently, all solutions must be added respective assessment and implementation services.

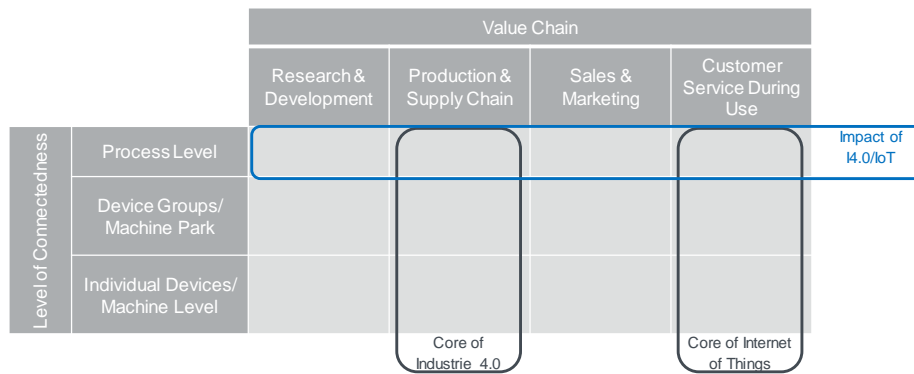
2. Definition of the Topic

Both terms – Industrie 4.0 (I4.0) and the Internet of Things (IoT) – address the same dynamics of change, i.e., the increasing connectedness and automation of devices, machines and products, but have a different focus.

Industrie 4.0 has a basic focus on the production process within a "smart factory", based on highly connected and automated machines that communicate with each other and also with the elements that they process, such as all kinds of components and resources, which are pre-produced and provisioned through a logistics chain.

The Internet of Things, on the other hand, does not have a focus on production, but on the utilization phase of digitalized and connected devices and products, which allows the vendors to communicate with their own products while they are used by the customers and to provide new "digital" customer services such as predictive maintenance.

I4.0 and IoT also address the impact on other elements of the industrial value chain within a company such as research & development and sales & marketing. Both trends examine the possibilities arising through increasing connectedness on various levels – from the device and machine level, to the machine park level (in production) or device groups (customers' use) to connected machines and products on a business process level.



Source: Experton Group, 2015

Figure 1: I4.0 & IoT definitions

3. Basis of This Study

3.1. Methodology and Analysis Design

Experton Group conducts independent vendor benchmarks. This "I4.0/IoT Vendor Benchmark 2016" is based on the "Experton Market Insight" methodology developed by Experton Group AG. This validated and internationally acknowledged methodology serves as basis for the evaluation and positioning of the individual vendors.

For each vendor, a detailed scoring based on key and additional secondary criteria is provided for each product category. These criteria are weighted, based on the respective product category, resulting in an assessment of the individual social offering's attractiveness ("portfolio attractiveness") and the strength of the individual vendor ("competitive strength"). The benchmarked vendors had to supply answers to the questionnaire by September 28, 2015.

The "Experton Market Insight" Quadrant contains four segments where the vendors are positioned accordingly:

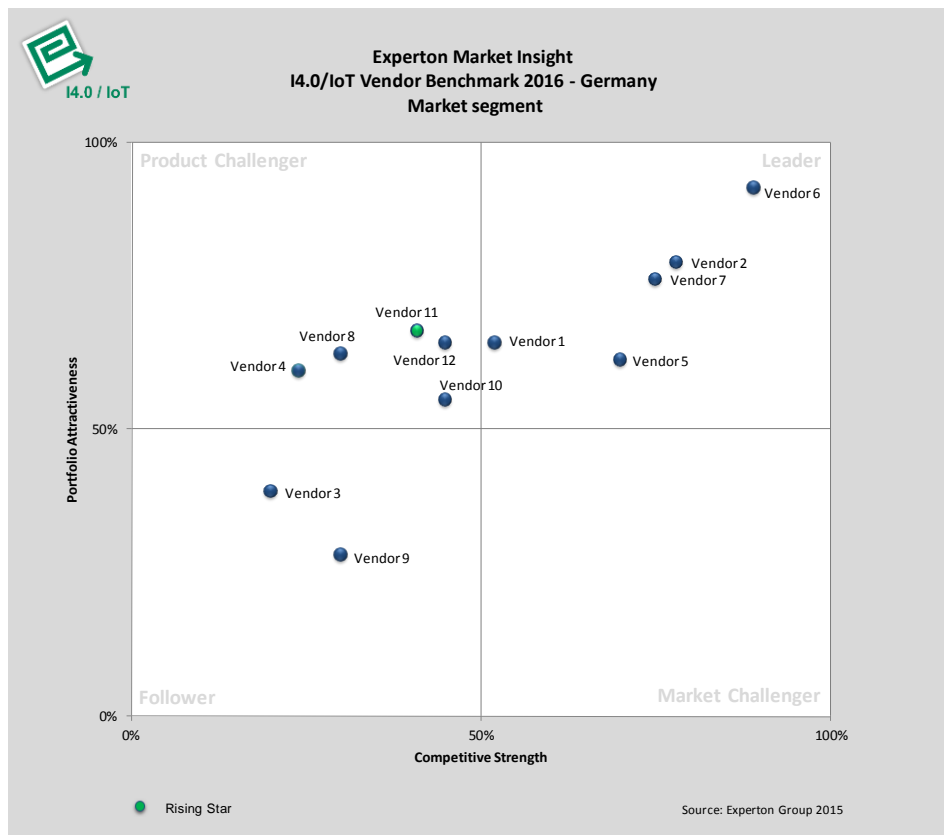


Figure 2: Experton Group Market Insight Quadrant

Leaders

The "leaders" among the vendors have a highly attractive product and service offering and a very strong market and competitive position; they fulfill all requirements for successful market cultivation. They can be regarded as opinion leaders, providing strategic impulses to the market and ensuring innovation and stability.

Product challengers

The "product challengers" offer a product and service portfolio that provides an above-average coverage of corporate requirements, but are not able to provide the same resources and strengths as the leaders regarding the individual market cultivation categories, often due to the weak footprint within the respective target segment.

Market challengers

"Market challengers" are also very competitive, but there is still significant portfolio potential and they clearly lag behind the "leaders". Often, the market challengers are established vendors that are somewhat slow to address new trends, due to their size and company structure, and have therefore still some potential to optimize their portfolio and increase their attractiveness.

Followers

"Followers" are still lacking mature products and services or sufficient depth and breadth of their offering, while also showing weaknesses and improvement potentials in their market cultivation efforts.

Rising Star

Experton Group identifies "Rising Stars" within selected categories, which receive the "Rising Star" award. These vendors have not reached the leader quadrant, but have high future potentials. This award is only given to vendors or service providers that have achieved a remarkable market entry or made extreme progress towards their goals within the last 12 months and are on a good way to reach the leader quadrant within the next 12-24 months, due to their above-average impact and innovative strength.

3.2. Selection of Market Categories

With the I4.0/IoT market being still in its infancy, the focus of this first I4.0/IoT Vendor Benchmark was on analyzing few, but clearly defined market segments covering currently existing areas of application.

Basically, the selection of benchmarked market segments was determined by two aspects. On the one hand, Experton Group always examines market segments from a user/customer, rather than a provider/vendor perspective. On the other hand, we have engaged in intense discussions with vendors, customers and experts on current core topics, in particular, on the I4.0/IoT maturity level of individual industries. These discussions were very helpful to help us select relevant industries within the German market to be addressed within this first I4.0/IoT Vendor Benchmark.

As a result, we have identified three segments:

- Most customers are looking for I4.0/IoT full-service providers (consulting houses & system integrators) with respective industry-specific process know-how.
- Increasingly, customers have the option to not only use customized complete solutions, but also standardized platforms for their I4.0/IoT use cases.
- Big data/analytics is perceived as the key technology enabler for I4.0/IoT solutions.

Based on these results, this first I4.0/IoT Vendor Benchmark includes the following six quadrants, which will be explained in more detail within the respective chapters:

1. I4.0/IoT Consulting & System Integration – Machine & Plant Engineering
2. I4.0/IoT Consulting & System Integration – Automotive Industry
3. I4.0/IoT Consulting & System Integration – Transportation & Logistics
4. IoT Platforms
5. I4.0 Analytics
6. I4.0 Analytics Visualization

3.3. Key Evaluation Criteria

Key criteria for the analysis and evaluation of vendors and service providers within the individual categories of this I4.0/IoT Vendor Benchmark 2016 included the following:

Portfolio attractiveness:

- Scope of portfolio
 - Breadth of offering
 - Depth of offering
- Quality of portfolio
 - Technology
 - Skill
 - Customer satisfaction
 - USP
 - Security
- Strategy & vision
 - Product roadmap
 - Thought leadership
 - Strategic investments
- Local specifics
 - Product support
 - Infrastructure

Competitive strength:

- Market position
 - Revenues
 - Growth
- Awareness & image
 - Customer perspective

- Core competences
 - o Innovative power
 - o Stability
 - o Ecosystem
 - o Business model
- Go-to-market
 - o Sales
 - o Channel
 - o Marketing

The "Focus of Assessments" section within the individual category chapters provides a summary of key subcriteria for each market segment.

3.4. Analysis Design

The analysis for this "4.0/IoT Vendor Benchmark 2016" was conducted based on three phases:

Research:

Extensive secondary research was performed to ensure sound data for those evaluations that are not based on the vendors' own information; it included a review of the individual vendors' offerings and also an analysis of their Internet presences, product specifications and marketing materials.

Many interviews with product managers, technology experts and vendors' customers also contributed greatly to this benchmark. Based on numerous consulting engagements on the user side, Experton Group also has comprehensive experience when it comes to assess the actual performance of the individual vendors.

Vendor survey:

A vendor survey, which was conducted based on a questionnaire and interviews between our analysts and executives on the vendor side, formed another key part of this study.

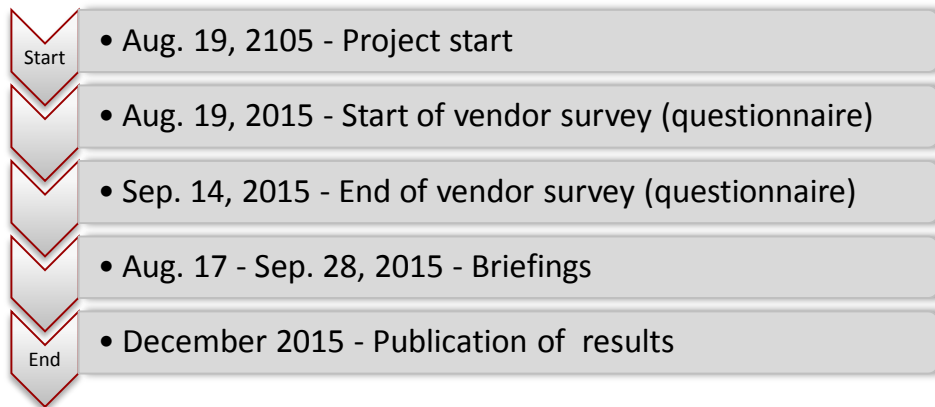
The questionnaire consisted of 31 pages. These questions addressed the company and its I4.0/IoT strategy, technological characteristics of the respective

solutions and services and also the company's commitment to address user requirements. Additional questions also provided answers on the company's market presence in Germany and additional products and services. Samples were taken to validate information provided by vendors.

Benchmark evaluation:

The three previous steps formed the basis for the final evaluation and vendor positioning within this „I4.0/IoT Vendor Benchmark 2016“. Information and insights gained in the individual steps were consolidated and analyzed, based on the predefined criteria.

Project Schedule:

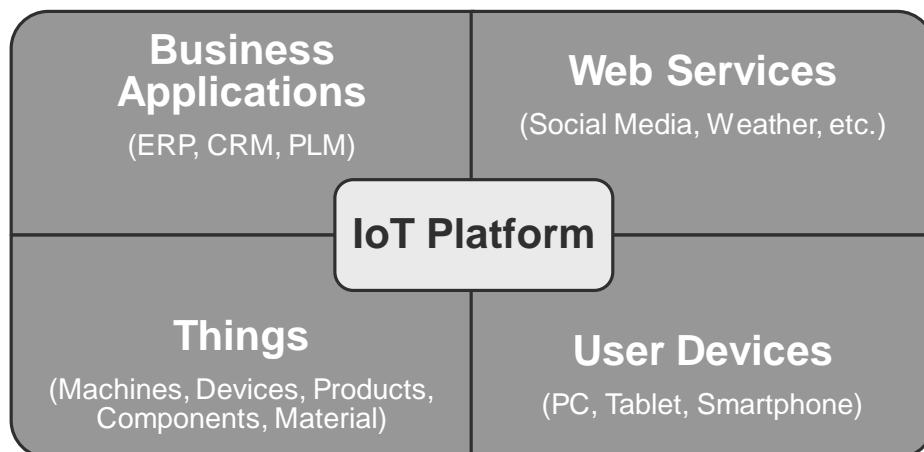


4. IoT Platforms

4.1. Definition

Data & device management is the core functionality of an IoT platform to allow for the centralized management of connected things (devices, products, machines) and for processing (storing, integrating, analyzing and visualizing) their data. Common additional functionality includes big data analytics, application development and connectivity management. IoT platforms are not vertical, i.e., industry-specific, but horizontal platforms to connect data and things across multiple industries.

IoT platforms connect four key elements: things, user devices, business applications and web services. Information is collected by things (machines, devices, products, components and materials) and prepared accordingly to visualize this information on various user devices. Remote access to "things" via user devices is also possible, as is data integration with business applications (ERP, CRM or PLM) and external web services such as social media data or weather information.



Source: Experton Group, 2015

Figure 3: IoT platforms connect things with applications and user devices

4.2. Vendor Selection

According to Experton Group's estimates, far more than 100 IoT platforms are already available worldwide. For the purpose of this vendor benchmark, we have examined nearly 50 IoT platforms; the following 17 out of these platforms were perceived as relevant for the German market and were included in the final benchmark:

- Atos
- Axiros
- Bosch SI
- Capgemini
- Cognizant
- CSC
- Cumulocity
- Deutsche Telekom
- Device Insight
- Eurotech
- HP
- IBM
- Infosys
- Intel
- Microsoft
- PTC
- QSC

While a number of renowned vendors of IoT platforms were examined prior to the actual analysis, they were not included into the benchmark, for various reasons. For instance, we excluded those vendors that do not provide their own data and device management, including Cisco, Wipro, Vodafone and Telefónica, as well as vendors whose platform is still in the beta phase, such as AWS, SAP, GE, Siemens or Salesforce, and non-horizontal platforms that have a focus on a certain topic or area, such as Google and Apple with their focus on smart home offerings. Vendors that do not market their platforms actively in Germany were also excluded, for instance, providers such as Jasper and Ayla Network. Many among the vendors named above will certainly evolve quickly and be included in next year's edition of the I4.0/IoT Vendor Benchmark within this IoT platform quadrant.

An overview of exclusion criteria:

- No data & device management
- Platform is still in the beta status
- Platform is not horizontal
- No active marketing in Germany

4.3. Focus of Assessments

The following evaluation criteria were of high relevance for the portfolio attractiveness ratings.

- Great importance is attached to the current scope of functionality (such as data and device management, big data analytics, application development and connectivity management) and also the quality assessment of platforms by customers, based on reference information and talks with customers.
- For Experton Group, a clear and strong USP is a key evaluation criterion, considering the challenge of mastering the expected consolidation of the IoT platform market.
- Another important aspect were vendors' efforts to build up an ecosystem around their platform. Experton Group thinks that it will not necessarily be the technologically best platform that will succeed in the market, but rather the platform that is able to speedily set up a strong ecosystem, a development that is based on investments in cooperations, thought leaderships and business model innovations.
- While local support structures and infrastructures are key basic topics, they were of minor relevance for the analysis of this quadrant.

On the competitive strength side, the following evaluation criteria were important:

- Awareness and image are important competitive advantages in the current early phase of this market and were therefore attached above-average relevance.
- Vendors with an existing partner ecosystem who can leverage this ecosystem to enhance their own IoT platform enjoy an enormous competitive advantage, which was also attached above-average importance.

- The same applies to marketing investments and companies' efforts to set up internal organizational structures, since these elements demonstrate the respective vendor's I4.0/IoT focus.

4.4. Market Situation

The I4.0/IoT **market** is still in its infancy. While these terms have been hype topics for quite some time, only few vendors have entered the German market with a concrete offering. Customers are primarily looking for full-service providers that are able to completely cover their individual solution requirements, rather than for providers of standardized platforms. To address these demands, solution vendors and system integrators act as full-service providers to provide a complete offering from a single source. Many small IoT platforms have evolved within short time; they are used by the vendors themselves in their role as full-service providers and/or are offered to other full-service providers that do not have their own IoT platform, based on the white-labeling model (platform for platforms). According to Experton Group's estimates, far more than 100 IoT platforms are already available worldwide, and consolidation is inevitable. The interesting question is which providers will be able to establish themselves in the market with their IoT platform. Experton Group thinks that it will not necessarily be the vendors with the technologically best platform that will succeed in the market, but those that are able to speedily set up a strong ecosystem around their own IoT platform. Their respective business model will play quite an important role to ensure a successful IoT platform, including ecosystem.

4.5. Vendor Evaluation

The following six out of the 17 benchmarked IoT platform providers were able to reach the leader quadrant: Atos, Bosch SI, Deutsche Telekom, IBM, Microsoft, and PTC.

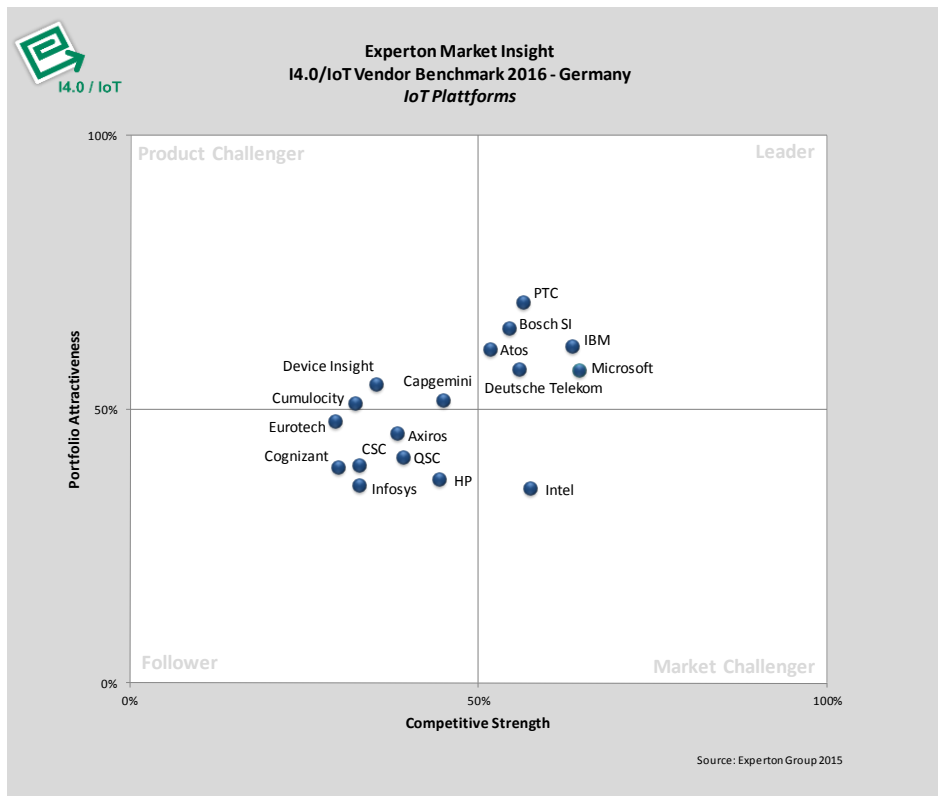


Figure 4: Benchmarked IoT platform providers

Atos' "Connected Living Enabler" IoT platform is a very advanced platform with enormous future potential. The provider has realized rather early that a specific IoT/I4.0 business unit is required and that it is also important to invest into the development of dedicated IoT business models. Atos is strongly involved into the "Gemini 4.0" initiative to gain important new insight for its own company as well as their customers. Also, the SIS acquisition is paying off two-fold. On the one hand, Atos has acquired important interface expertise between IT and industry, on the other hand, Siemens is a strong industrial partner with whom Atos has engaged in close cooperation to invest into innovations. Atos has to catch up as a thought leader and is challenged to further enhance the ecosystem around the provider's own IoT platform.

On the portfolio side, the Bosch IoT Suite is the strongest competitor of PTC. The Bosch IoT Suite is based on a combination of acquisitions and in-house developments of **Bosch Software Innovations**. Bosch wants to position itself as IoT/I4.0 "lead user" and, with the Bosch SI business unit, also as IoT/I4.0 "lead provider" in the market. No other vendor pursues such strong marketing efforts, and Bosch SI is perceived as "the" IoT/I4.0 thought leader in the German market, and quite rightly so. The annual Bosch ConnectedWorld event in Berlin is unique in Germany. Also, no other vendor is so strongly committed to business models, not only through its close cooperation with the University of St. Gallen in the "Business Model Navigator" context, but also through the vendor's workshops for its IoT Suite customers to support their search for new digital IoT/I4.0 business models.

Deutsche Telekom's "Connected Industry / DT IoT Platform" is a highly performant, modular end-to-end solution. No other vendor has so many renowned references in the German market as Deutsche Telekom, which Experton Group perceives as a real USP in the current market situation. Many providers are still struggling to name any references at all or only do so behind closed doors. IoT platforms are a topic where Deutsche Telekom can leverage its very own local strengths under performance, security and connectivity considerations, whereas thought leadership and ecosystem for their own IoT platform can still be improved.

IBM is another strong player in this market segment and can add various strengths to its "IoT Foundation" IoT platform, such as its excellent analytics/big data expertise and application development in the Blue Mix IoT Zone. This Blue Mix IoT Zone is an opportunity for IBM to build up a developer and ISV ecosystem around its IoT Foundation platform. IBM also demonstrates strong IoT commitment through investments and organizational initiatives, as is reflected in the newly founded, independent IoT business unit and IBM's announcement of plans to invest a total of three billion USD into the development of new IoT solutions. Compared to the competition, IBM should improve its IoT thought leadership in Germany.

Microsoft and its "Azure IoT Suite" platform are relatively new in the market. Microsoft's great strength, besides the actual platform, is the vendor's ecosystem. No other vendor can provide such a strong developer and ISV ecosystem as Microsoft on its Azure Cloud. Now the vendor must pave the way toward IoT for its existing ecosystem of developers, ISVs and system integrators. If Microsoft is able to successfully undergo this development, the vendor will become a really

strong IoT and especially IoT platform player, thanks to its partners. We urgently recommend that Microsoft improves its thought leadership in Germany.

Under portfolio aspects, **PTC** with its Thingworx IoT platform can be regarded as the leader in this market segment who has secured a strong starting position through the acquisition of Thingworx in 2013 and Axeda in 2014. The Thingworx acquisition is an important USP for PTC, compared to many other IoT platforms. The platform does not only have a focus on data and device management, but also offers application development capabilities. The Thingworx motto is "rapid application development" to enable users to create their own IoT applications and dashboards, based on a self-service mode, also without in-depth IT skills and long learning phases – fast and easily, which is an enormous advantage and a strong USP. Regarding the ecosystem, PTC is also ahead of its competitors and has already built up a marketplace with 200 apps around Thingworx. PTC also has numerous references in the German market and is highly respected as genuine thought leader when it comes to IoT platforms. Experton Group perceives PTC as a leader in the race for establishing itself as an economically successful IoT platform.

Besides the leaders in this segment, there is a number of other players, which can be categorized in groups, based on their origins and their respective focus.

For instance, Capgemini, HP, CSC, QSC, Cognizant and Infosys are renowned IT service providers that have launched their own IoT platform in the German market with the primary goal of establishing their respective IoT platform as a full-service provider in customer organizations, which means that IoT platforms are mainly offered as an integrated component of an industry-specific complete solution, including consulting and system integration, depending on the provider's core competence and with a focus on cloud-based data and device management functionality and analytics. For Experton Group, these are all good platforms technologically, but we do not see the willingness among these providers to build up a strong ecosystem around their own IoT platform. Only platforms that can scale, based on their business model, will ultimately be successful in the market in the future. Consulting houses and system integrators are especially challenged to make a decision about their future focus – the model of the full-service provider or the IoT platform. It will be extremely difficult to be successful with both models in the market.

The following IoT platforms were categorized under the "IT service provider" group and were examined accordingly:

- Capgemini eObjects Platform
- HP IoT Platform
- CSC xIP
- QSC Solucon
- Cognizant Foresight
- Infosys Information & Connectivity Platform

Besides this group of IT consultants and system integrators that provide a broad IT portfolio and have launched their IoT platforms only recently, there is another group of companies that have their origins in the M2M segment and have evolved into IoT platform providers. These smaller companies could be named IoT specialists and this group includes vendors such as Device Insight, Eurotech, Cumulocity and Axiros. Device Insight and Axiros can be regarded as genuine IoT platform pioneers, since both companies have been intensely engaged with M2M/IoT and platforms since 2002/2003. Eurotech has been active in the market for embedded systems since the 1990ies, but has only launched its own M2M/IoT platform, the "Everyware Cloud", in 2010. Cumulocity, too, has launched its platform in 2010 and was founded in the same year, with origins in Nokia Siemens Networks. While Eurotech sells its platform primarily to users, the three other providers closely cooperate with large telco providers, who offer these smaller IoT specialists market access and reach, which is exactly what they are lacking. For instance, Device Insight acts independently in the German market, but is also engaged in close cooperation with Vodafone. Similarly, Cumulocity cooperates with Deutsche Telekom and Axiros has its sole focus on telcos as target group and has established partnerships with a number of telcos all over Europe. For Experton Group, the picture is quite similar to the group of IT service providers. While there are good technological platforms, we miss efforts by the providers to build up a strong ecosystem around their own IoT platform. But according to Experton Group, they will not be able to act successfully in the market without such ecosystem.

The following IoT platforms were assigned to the group of "IoT specialists" and examined accordingly:

- Device Insight Centersight
- Eurotech Everyware Cloud
- Cumulocity Platform
- Axiros Aperience

5. Industrial Big Data Analytics

5.1. Definition

This category of Experton Group's IoT/I4.0 Vendor Benchmark includes analytics solutions and analytical databases from vendors or qualified full-service providers with a dedicated focus on the processing of industrial machine and facility data and on the analysis of large, complex and unstructured data volumes (big data analytics). Optimally, analysis results flow back into the machine or plant control systems, for instance, to influence the whole production system automatically. Typically, the solutions deliver analysis results as results data or reports.

Industrial analytics, as defined for the purpose of this benchmark, is a highly complex task, which is not limited to collecting the data and presenting results in ERP or MES systems, but also includes the analysis of huge amounts of data and often constantly flowing data streams to influence the systems, based on the analysis results. Data analysis is used to not only know that a system is ineffective, but to also identify the cause of such ineffectiveness.

5.2. Vendor Selection

According to Experton Group estimates, about 60 IoT/I4.0 analytics solutions are available worldwide. For the purpose of this first vendor benchmark, we have identified 23 companies that are relevant in the German market for machine data analytics solutions:

- | | |
|--------------------|------------------|
| ▪ Alegri | ▪ Atos |
| ▪ Blue Yonder | ▪ Bosch SI |
| ▪ Capgemini | ▪ CGI |
| ▪ Cognizant | ▪ CSC |
| ▪ Deutsche Telekom | ▪ Device Insight |
| ▪ Empolis | ▪ HP |
| ▪ IBM | ▪ Microsoft |
| ▪ MIOsoft | ▪ NorCom |
| ▪ ParStream | ▪ PTC |

▪ Resolto	▪ SAP
▪ SAS	▪ Splunk
▪ Synop	▪ Wipro

MES and ERP vendors and vendors whose products are not perceived as solutions used to process machine data were not examined. While CEP (complex event processing) solutions were also excluded, CEP functionality may be part of IoT/I4.0 analytics software. CAM systems were not analyzed either, although they may be part of the analyzed solutions, executing respective measuring, control or regulation functions, based on machine data analyses.

Considering the current market development, a clear division into pure consulting houses (consulting including system integration) and pure product vendors (ISVs, independent software vendors) is not possible at the moment. Currently, all solutions must be added respective assessment and implementation services.

5.3. Focus of Assessments

The IoT/I4.0 offering must also comprise current references, which also means that the reference project must have been conducted not earlier than 2013 (in April 2013 and on the occasion of the Hanover Fair, a practical definition of the theoretical Industrie 4.0 construct was presented). However, in discussions prior to this analysis some automation solutions from 2000 were presented as "Industrie 4.0" solutions. While automation technology is regarded as a key component of such solutions, it is not the subject of our industrial big data analysis. Rather, we want to show solutions that deliver new insights, for instance, through streaming analyses of all data, or that influence systems and facilities, based on the analysis of certain characteristic diagrams.

The generalists and consulting companies that provide a comprehensive solutions portfolio, also dealing with large amounts of streaming data and linking them with other, often poly-structured data, have all made the same interesting remark: They say that they grow and develop "as needed", which, however, also means that they have not set up a respective strategy yet. This is partly true for other providers who were not able to provide exact customer numbers or expected growth rates and provided strongly varying statements, which supply quite interesting indicators of IoT/I4.0 maturity levels.

Many providers had difficulties to supply concrete figures for the required system configuration for their solution. Neither reference architectures nor performance limits are provided, which may well reflect the actual situation in such a young market and the high share of assessment and consulting services around the solution, but may also indicate that the vendors' offering lacks the necessary degree of maturity. Solutions that reduce or filter data in a first step are critical, since this is contrary to the actual purpose which is to gain insights into a certain situation with the machine or system, based on an analysis of all available data.

When it comes to the level of innovation and based on the definition given for this benchmark, we have observed that many vendors seem to work with prototypes, set up POCs (proofs of concept) or conduct pilot projects. However, many companies can look back on a certain and sometimes even many years of history with machine data, often related to the import and preprocessing of data for ERP and MES.

Criteria include the vendors' flexibility and agility. For instance, the dependency of companies or their German subsidiaries on guidelines specified by their (international) mother companies plays an important role. The local presence of the German organization and the influence of the local management onto the strategy have also impacted the competitive strength ratings.

5.4. Evaluation of Vendors

The following nine companies achieved a position in the leader quadrant:

- Blue Yonder
 - Deutsche Telekom
 - HP
 - Microsoft
 - SAP
- Bosch SI
 - Device Insight
 - IBM
 - PTC

Empolis Information Management GmbH received the "Rising Star" award.

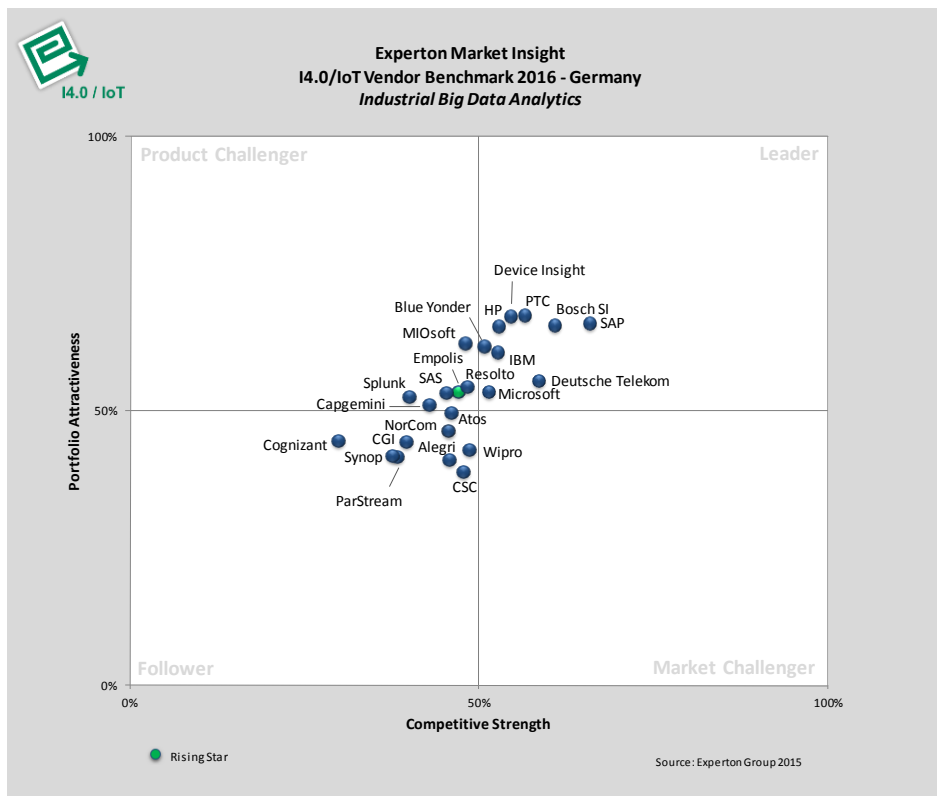


Figure 5: Benchmarked vendors of industrial big data analytics

Blue Yonder is a renowned data analytics vendor, with a focus on forecasts for the retail sector. Blue Yonder with headquarters in Karlsruhe has realized at an early point that it is possible to analyze additional data, for instance, to improve predictive maintenance, and has neither missed the trend towards the

production-related analysis of large amounts of data. The company provides demand forecasts and spare parts logistics, failure predictions with remote emergency analysis, predictive maintenance (including condition-based services) and consumption forecasts such as energy efficiency analyses. Partnerships with renowned service providers also contribute to the good rating.

Bosch SI was one of the pioneers that have shaped the Industrie 4.0 term. This analysis has not examined the whole Bosch group or other Bosch business units and subsidiaries. Bosch SI has already gathered experiences in many industries and can be deemed a pioneer in this segment. Bosch SI has set up a dedicated Industrie 4.0 team. Project planning is based on procedure models. A clearly defined roadmap, including a cloud offering that will be available starting 2016, contributes to the very good position.

Together with its IT service daughter T-Systems **Deutsche Telekom** provides one of the most comprehensive offerings for users that are interested in Industrie 4.0 solutions. A major component is the infrastructure offering, from secure transmission paths and secure data centers to the "German Cloud". The company has all kinds of concrete reference projects from practically all segments of the supply chain, has the required consulting competence and also provides its own technological developments. Deutsche Telekom has set up their Digital Division as an organizational measure to address users' requirements and needs.

Device Insight has been a renowned player within the manufacturing industry for several years. The centralized data collection functionality is the core component of the vendor's solutions. Based on the company's experiences, various functionality for subsequent processes was developed, including data analysis and results interpretation functionality. Device Insight understands that domain knowledge is a key prerequisite for efficient analyses and their interpretation, which is also reflected in the vendor's specific focus on individual branches of the manufacturing industry.

Hewlett-Packard Enterprise (HPE) has embraced the platform concept; together with the provider's comprehensive experience in the manufacturing industry, this ensured a good position in this category. HPE provides its own analytics solutions and has developed them into platform concepts that are tailored to address specific areas of application (factory, collaboration, product life cycle and others), but can also be implemented as an overall solution. While HPE's solutions are well and even very well able to meet the criteria of this benchmark and current reference projects such as Wittenstein and Fraunhofer

were named, a company of this size should be able to supply more current references. A service organization supports user companies to plan, set up and implement solutions accordingly.

IBM provides a broad and comprehensive portfolio of solutions for user organizations, and IBM was one of those players that have shaped the Industrie 4.0 and Internet of Things topic. First big data analytics examples already had a focus on machines and machine maintenance (including the probably most popular example of the wind power plants and respective data analyses for predictive maintenance purposes). The comprehensive product portfolio and strong implementation skills contributed to the vendor's leading portfolio attractiveness position. A clearer roadmap would be helpful to further increase the competitive strength ratings.

Microsoft's Embedded Windows is one of the leading operating systems for machines and plants. Microsoft provides software and solutions for data collection, management and analysis for the Windows operating system platform and works with many partners that help user organizations implement concrete projects.

PTC ThingWorx Analytics processes machine data and provides functionality to adapt facilities and processes, based on the analysis results. PTC, too, has a focus on predictive maintenance. For Experton Group, the analytics solution (formerly "Coldlight") has the potential to allow extensive interaction of analytical functions and measuring, control and regulation functionality. PTC's strategic concept is the 360° view of the product.

Already on the occasion of CeBIT 2014 **SAP** demonstrated the advancing convergence of cybernetics and information technology. The company's business applications (MM, PP, etc.) enjoy a high degree of adoption within the manufacturing industry, and SAP can leverage these experiences within its analytics solutions. The SAP offering includes the analytical database HANA, related certified hardware platforms, additional solutions and a large number of partners to provide a very comprehensive and complete portfolio. SAP has developed IoT/I4.0 use cases for various industries and manufacturing subsegments, often with a focus on improved predictive maintenance.

Empolis has been identified as the "Rising Star" of this segment, because this company pursues its own, unique technological approaches. The Empolis solutions have been designed to detect still unknown relations between machine data and other data from a company's IT landscape, for instance, to develop use

cases that shall not only find out when or why a component fails, but also, why there are differences in the yield of identical production lines. Empolis' solution offering is complemented with cloud services that also meet users' data security and data protection requirements, in compliance with German data protection laws.

6. Authors and Contacts

Arnold Vogt is a Senior Advisor at Experton Group.



Mr. Vogt advises ICT vendors and users on current IT service issues such as cloud computing and Industrie 4.0 (Internet of things & services). His focus is on strategic marketing and sales development through the analysis of customer requirements, competitors and technologies and on market segmentation and evaluation.

Prior to joining Experton Group, Mr. Vogt worked as Senior Market Development Advisor for IBM Deutschland GmbH, where he was responsible for market and competitive analyses on cloud computing, IT services and business strategies.

After completing his studies of business administration with a focus on marketing Mr. Vogt worked in IBM's marketing department for 15 years and held various positions with national and international responsibilities. In 2010 he completed his part-time MBA studies at the Henley Business School (University of Reading, UK); his thesis was about the diffusion of innovations and dealt with the question "What makes innovations successful in the market?"

Holm Landrock is Lead Advisor Big Data at Experton Group.



His main areas of coverage include big data and supercomputing as well as technical-scientific information processing. He is head of Experton Group's "Big Data" team of advisors and has contributed greatly to the company's first "Big Data" multi-client study. He is also responsible for Experton Group's "Big Data Vendor Benchmark".

Since 2006, Holm Landrock has also worked as a freelance journalist. Before, he worked as a journalist and PR consultant for various global IT companies and has published more than 200 technical articles.

Holm Landrock has completed training as an IT specialist in Dresden; since 1982, he has studied enterprise-class IT systems.

Dr. Michael Weiß is a Senior Advisor at Experton Group.

Main areas of coverage include mainframe consulting – operations, automation and organization as well as their future and potential. On the architecture side, his focus is on servers, storage, networks as well as Linux and BI partitions. Dr. Weiß has many years of experience in talent management, motivation and recruitment within this specific area.



After studying natural sciences, Dr. Weiß worked for the University of Bonn (Rheinische Friedrich-Wilhelms-Universität), the Landschaftsverband Rheinland (regional authority of Rhineland) and BonnData, before he joined HUK-Coburg, a leading German insurer, taking over responsibility for IBM mainframe-specific products within the IT department.

For four years, Dr. Weiß was Region Manager for Germany for GUIDE SHARE EUROPE (GSE) and responsible for the press and marketing activities of this large IBM user group. Another focus was on the active support of the IBM Academic Initiative. Dr. Weiß has a comprehensive network of excellent contacts to vendors and ISVs as well as European customers and specialists.

Dr. Weiß holds a degree as Dr. rer. nat. of the University of Bonn.

Dr. Henning Dransfeld is Manager Advisor & Program Manager Mobile Enterprise at Experton Group.



Dr. Dransfeld advises both ICT users and ICT vendors; his main areas of coverage include the mobile enterprise with a focus on issues such as client strategy, mobile productivity, security and employee motivation. Dr. Dransfeld is a recognized expert for ICT trend analyses, vendor strategy evaluation and competitive positioning and has more than 18 years of industry experience. Dr. Dransfeld also advises ICT users on their core marketing and sales messages.

Prior to joining Experton Group, Dr. Dransfeld worked as head of Forrester Research's Mobile Enterprise unit in Europe. In this position, he published various analyses on current mobility topics, including "Demystifying BYOD in Europe".

Before, he worked for T-Systems. Within eight years, he held a variety of positions as marketing, sales strategy and business strategy project manager. Most recently, he was responsible for T-Systems' solution marketing for mobile enterprise and workplace services.

Before, Dr. Dransfeld worked six years as an analyst for Ovum in London, where he was head of the IP Communications Services advisory service. He was responsible for numerous studies and forecasts, including IP communications services, and acted as Research Director for the ICT Network Strategy division.

Dr. Henning Dransfeld is an experienced speaker on international conferences, such as the European VPN User Association (EVUA) and the European IPQC Mobility Exchange.

Dr. Dransfeld has studied at Henley Business School, the University of Wales, Swansea and the Université 1, Institut de Gestion, Rennes. He is married and has four children.

About Experton Group

Experton Group is a leading IT research, advisory and consulting company. The company has 30 experienced analysts in Europe who support mid-sized and large organizations with their IT strategic planning and implementation. In Germany, Experton Group has offices in Munich and Kassel.

More information on our research can be found under:

<http://experton-group.de>

<http://blog.experton-group.de/>

<https://twitter.com/ExpertonGroup>

Contact

Experton Group AG
Carl-Zeiss-Ring 4
D-85737 Ismaning
Tel. +49 89 923331-0
Fax +49 89 923331-11