PAC RADAR

Artificial Intelligence I Germany I 2020

AI-related Services for Sales, Service, Marketing in Germany 2020

SITSI I Vendor Analysis I PAC INNOVATION RADAR

Leading providers of AI-related consulting, systems integration, and operation services

– Positioning of Reply –

Lead analysts:
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teknowlogy | PAC, September 2020

teknowlogy | PAC

RADAR
IT SUPPLIER ASSESSMENT FROM PAC

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OBJECTIVE OF THE PAC RADAR

The PAC RADAR by teknowlogy | PAC is an effective tool for the holistic evaluation and visual positioning of software and ICT service providers on local markets. Numerous ICT and business decision-makers in user companies of all industries and company sizes rely on the PAC RADAR when selecting their partners and developing their sourcing strategies.

With the help of predefined criteria, teknowlogy | PAC evaluates and compares providers' strategies, development, and market position in addition to performance and competencies within specific market segments.

Each PAC INNOVATION RADAR focuses on a certain IT services segment. Up to 30 leading providers are evaluated per segment. Participation in the PAC INNOVATION RADAR is free of charge.

All providers are evaluated using teknowlogy | PAC's proven methodology, which is based on personal face-to-face interviews.

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After the evaluation of the predefined criteria, each supplier's position is plotted in the PAC INNOVATION RADAR. The criteria are classified by clusters and can all be attributed to the "Competence" and "Market Strength" main clusters.

Within the PAC INNOVATION RADAR the following applies: The closer a company is to the center, the closer they are to meeting customers' requirements.

Fig. 1: PAC INNOVATION RADAR graph (exemplary presentation)

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INTRODUCTION

AI in Germany: high expectations, strong growth, and currently a small market

Of all digitization topics, artificial intelligence is certainly the most highly charged, with high expectations. Companies from all industries without exception are at least evaluating the potential of AI in terms of possible business process automation or improvement of customer service. Many companies are already using AI-based solutions. Visible results are the chatbots using semantic text analysis that are already in use in many companies. AI solutions that are less immediately recognizable can be found in back-end processes, where, for example, insurance companies automatically evaluate damage patterns, analyze risks on the basis of AI, and enhance decision-support systems with neural capabilities.

The high expectations are also reflected by PAC | teknowlogy's market growth forecast. For AI-related services in Germany alone, we expect average annual growth of almost 30% in the years 2020 to 2024. It is currently unclear to what extent the coronavirus crisis will impact this growth scenario. Our qualitative analysis paints a mixed picture. Wherever AI can help automate processes and achieve greater process efficiency with little effort, companies stick to their chosen path and carry out AI projects as planned. Wherever AI projects are intended as a long-term investment, for example in customer services, they are being reconsidered given the general economic uncertainty at present. However, the picture is not really that clear-cut – for example, strongly customer-oriented and digitally sophisticated industries (such as online trade, consumer goods) tend to continue planned AI projects in the CX environment unchanged. In addition, there are also AI projects of strategic importance underway in many companies, which do not promise short-term ROI, but are considered as necessary and differentiating from the competition. These projects will be continued without interruption. An example here are projects for autonomous driving.

However, the high growth rate should not distract from the fact that the overall market is still comparatively small. For 2019, we estimate the total volume of AI-related services (including management consulting, application services, and infrastructure services) at just under EUR 700 million. This may seem high at first glance, but it is put into perspective when compared with the market for SAP services, for example. According to analysis by PAC | teknowlogy, German user companies spent a total of more than EUR 8.3 billion on SAP services. The SAP market includes services for consulting and system integration (C&SI), application management, and hosting services. It is thus 12 times the size of the AI-related services market.

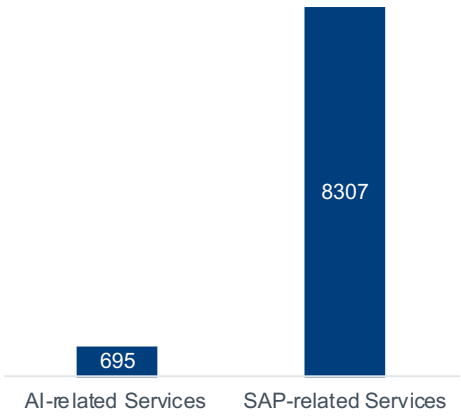

Fig. 2: The market for AI-related services vs. the market for SAP-related services in Germany

Why we have created a provider benchmark for a relatively small market

Given the small size of the market for AI-related services, the question arises of why we have created a PAC INNOVATION RADAR for this market segment.

Size alone is no indicator of a market's importance and attractiveness. It is high growth (see above) that makes it attractive for service providers. Even more important from user companies' perspective is the fact that AI is a relatively new topic and still lacks in transparency. Current projects that are launched with the help of AI technologies often are of strategic significance and deeply disrupt core business processes. It is therefore important for user companies to make an informed decision when selecting a provider, even if the projects are still limited in scope at this stage (compared to SAP transformation projects, for example). With these PAC INNOVATION RADARs on AI-related services, we want to give user companies a tool for decision-making and support them in the preselection process, taking into account type of project (consulting, systems integration, operation), company size, and use case (HCM, CX, IoT, SCM, etc.).

THE TRENDS IN DETAIL

Key findings in AI-related services for sales, service, and marketing

Business processes for sales, service, and marketing, which are increasingly summarized under the term ‘customer experience (CX)’, are certainly among those processes where companies expect the greatest benefits from the use of AI. This is why the number of competitors, and thus also the number of participants in the PAC INNOVATION RADAR on AI-related services for sales, service, and marketing is very high. CX installations claim to holistically support the customer and improve the points of contact through excellent communication.

These improvements are often based on data and its analysis in order to identify opinions and moods, but also to be able to make forecasts for buying behavior and customer needs. The aim is to accompany as many individual customers as possible through the marketing, sales, and service process. It is obvious that AI can play a major role in this process because it is about the evaluation of plenty of structured and unstructured data as well as the combination of historical and current data in order to make suggestions and forecasts, but also to detect fraud or customer dissatisfaction.

Chatbots and servicebots to improve client relations

The evaluation of the projects presented in this PAC INNOVATION RADAR shows a focus on customer service. Chatbots and servicebots with speech recognition, speech output, and semantic analysis capabilities are among the solutions that service providers very often implement for their customers. Some of the implementations have to meet very high requirements, for example when automated information has to be legally secure. This is intended to relieve the burden on service centers while still individualizing customer service. In addition to bots, AI-based routing solutions can also help to assign customer requests to the service staff with the best skill profile faster and more accurately.

Automated support of social media channels

Automated support of social media channels and bot systems is another important application of AI in the CX environment. Here, AI can help to register changes in mood, collect and analyze customer opinions, and of course detect and delete prohibited content or hate comments. An important basis for this are intelligent crawler systems that collect information from internal and external sources and also use AI-based solutions to evaluate and analyze the collected data.

Proactive recommendation systems and dynamic pricing

The recommendation systems that have been used in many e-commerce shops for years are constantly being improved and increasingly supplemented with AI-based solutions that individualize customer recommendations. Further interesting examples show that AI is used for dynamic pricing and for adjusting the sales assortment.

Automation of processes

One of the most important tasks in sales, service, and marketing is the detection of fraud and customer ratings. AI solutions can help automate these processes and ensure reliable results. Another field of automation can be found in the segment of classic document management systems, where incoming correspondence is semantically analyzed and forwarded. In contrast to earlier DMS solutions, current AI-based solutions are able to detect the mood of customer communication and identify customers' concerns very well.

AI in CX will experience increasing demand

CX is definitely a topic that will substantially change and evolve through the use of AI in the coming years. One of the main drivers will be automating today's very labor-intensive customer care processes in sales, service, and marketing with the help of AI-supported systems while still ensuring individual support. In addition, AI systems will to a greater extent than before help to better understand customers and support them across all touchpoints.

SCOPE & DEFINITION

teknowlogy | PAC's definition of AI-related services

teknowlogy | PAC has evaluated providers of **AI-related services in Germany** in different PAC INNOVATION RADAR analyses, each of which emphasizes the implementation of AI use cases – based on common AI fundamentals and frameworks – in **different lines of business**.

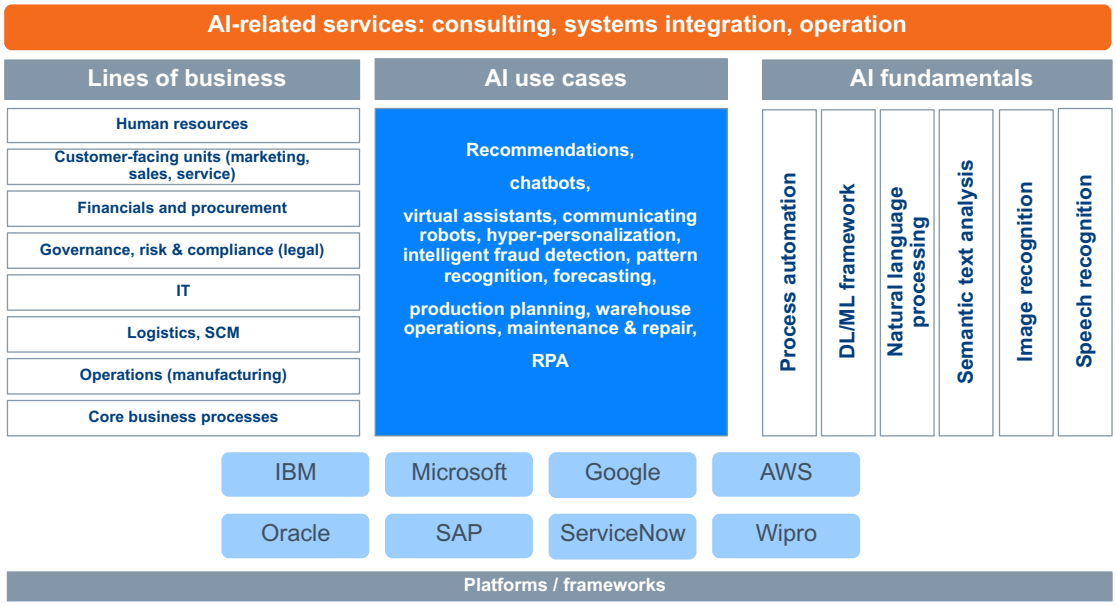

Fig. 3: Definition of AI-related services

AI-related services as considered in this PAC INNOVATION RADAR analysis include:

- **AI-related consulting services** (business consulting/IT consulting; feasibility studies, planning, specification, and design; audit of system infrastructures, selection of technologies and solutions, business process reengineering, and change management)
- **AI solution implementation and integration** (implementation services and integration of AI solutions with the existing software and services infrastructure and with other AI solutions where applicable, software development, testing, training, etc.)
- The assessment takes into account, but does not focus on, the **operation of AI solutions** (hosting/managed services), i.e. services that are needed to implement/deploy **AI-related use cases** in the above-mentioned lines of business.

It is not the AI platforms that have been assessed, but the **ecosystem services** that provide support to corporate clients with the implementation of AI solutions, from the initial development of an AI strategy and the identification of use cases to the implementation, integration, and management of AI solutions.

Segmentation of AI-related services

teknowlogy | PAC has evaluated providers of **AI-related services in Germany** in several PAC INNOVATION RADAR segments, which are dedicated to **specific line-of-business requirements:**

Fig. 4: Overview of the eight PAC INNOVATION RADAR reports on AI-related services

Depending on their specific focus, the providers will be positioned in one or more of the PAC INNOVATION RADAR analyses.

AI-related Services in Germany (overall results): In this PAC INNOVATION RADAR we evaluate the entire range of offers across all vertical and horizontal business processes. The use cases listed below are included in this evaluation, plus processes such as banking (e.g. payments, credit management), insurance (claims management, commissions), public (tax and revenue management), telecom/utilities (billing/metering, network management), retail & wholesale (sales, merchandising), and media (content management, ad management).

AI-related Services for HR/HCM: Human resources (HR) refers to all processes in HR departments, e.g. digital personnel file, leave & attendance management, payroll, etc. HCM goes beyond HR as it covers all employee-related topics, from recruitment (including job application processes and related services) to retirement.

AI-related Services for Sales, Service, Marketing: This area covers the separate segments of sales, service, and marketing, but also addresses integrated approaches with regard to customer experience management (CX) and customer relationship management (CRM).

AI-related Services for Logistics/SCM refers to all the processes related to the flow of goods and services. This includes, e.g., inventory optimization, forecasting and demand planning, warehouse management, transportation management, asset management, etc.

AI-related Services for GRC: Governance refers to binding principles (laws, norms, and standards) and company-specific principles (e.g. transparency, equality, etc.). Risk means enterprise risk management (which includes all

required methods and processes). Compliance refers to the implementation of relevant processes, methods, reporting, and controlling.

AI-related Services for Financials includes corporate back-office processes such as financial/cost/group accounting, controlling, financial risk management, treasury. **Procurement**, or supplier relationship management (SRM), helps companies to better manage the strategic buying process, be it materials, services, or goods.

AI-related Services for Production & IoT refers to all manufacturing processes in industrial companies (discrete manufacturing, process industry, automotive). This includes production planning, production and warehouse operations, quality control processes, and maintenance and repair operations.

AI-related Services for IT comprises all processes for the operation and further development of internal IT. This includes tasks such as security, maintenance, updates, service management, and admin processes.

PAC RADAR EVALUATION METHOD

Provider selection & participation

Which providers are positioned in the PAC INNOVATION RADAR?

Providers are selected and invited according to the following criteria:

- Positioning and business activities in the segment to be analyzed in the specified region;
- "Relevance": Even providers that do not belong to the top-selling providers in the segment to be analyzed are considered if teknowlogy | PAC classifies them as relevant for potential customers, for instance due to an innovative offering, strong growth, or a compelling vision.

There is no differentiation as to whether the providers are customers of teknowlogy | PAC – neither in the selection of the providers to be positioned, nor in the actual evaluation.

What do providers have to do in order to be considered in a PAC INNOVATION RADAR analysis?

The decision as to which providers are considered in the PAC INNOVATION RADAR analysis is entirely up to teknowlogy | PAC. Providers do not have any direct influence on this decision.

However, in the run-up to a PAC INNOVATION RADAR analysis, providers can make sure in an indirect way that teknowlogy | PAC can adequately evaluate their offerings and positioning – and thus their relevance – e.g. by means of regular analyst briefings, etc.

Why should providers accept the invitation to actively participate?

Whether or not a provider participates in the RADAR process does not actually affect their inclusion and positioning in the PAC INNOVATION RADAR, nor their assessment. However, there are a whole host of benefits associated with active participation:

- Participation ensures that teknowlogy | PAC has access to the largest possible range of specific and up-to-date data as a basis for the assessment;
- Participating providers can set out their specific competencies, strengths, and weaknesses as well as their strategies and visions;
- The review process guarantees the accuracy of the assessed factors;
- The provider gets a neutral, comprehensive, and detailed view of their strengths and weaknesses as compared to the direct competition – related to a specific service in a local market;
- A positioning in the PAC INNOVATION RADAR gives the provider prominence amongst a broad readership as one of the leading operators in the segment under consideration.

Considered providers by segment

AI-related Services for HR/HCM	AI-related Services for Sales/Service/Marketing	AI-related Services for Logistics/SCM	AI-related Services for GRC
• Accenture • Atos • Capgemini • Datagroup • Deloitte • IBM • NTT DATA • Sopra Steria	• Accenture • adesso • Alexander Thamm • Arvato Systems • Capgemini • CGI • Datagroup • Deloitte • DXC • IBM • Lufthansa Industry Solutions • Materna • NTT DATA • pmOne • Reply • Sopra Steria • TCS	• Alexander Thamm • All for One • Arvato Systems • Atos • Capgemini • Datagroup • Deloitte • DXC • IBM • Lufthansa Industry Solutions • Materna • NTT DATA • pmOne • Reply • Sopra Steria • TCS • T-Systems	• Accenture • adesso • Alexander Thamm • Arvato Systems • Atos • Deloitte • DXC • IBM • Sopra Steria • TCS

AI-related Services for Financials/Procurement	AI-related Services for Production & IoT	AI-related Services for IT
• Accenture • Alexander Thamm • Datagroup • Deloitte • DXC • IBM • pmOne • Sopra Steria	• Accenture • adesso • Alexander Thamm • All for One • Arvato Systems • Atos • Capgemini • CGI • Datagroup • Deloitte • DXC • Fujitsu • IBM • Lufthansa Industry Solutions • NTT DATA • pmOne • Reply • Sopra Steria • TCS • T-Systems	• Accenture • Arvato Systems • Atos • Capgemini • CGI • Datagroup • Deloitte • DXC • Fujitsu • IBM • Materna • NTT DATA • Sopra Steria • TCS • T-Systems

The concept

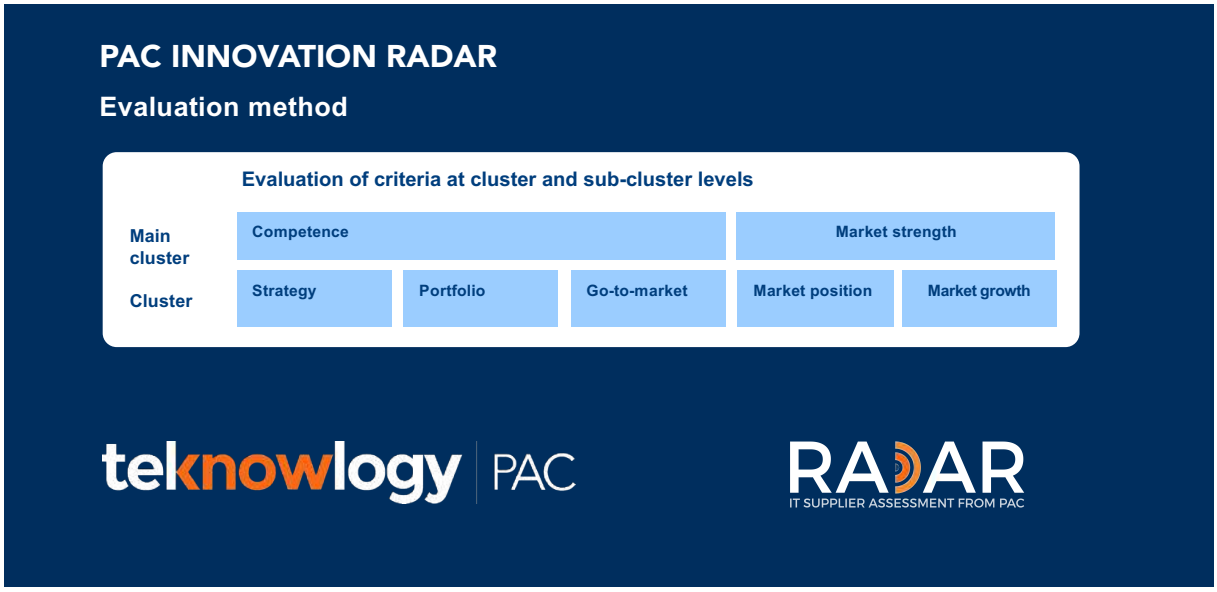

Fig. 5: PAC INNOVATION RADAR – evaluation method

teknowlogy | PAC uses **predefined criteria** to assess and compare the providers within given service segments.

The assessment is based on the report-card score within the peer group of the positioned providers.

This is based on:

- Dedicated face-to-face interviews with the providers about resources, distribution, delivery, portfolio, contract drafting, pricing, customer structure, client references, investments, partnerships, certifications, etc.;
- The analysis of existing teknowlogy | PAC databases;
- Secondary research;
- If applicable, a poll among customers by teknowlogy | PAC.

The provider data is verified by teknowlogy | PAC and any omissions are rectified based on estimates.

If the provider does not participate, the assessment is performed using the proven teknowlogy | PAC methodology, in particular based on:

- Information obtained from face-to-face interviews with the provider's representatives, analyst briefings, etc.;
- An assessment of company presentations, company reports, etc.;
- An assessment of teknowlogy | PAC databases;
- An assessment of earlier PAC (INNOVATION) RADARs in which the provider participated;
- A poll among the provider's customers (as required) on their experiences and satisfaction.

Evaluation criteria

The **general evaluation** is based on the following criteria:

Competence	Market Strength
• Availability of own AI technologies • Certifications for common AI platforms & solutions • Homogeneous coverage of common AI platforms • Coverage of AI fundamentals (e.g. video/speech/ image recognition, semantic text analysis) • Investment in assets (IP, tools, solutions, methods, M&As, etc.) • Overall expertise in business process modernization (cross-sector) • Investment in AI skills (incl. training, certifications, M&As, hiring, etc.) • Dedicated organizational structures for AI-related services • Realized AI use cases at strategy level / C-level • Convincing AI strategy in the view of teknowlogy | PAC • Homogeneous coverage of common RPA platforms	• Significance of operations in AI-related services • Focus on large accounts • International presence in AI-related services • Availability of local AI resources • Significance of consulting and systems integration in AI-related services • Awareness among peers • Significance of business consulting in AI-related services • Focus on medium-sized and small accounts

AI-related services for sales, service, marketing:

Competence	Market Strength
• Breadth of use cases in sales/service/marketing processes (portfolio view) • Overall expertise in sales/service/marketing processes (competencies and experience)	• Implemented reference projects in sales/service/marketing processes

General PAC research method

The following overview describes teknowlogy | PAC's research method for market analysis and key differentiation features.

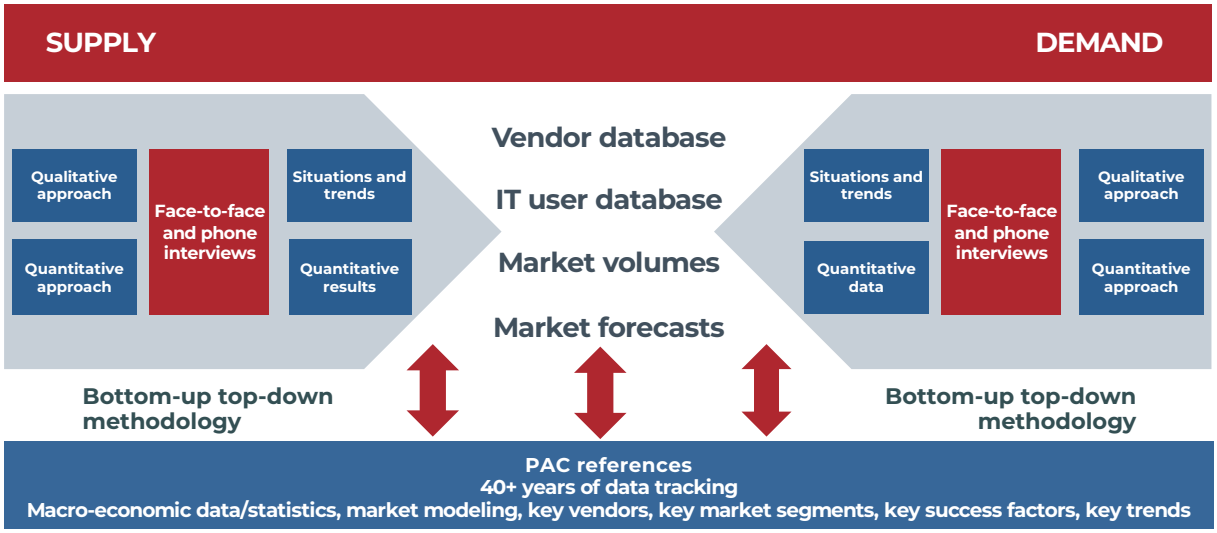

Fig. 6: Description of the PAC methodology

Local research and face-to-face communication are two core elements of teknowlogy | PAC's methodology. In our market studies, we can draw on more than 40 years of experience in Europe.

Positioning within the PAC INNOVATION RADAR

Based on the scores in competence and market strength, the overall score is calculated (calculation: competence score plus market strength score, divided by two). From the resulting overall score, each provider receives their characteristic positioning within the PAC INNOVATION RADAR. Here, the following applies: The closer a provider is to the upper right corner, the closer they are to meeting customers' requirements for that segment.

The classification of providers is based on the overall score:

"Best in Class"	1.0 – 1.9
"Excellent"	2.0 – 2.9
"Strong"	3.0 – 3.9
"Solid"	4.0 – 4.9

Fig. 7: Classification of providers in the PAC INNOVATION RADAR graph (example)

PAC INNOVATION RADAR "AI-RELATED SERVICES FOR SALES, SERVICE, MARKETING IN GERMANY 2020"

Fig. 8: PAC INNOVATION RADAR AI-related Services for Sales, Service, Marketing in Germany 2020

REVIEW OF TOP-SEEDED PROVIDER REPLY

Reply

PAC INNOVATION RADAR AI-related Services
for Sales, Service, Marketing in Germany 2020 **Best in Class**

Cluster	Average	Reply
Relative Market Strength	2.10	1.63
Competence	2.10	1.58
Total Score	**2.10**	**1.60**

Criteria rated as significantly ABOVE AVERAGE (more than 0.75)
• Homogeneous coverage of common RPA platforms • Dedicated organizational structures for AI-related services • Overall evaluation of AI-related services for sales/service/marketing processes • Breadth of use cases in sales/service/marketing processes (portfolio view) • Implemented reference projects in sales/service/marketing processes

Criteria rated as significantly UNDER AVERAGE (more than 0.75)
• Significance of operations in AI-related services

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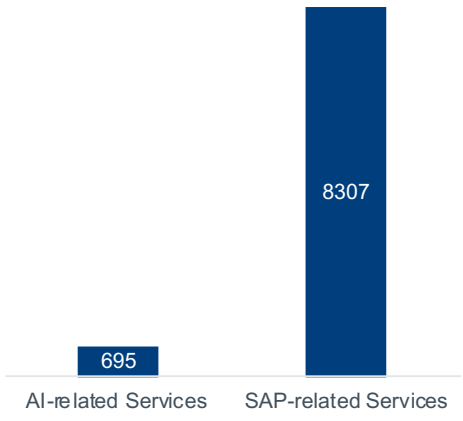

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THE TRENDS IN DETAIL

Key findings in AI-related services for logistics and SCM

For all industries involved in the production, transport, and sale of physical goods, logistics and SCM (supply chain management) are central and critical business processes. Savings, improvements, and efficiency gains in this area have an immediate positive impact on flexibility, agility, responsiveness to changing trends and customer requirements, and thus directly on business success.

Many sub-processes in logistics and supply chain are already digitally documented very well. In recent years, many companies have pushed the use of RFID tags and QR codes, which means that digitization has made good progress. Nevertheless, there is often a lack of transparency due to media breaks, data silos, and a lack of cross-provider integration. Therefore, transparency across the entire supply chain is certainly a major goal of all digitization initiatives. Here, too, AI projects can help to improve data quality.

Process automation and improvements

Most of the projects presented in this PAC INNOVATION RADAR on AI-related services for logistics and SCM aim at optimizing inventory and just-in-sequence processes, and target the automation of intra-company processes, for example self-driving, autonomous vehicles and smart shelves. In addition, companies are seeking improvements in warehousing in order to minimize stock and have the right parts in the right place. An important element is the analysis of throughput times, which also provides a good basis for a verifiable ROI.

Demand forecasting

Forecasting is a key factor in optimized inventory management, so it is not surprising that many service providers work with their customers on better understand their customers' needs. This applies to both B2B and B2C customers, but the factors determining good forecasting are very different. Especially in the B2C environment, a lot of external factors are included in the analysis, such as weather, events, movement data, social media activities, and marketing actions.

Route optimization

An essential factor in the entire logistics process is the transport of physical goods, including the evaluation and processing of accompanying documents. This is why route optimization is a frequently given use case of AI solutions. The requirements are sometimes very high, for example if the transport of perishable goods or medicines requires very short transport times, or if fixed delivery dates have been agreed. In some cases, image recognition methods are also used in the transport of goods to document damage-free and loss-free transport, or to scan freight documents and analyze them for automatic processing.

AI in SCM and logistics – there will be further automation efforts

All in all, the range of use cases is very much oriented towards the automation of processes and the handling of accompanying freight documents, customs documents, and other documents. From the projects presented, it is clear that further efforts will be made to automate the entire SCM and logistics processes. There is room for improvement in forecasting, as well as in transport and administrative processes. The increasing use of sensors in SCM/logistics processes provides a solid data-related basis for the desired improvements. Big data, data analytics, machine learning, and neural networks will be the technological ingredients required for this.

The Covid-19 crisis will further push AI deployments in companies' logistics and supply chains. The lockdown in many countries disrupted supply chains and revealed the vulnerability of these complex systems. Today, projects are already being launched to reinforce supply chains with the help of AI and make potential difficulties and challenges more predictable and transparent.

SCOPE & DEFINITION

teknowlogy | PAC's definition of AI-related services

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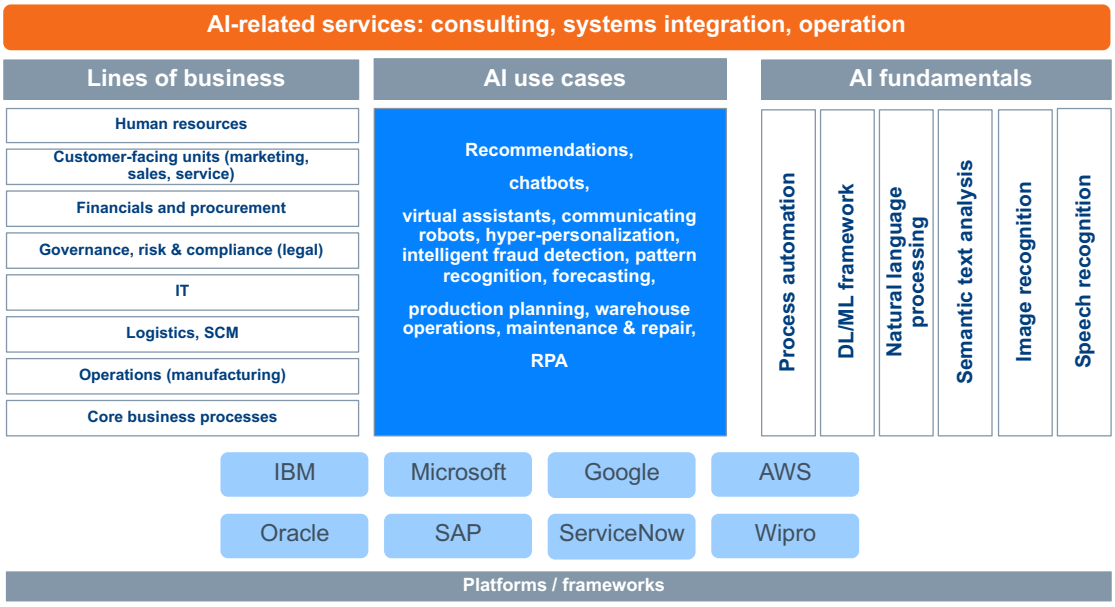

Fig. 3: Definition of AI-related services

AI-related services as considered in this PAC INNOVATION RADAR analysis include:

- **AI-related consulting services** (business consulting/IT consulting; feasibility studies, planning, specification, and design; audit of system infrastructures, selection of technologies and solutions, business process reengineering, and change management)
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- The assessment takes into account, but does not focus on, the **operation of AI solutions** (hosting/managed services), i.e. services that are needed to implement/deploy **AI-related use cases** in the above-mentioned lines of business.

It is not the AI platforms that have been assessed, but the **ecosystem services** that provide support to corporate clients with the implementation of AI solutions, from the initial development of an AI strategy and the identification of use cases to the implementation, integration, and management of AI solutions.

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Whether or not a provider participates in the RADAR process does not actually affect their inclusion and positioning in the PAC INNOVATION RADAR, nor their assessment. However, there are a whole host of benefits associated with active participation:

- Participation ensures that teknowlogy | PAC has access to the largest possible range of specific and up-to-date data as a basis for the assessment;
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- A positioning in the PAC INNOVATION RADAR gives the provider prominence amongst a broad readership as one of the leading operators in the segment under consideration.

Considered providers by segment

AI-related Services for HR/HCM	AI-related Services for Sales/Service/Marketing	AI-related Services for Logistics/SCM	AI-related Services for GRC
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AI-related Services for Financials/Procurement	AI-related Services for Production & IoT	AI-related Services for IT
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The concept

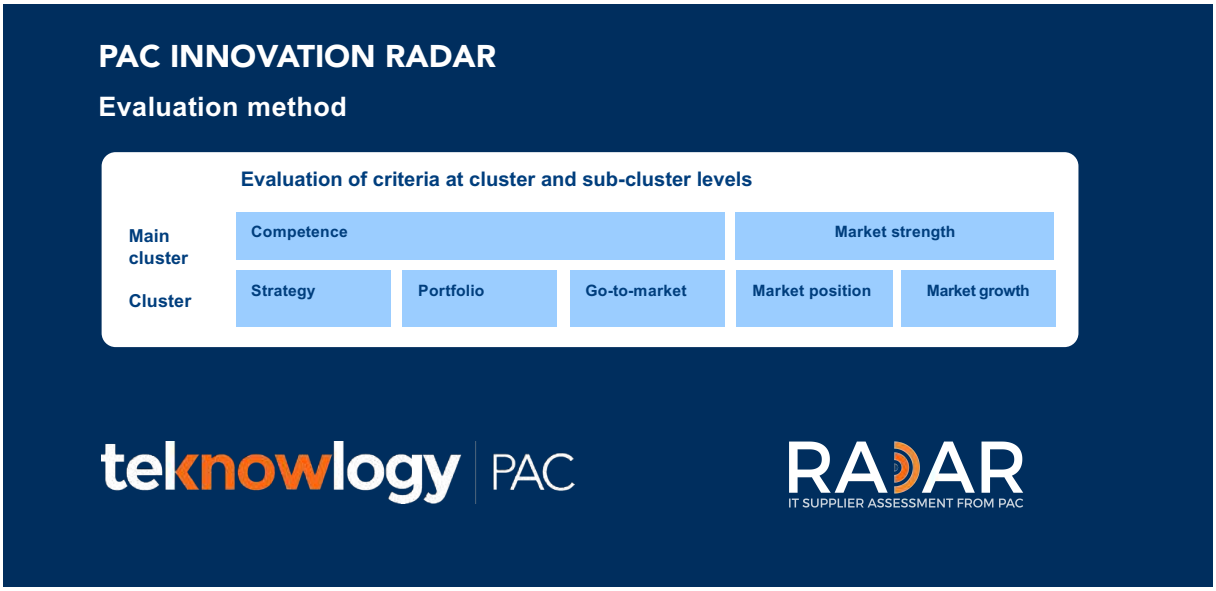

Fig. 5: PAC INNOVATION RADAR – evaluation method

teknowlogy | PAC uses **predefined criteria** to assess and compare the providers within given service segments.

The assessment is based on the report-card score within the peer group of the positioned providers.

This is based on:

- Dedicated face-to-face interviews with the providers about resources, distribution, delivery, portfolio, contract drafting, pricing, customer structure, client references, investments, partnerships, certifications, etc.;
- The analysis of existing teknowlogy | PAC databases;
- Secondary research;
- If applicable, a poll among customers by teknowlogy | PAC.

The provider data is verified by teknowlogy | PAC and any omissions are rectified based on estimates.

If the provider does not participate, the assessment is performed using the proven teknowlogy | PAC methodology, in particular based on:

- Information obtained from face-to-face interviews with the provider's representatives, analyst briefings, etc.;
- An assessment of company presentations, company reports, etc.;
- An assessment of teknowlogy | PAC databases;
- An assessment of earlier PAC (INNOVATION) RADARs in which the provider participated;
- A poll among the provider's customers (as required) on their experiences and satisfaction.

Evaluation criteria

The **general evaluation** is based on the following criteria:

Competence	Market Strength
• Availability of own AI technologies • Certifications for common AI platforms & solutions • Homogeneous coverage of common AI platforms • Coverage of AI fundamentals (e.g. video/speech/ image recognition, semantic text analysis) • Investment in assets (IP, tools, solutions, methods, M&As, etc.) • Overall expertise in business process modernization (cross-sector) • Investment in AI skills (incl. training, certifications, M&As, hiring, etc.) • Dedicated organizational structures for AI-related services • Realized AI use cases at strategy level / C-level • Convincing AI strategy in the view of teknowlogy | PAC • Homogeneous coverage of common RPA platforms	• Significance of operations in AI-related services • Focus on large accounts • International presence in AI-related services • Availability of local AI resources • Significance of consulting and systems integration in AI-related services • Awareness among peers • Significance of business consulting in AI-related services • Focus on medium-sized and small accounts

AI-related services for logistics/SCM:

Competence	Market Strength
• Breadth of use cases in logistics/SCM processes (portfolio view) • Overall expertise in logistics/SCM processes (competencies and experience)	• Implemented reference projects in logistics/SCM processes

General PAC research method

The following overview describes teknowlogy | PAC's research method for market analysis and key differentiation features.

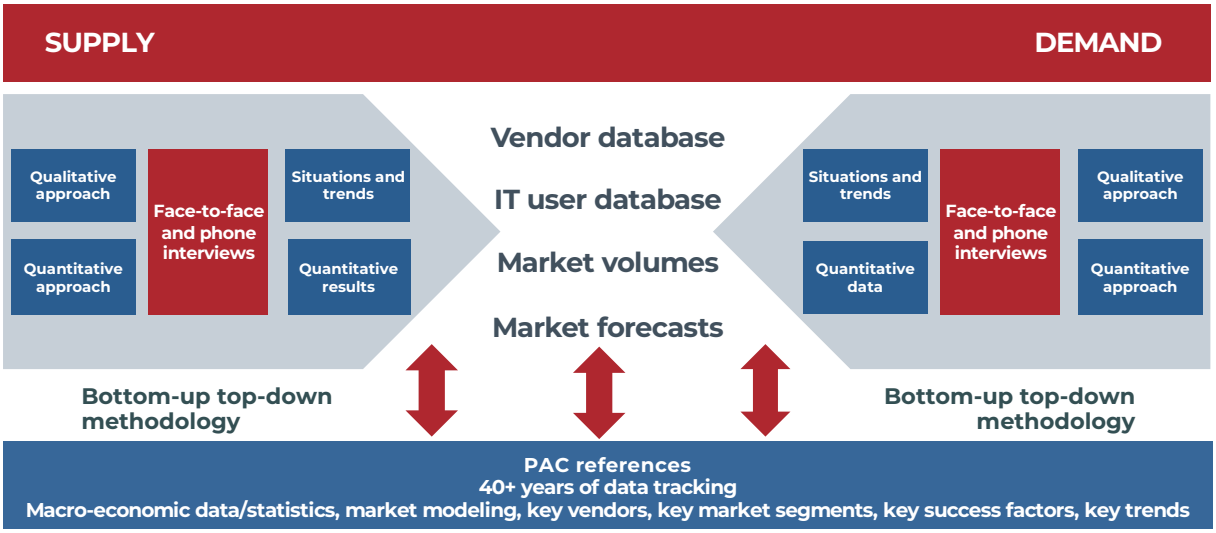

Fig. 6: Description of the PAC methodology

Local research and face-to-face communication are two core elements of teknowlogy | PAC's methodology. In our market studies, we can draw on more than 40 years of experience in Europe.

Positioning within the PAC INNOVATION RADAR

Based on the scores in competence and market strength, the overall score is calculated (calculation: competence score plus market strength score, divided by two). From the resulting overall score, each provider receives their characteristic positioning within the PAC INNOVATION RADAR. Here, the following applies: The closer a provider is to the upper right corner, the closer they are to meeting customers' requirements for that segment.

The classification of providers is based on the overall score:

"Best in Class"	1.0 – 1.9
"Excellent"	2.0 – 2.9
"Strong"	3.0 – 3.9
"Solid"	4.0 – 4.9

Fig. 7: Classification of providers in the PAC INNOVATION RADAR graph (example)

PAC INNOVATION RADAR "AI-RELATED SERVICES FOR LOGISTICS/SCM IN GERMANY 2020"

Fig. 8: PAC INNOVATION RADAR AI-related Services for Logistics/SCM in Germany 2020

REVIEW OF TOP-SEEDED PROVIDER REPLY

Reply

PAC INNOVATION RADAR AI-related Services for Logistics/SCM in Germany 2020 — Best in Class

Cluster	Average	Reply
Relative Market Strength	2.24	1.90
Competence	2.19	1.88
Total Score	**2.20**	**1.89**

Criteria rated as significantly ABOVE AVERAGE (more than 0.75)
• Homogeneous coverage of common RPA platforms • Dedicated organizational structures for AI-related services • Overall evaluation of AI-related services for logistics/SCM processes

Criteria rated as significantly UNDER AVERAGE (more than 0.75)
• Significance of operations in AI-related services

PAC RADAR

Artificial Intelligence I Germany I 2020

AI-related Services for Production & IoT in Germany 2020

SITSI I Vendor Analysis I PAC INNOVATION RADAR

Leading providers of AI-related consulting, systems integration, and operation services

– Positioning of Reply –

Lead analysts:
Joachim Hackmann,
Karsten Leclerque, Elena Ndrepepa

teknowlogy | PAC, September 2020

teknowlogy | PAC

RADAR
IT SUPPLIER ASSESSMENT FROM PAC

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DOCUMENT INFORMATION

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Portfolio ID: SITSI I Vendor Analysis I PAC RADAR
Related reports: This document is part of a series of eight RADAR reports.

OBJECTIVE OF THE PAC RADAR

The PAC RADAR by teknowlogy | PAC is an effective tool for the holistic evaluation and visual positioning of software and ICT service providers on local markets. Numerous ICT and business decision-makers in user companies of all industries and company sizes rely on the PAC RADAR when selecting their partners and developing their sourcing strategies.

With the help of predefined criteria, teknowlogy | PAC evaluates and compares providers' strategies, development, and market position in addition to performance and competencies within specific market segments.

Each PAC INNOVATION RADAR focuses on a certain IT services segment. Up to 30 leading providers are evaluated per segment. Participation in the PAC INNOVATION RADAR is free of charge.

All providers are evaluated using teknowlogy | PAC's proven methodology, which is based on personal face-to-face interviews.

teknowlogy | PAC reserves to also evaluate and position those providers in the PAC INNOVATION RADAR that do not participate in the self-disclosure process.

After the evaluation of the predefined criteria, each supplier's position is plotted in the PAC INNOVATION RADAR. The criteria are classified by clusters and can all be attributed to the "Competence" and "Market Strength" main clusters.

Within the PAC INNOVATION RADAR the following applies: The closer a company is to the center, the closer they are to meeting customers' requirements.

Fig. 1: PAC INNOVATION RADAR graph (exemplary presentation)

RADAR LICENSE

PAC INNOVATION RADAR "AI-related Services for Production & IoT in Germany 2020"

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INTRODUCTION

AI in Germany: high expectations, strong growth, and currently a small market

Of all digitization topics, artificial intelligence is certainly the most highly charged, with high expectations. Companies from all industries without exception are at least evaluating the potential of AI in terms of possible business process automation or improvement of customer service. Many companies are already using AI-based solutions. Visible results are the chatbots using semantic text analysis that are already in use in many companies. AI solutions that are less immediately recognizable can be found in back-end processes, where, for example, insurance companies automatically evaluate damage patterns, analyze risks on the basis of AI, and enhance decision-support systems with neural capabilities.

The high expectations are also reflected by PAC | teknowlogy's market growth forecast. For AI-related services in Germany alone, we expect average annual growth of almost 30% in the years 2020 to 2024. It is currently unclear to what extent the coronavirus crisis will impact this growth scenario. Our qualitative analysis paints a mixed picture. Wherever AI can help automate processes and achieve greater process efficiency with little effort, companies stick to their chosen path and carry out AI projects as planned. Wherever AI projects are intended as a long-term investment, for example in customer services, they are being reconsidered given the general economic uncertainty at present. However, the picture is not really that clear-cut – for example, strongly customer-oriented and digitally sophisticated industries (such as online trade, consumer goods) tend to continue planned AI projects in the CX environment unchanged. In addition, there are also AI projects of strategic importance underway in many companies, which do not promise short-term ROI, but are considered as necessary and differentiating from the competition. These projects will be continued without interruption. An example here are projects for autonomous driving.

However, the high growth rate should not distract from the fact that the overall market is still comparatively small. For 2019, we estimate the total volume of AI-related services (including management consulting, application services, and infrastructure services) at just under EUR 700 million. This may seem high at first glance, but it is put into perspective when compared with the market for SAP services, for example. According to analysis by PAC | teknowlogy, German user companies spent a total of more than EUR 8.3 billion on SAP services. The SAP market includes services for consulting and system integration (C&SI), application management, and hosting services. It is thus 12 times the size of the AI-related services market.

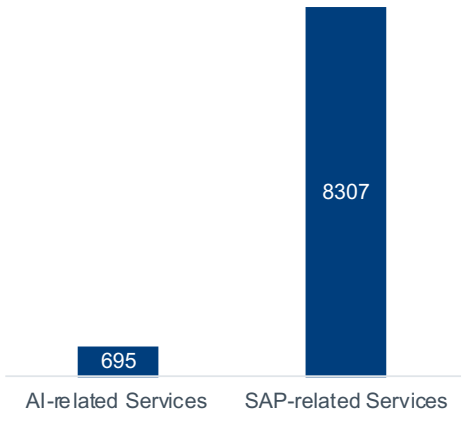

Fig. 2: The market for AI-related services vs. the market for SAP-related services in Germany

Why we have created a provider benchmark for a relatively small market

Given the small size of the market for AI-related services, the question arises of why we have created a PAC INNOVATION RADAR for this market segment.

Size alone is no indicator of a market's importance and attractiveness. It is high growth (see above) that makes it attractive for service providers. Even more important from user companies' perspective is the fact that AI is a relatively new topic and still lacks in transparency. Current projects that are launched with the help of AI technologies often are of strategic significance and deeply disrupt core business processes. It is therefore important for user companies to make an informed decision when selecting a provider, even if the projects are still limited in scope at this stage (compared to SAP transformation projects, for example). With these PAC INNOVATION RADARs on AI-related services, we want to give user companies a tool for decision-making and support them in the preselection process, taking into account type of project (consulting, systems integration, operation), company size, and use case (HCM, CX, IoT, SCM, etc.).

THE TRENDS IN DETAIL

Key findings in AI-related services for production and IoT

Production and IoT are of major significance to the manufacturing industry, which plays a prominent role in Germany. However, possible applications go beyond this, because IoT can also be deployed for networked products of daily use, which is why industries other than manufacturing are also interested in the topic of IoT. Basically, almost all companies can potentially use IoT as long as their business models involve physical goods and where it is worthwhile to digitally complement these products (for example with chips, sensors, and RFID tags) in order to gain better insights into the condition and use of the products. Given such a broad spectrum of possible use cases, it is not surprising that the PAC INNOVATION RADAR on AI-related services for production and IoT had the largest field of participants.

Predictive maintenance

The most common application of AI in production and IoT is predictive maintenance. Here a predictive model is developed on the basis of large volumes of historical and current data in order to detect possible faults at an early stage so that wear parts can be replaced during planned downtimes. AI algorithms are trained using large amounts of data in order to be able to make precise predictions.

Quality assurance

AI-based solutions are also frequently used in quality assurance processes to detect damage, defects, and anomalies in products before they are shipped or before large quantities of rejects are produced. Image recognition methods, machine learning, and neural networks are usually used for this purpose. The range of applications is surprisingly broad, comprising parts for vehicle manufacture, quality inspection in steel, paper, and glass production, aircraft manufacture, and even bridge building, to name but a few interesting use cases from our interviews.

Forecasting

In order to better adapt production to customer needs, many companies are striving for better forecasting of customer requirements. These forecasting systems are closely linked to comparable projects in sales, service, marketing, and logistics, which means that it is not always possible to clearly assign such a project to one of these processes. During our discussions with providers, however, some of them emphasized that AI-related projects for forecasting were initiated by the production departments (e.g. at energy suppliers).

Smart products

Use cases for smart consumer goods that use sensors to report their condition and thus enable a new type of customer service are currently focused on high-priced products, usually cars (and sometimes elevators). Many OEMs are working with service providers (e.g. in the autonomous driving segment) to equip their vehicles with AI-based solutions. An interesting but rarely mentioned example is M2M communication, where intelligent products communicate with each other, machines, or sensors and automatically generate decisions, error messages, or notifications to users.

Digital factory

Examples of completely digitalized and automated production, where downstream processes are also fully integrated and linked with intelligent forecasts of customer demand, and thus of future production output, for instance, have so far only been available as showroom installations – at least among the customer references given by the service providers participating in this PAC INNOVATION RADAR.

Automation is most important

Overall, the evaluation has shown that the majority of AI projects focus on predictive maintenance. This is certainly due to the fact that German manufacturing companies have always attached great importance to increasing machine uptime, and predictive maintenance enables this with IoT solutions. The use of AI is obvious here as well in order to achieve better prediction models for possible failures.

In many companies, automation of manufacturing processes is already very advanced. Some of the examples mentioned here show that further automation is being sought in areas such as quality assurance, back office, and logistics processes. There is likely to be a lot of potential for AI-related services in these areas in the near future.

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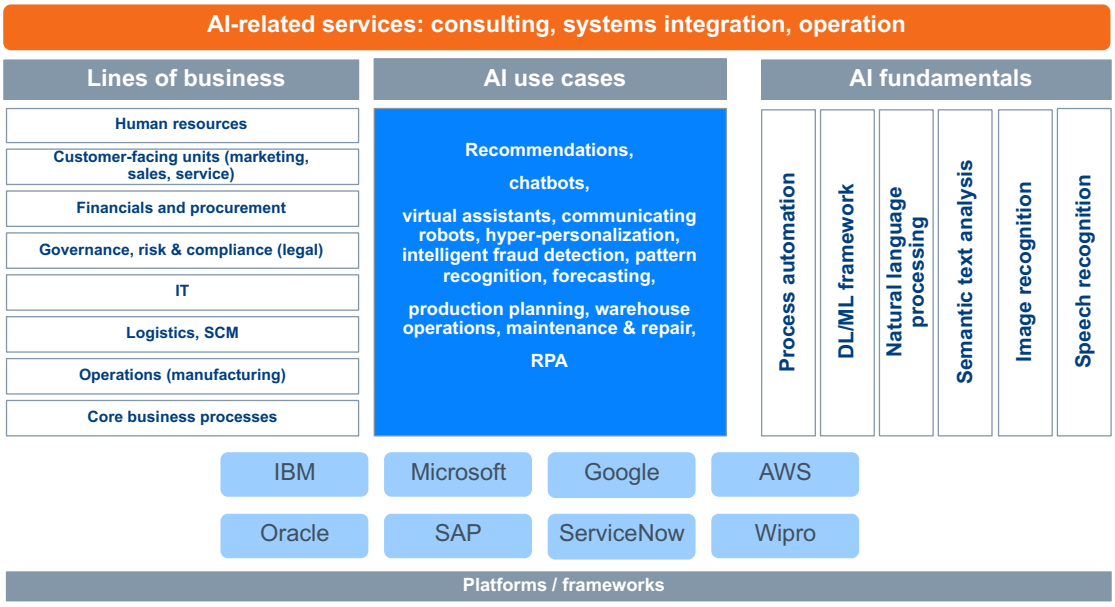

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AI-related Services for HR/HCM	AI-related Services for Sales/Service/Marketing	AI-related Services for Logistics/SCM	AI-related Services for GRC
• Accenture • Atos • Capgemini • Datagroup • Deloitte • IBM • NTT DATA • Sopra Steria	• Accenture • adesso • Alexander Thamm • Arvato Systems • Capgemini • CGI • Datagroup • Deloitte • DXC • IBM • Lufthansa Industry Solutions • Materna • NTT DATA • pmOne • Reply • Sopra Steria • TCS	• Alexander Thamm • All for One • Arvato Systems • Atos • Capgemini • Datagroup • Deloitte • DXC • IBM • Lufthansa Industry Solutions • Materna • NTT DATA • pmOne • Reply • Sopra Steria • TCS • T-Systems	• Accenture • adesso • Alexander Thamm • Arvato Systems • Atos • Deloitte • DXC • IBM • Sopra Steria • TCS

AI-related Services for Financials/Procurement	AI-related Services for Production & IoT	AI-related Services for IT
• Accenture • Alexander Thamm • Datagroup • Deloitte • DXC • IBM • pmOne • Sopra Steria	• Accenture • adesso • Alexander Thamm • All for One • Arvato Systems • Atos • Capgemini • CGI • Datagroup • Deloitte • DXC • Fujitsu • IBM • Lufthansa Industry Solutions • NTT DATA • pmOne • Reply • Sopra Steria • TCS • T-Systems	• Accenture • Arvato Systems • Atos • Capgemini • CGI • Datagroup • Deloitte • DXC • Fujitsu • IBM • Materna • NTT DATA • Sopra Steria • TCS • T-Systems

The concept

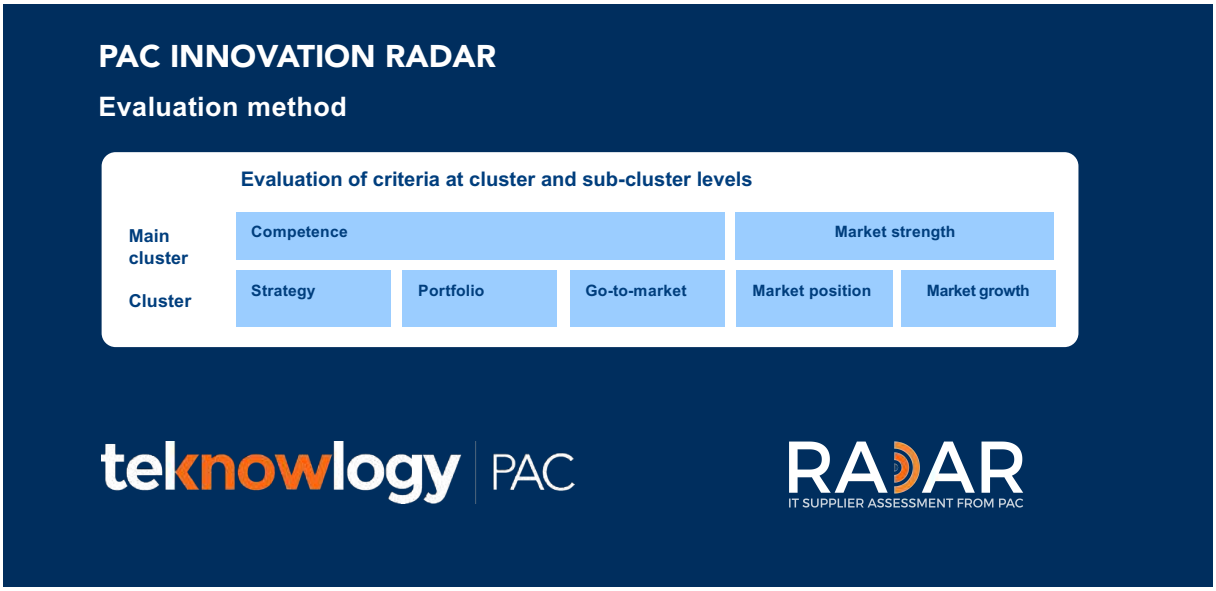

Fig. 5: PAC INNOVATION RADAR – evaluation method

teknowlogy | PAC uses **predefined criteria** to assess and compare the providers within given service segments.

The assessment is based on the report-card score within the peer group of the positioned providers.

This is based on:

- Dedicated face-to-face interviews with the providers about resources, distribution, delivery, portfolio, contract drafting, pricing, customer structure, client references, investments, partnerships, certifications, etc.;
- The analysis of existing teknowlogy | PAC databases;
- Secondary research;
- If applicable, a poll among customers by teknowlogy | PAC.

The provider data is verified by teknowlogy | PAC and any omissions are rectified based on estimates.

If the provider does not participate, the assessment is performed using the proven teknowlogy | PAC methodology, in particular based on:

- Information obtained from face-to-face interviews with the provider's representatives, analyst briefings, etc.;
- An assessment of company presentations, company reports, etc.;
- An assessment of teknowlogy | PAC databases;
- An assessment of earlier PAC (INNOVATION) RADARs in which the provider participated;
- A poll among the provider's customers (as required) on their experiences and satisfaction.

Evaluation criteria

The **general evaluation** is based on the following criteria:

Competence	Market Strength
• Availability of own AI technologies • Certifications for common AI platforms & solutions • Homogeneous coverage of common AI platforms • Coverage of AI fundamentals (e.g. video/speech/ image recognition, semantic text analysis) • Investment in assets (IP, tools, solutions, methods, M&As, etc.) • Overall expertise in business process modernization (cross-sector) • Investment in AI skills (incl. training, certifications, M&As, hiring, etc.) • Dedicated organizational structures for AI-related services • Realized AI use cases at strategy level / C-level • Convincing AI strategy in the view of teknowlogy | PAC • Homogeneous coverage of common RPA platforms	• Significance of operations in AI-related services • Focus on large accounts • International presence in AI-related services • Availability of local AI resources • Significance of consulting and systems integration in AI-related services • Awareness among peers • Significance of business consulting in AI-related services • Focus on medium-sized and small accounts

AI-related services for production & IoT:

Competence	Market Strength
• Breadth of use cases in production & IoT processes (portfolio view) • Overall expertise in production & IoT processes (competencies and experience)	• Implemented reference projects in production & IoT processes

General PAC research method

The following overview describes teknowlogy | PAC's research method for market analysis and key differentiation features.

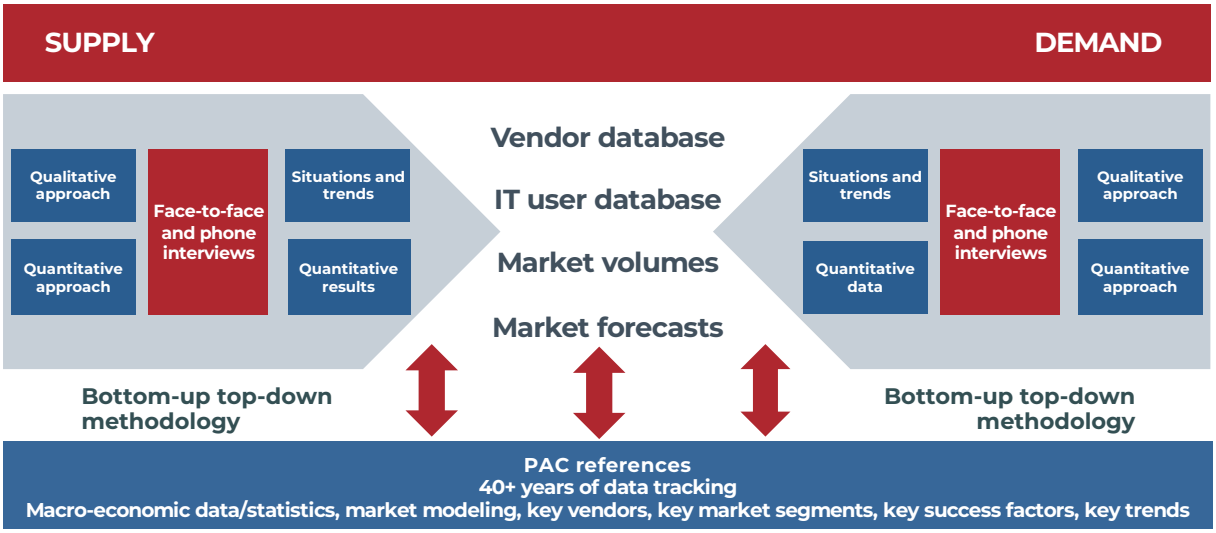

Fig. 6: Description of the PAC methodology

Local research and face-to-face communication are two core elements of teknowlogy | PAC's methodology. In our market studies, we can draw on more than 40 years of experience in Europe.

Positioning within the PAC INNOVATION RADAR

Based on the scores in competence and market strength, the overall score is calculated (calculation: competence score plus market strength score, divided by two). From the resulting overall score, each provider receives their characteristic positioning within the PAC INNOVATION RADAR. Here, the following applies: The closer a provider is to the upper right corner, the closer they are to meeting customers' requirements for that segment.

The classification of providers is based on the overall score:

"Best in Class"	1.0 – 1.9
"Excellent"	2.0 – 2.9
"Strong"	3.0 – 3.9
"Solid"	4.0 – 4.9

Fig. 7: Classification of providers in the PAC INNOVATION RADAR graph (example)

PAC INNOVATION RADAR "AI-RELATED SERVICES FOR PRODUCTION & IOT IN GERMANY 2020"

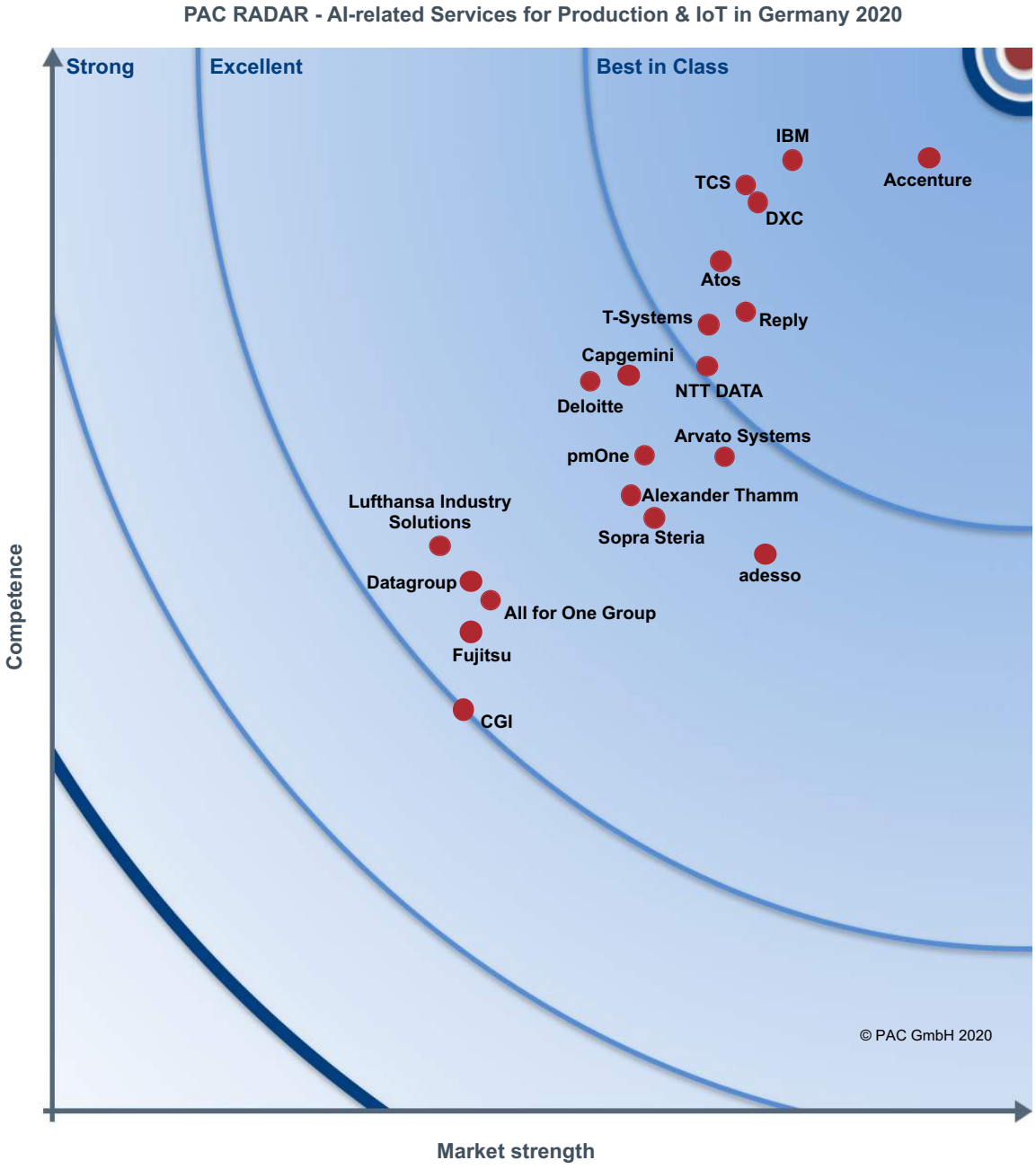

Fig. 8: PAC INNOVATION RADAR AI-related Services for Production & IoT in Germany 2020

REVIEW OF TOP-SEEDED PROVIDER REPLY

Reply

PAC INNOVATION RADAR AI-related Services
for Production & IoT in Germany 2020 **Best in Class**

Cluster	Average	Reply
Relative Market Strength	2.25	1.90
Competence	2.11	1.76
Total Score	**2.16**	**1.81**

Criteria rated as significantly ABOVE AVERAGE (more than 0.75)
• Homogeneous coverage of common RPA platforms • Dedicated organizational structures for AI-related services

Criteria rated as significantly UNDER AVERAGE (more than 0.75)
• Significance of operations in AI-related services

ABOUT TEKNOWLOGY GROUP

teknowlogy Group is the leading independent European research and consulting firm in the fields of digital transformation, software, and IT services. It brings together the expertise of two research and advisory firms, each with a strong history and local presence in the fragmented markets of Europe: CXP and PAC (Pierre Audoin Consultants).

We are a content-based company with strong consulting DNA. We are the preferred partner for European user companies to define IT strategy, govern teams and projects, and de-risk technology choices that drive successful business transformation.

We have a second-to-none understanding of market trends and IT users' expectations. We help software vendors and IT services companies better shape, execute and promote their own strategy in coherence with market needs and in anticipation of tomorrow's expectations.

Capitalizing on more than 40 years of experience, we are active worldwide with a network of 150 experts.

For more information, please visit www.teknowlogy.com and follow us on Twitter or LinkedIn.

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The PAC RADAR is a graphical representation and written analysis of the positioning of various IT providers within a defined market segment at a specific point in time. The positioning and characterization of selected companies within the PAC RADAR is conducted on the basis of an analytical assessment of criteria which PAC previously defined for this analysis.

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