

Digital Innovation & IoT | Europe | 2022

Open Digital Platforms for the Industrial World

SITSI® | Vendor Analysis | PAC INNOVATION RADAR

Leading Providers of
Industrial Platforms in Europe

Management Summary



Lead Analyst:
Arnold Vogt

PAC, August 2022

PAC INNOVATION RADAR GRAPH

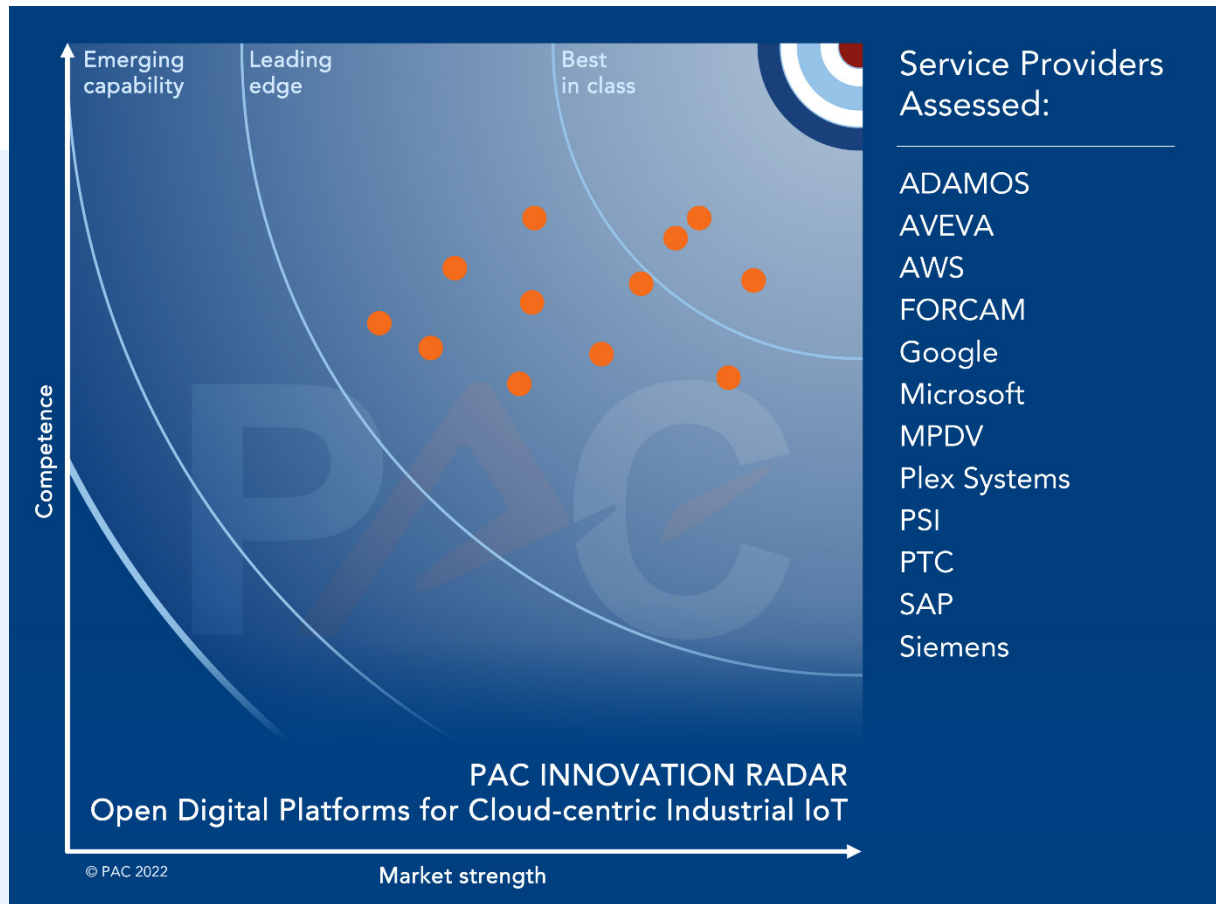


Fig. 1: PAC INNOVATION RADAR graph

INTRODUCTION

Open digital platforms for industrial IoT are the center piece of this analysis

PAC strongly believes that in a high-speed world, no individual application creates a long-term competitive advantage – it is platforms with the ability to develop, deploy, and scale AI-driven applications faster that make a difference. The same is true for the industrial world. From our perspective, the industrial world needs an agile and efficient software platform for application lifecycle management. To improve agility around application development, low-code capabilities, microservice architectures, and container technology form the relevant technical fundament. To maximize efficiency around large-scale application deployments, automation and self-service capabilities (via an app store model) are relevant aspects.

In the context of industrial IoT, PAC has identified competing concepts in the market to achieve the vision outlined above.

While PLCs (Programmable Logic Controllers) and IPCs (Industrial PCs) are classic examples of processing sensor data directly at the machine edge, with cloud computing the **cloud-centric IIoT model** emerged. This concept allows to move the central part of IoT data processing plus application lifecycle management into the cloud. This basically represents the birth of “IoT”.

Another concept shifts application lifecycle management to the cloud, but the central part of data processing remains at the existing PLC and IPC level. This allows cloud-vendor-agnostic data processing, low latency, compliance with strict data processing regulations, and the unchanged use of already existing IT infrastructures (PLCs and IPCs). Because of these advantages, the concept is especially relevant for machine builders who want to continuously roll out software to their distributed installed bases at customer sites, but also for factory managers who want to protect their existing

investments in IT infrastructures (PLCs/IPC). We refer to this concept as **machine-edge-centric IIoT**.

When clients consider reducing the complexity and cost of their existing, distributed IT infrastructures within the factory, the **factory-edge-centric IIoT** concept can become an interesting alternative. This concept is especially suitable for manufacturing companies with a large and further growing number of complex real-time applications in their factories (like AI-based visual inspection). With rising complexity, Kubernetes plays an increasingly relevant role in the edge context, to automate container orchestration.

New emerging topics

PAC continuously screens the market to identify new emerging topics. As a result, PAC added topics like **platforms for connected workers** and **open-source-based IoT** to this analysis already in the past. In addition, PAC evaluates two more topics for the first time in 2022.

Referring to “**secure, zero-touch industrial IoT deployments**”, PAC evaluates vendors with capabilities to provide integrated, secure and automated solutions to support industrial IoT deployments at a larger scale.

Software-defined vehicles and robots represent the second new topic in this analysis. In the past, the IT architectures of these devices were highly distributed and disconnected from the cloud. Today, software (including AI) has increasingly become the value driver for complex devices like cars, autonomous mobile robots, cobots, and industrial robots. The ambition is to enable complex AI processing at the device edge. In this world, software development has more and more become the core element. To accelerate the time-to-market for new software and to improve the efficiency of software deployments at scale, application lifecycle management has to happen centrally via the cloud.

THE TRENDS IN DETAIL

Industrial IoT – key findings

Around industrial IoT, we see different hybrid concepts (edge and cloud) co-existing in the market today. PAC recommends that clients first choose the right concept and then the right partner. Otherwise, conceptual freedom is limited.

Cloud-centric IIoT – key findings

The vendor landscape comes from two different backgrounds – cloud infrastructure providers and cloud-related application providers. While the hyperscalers are further verticalizing their offerings for the manufacturing industry, joint data models become a key topic for the further evolution of the market.

Machine-edge-centric IIoT – key findings

The vendor landscape still has a strong background in OT/industrial automation, and leading vendors enhance their capabilities with a clear focus on app store models and openness.

Factory-centric IIoT – key findings

Kubernetes is the leading open-source platform for managing containerized workloads and services. Nevertheless, around the industrial edge, Kubernetes is still a newly emerging topic. However, survey data confirm that manufacturing/industrial IoT represents the main use case for Kubernetes at the edge.

Open-source-based IIoT – key findings

Bosch repositioned its Bosch.IO subsidiary and excluded it from doing independent external business – an indicator that Bosch has not been successful in positioning its open-source-based Bosch IoT suite as an independent solution in the market.

Connected workers (AR) – key findings

While we observe different starting points among vendors, it is evident that existing connected worker platforms are increasingly able to offer solutions for multiple use cases. Vendors that do not follow this trend will most likely become irrelevant.

Software-defined vehicles and robots – key findings

The most progress around software-defined vehicles and robots is currently happening in the automotive sector. New vendors in the space of safety-certified RTOS, like Apex.AI or Red Hat, have a clear focus on reaching first safety certification for automotive.

Secure, zero-touch IIoT deployments – key findings

Initial vendors are cloud providers who have capabilities around IoT operating systems and edge hardware. Also, hardware providers with capabilities around IoT operating systems and cloud-based IoT platforms. In addition, operating systems providers and providers with dedicated capabilities around eSIMs.

OBJECTIVE OF THE PAC RADAR

What is the PAC RADAR?

The PAC RADAR 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, PAC evaluates and compares providers' strategies, development, and market position in addition to performance and competencies within specific market segments.

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

All providers are evaluated using PAC's proven methodology, which is based on personal face-to-face interviews and a detailed self-disclosure from each provider.

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

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

The provider evaluation, including a market description, is published as a report.

What is the PAC INNOVATION RADAR?

Concept and methodology of the PAC INNOVATION RADAR are similar to those of the traditional PAC RADAR.

While the traditional PAC RADAR focuses on mature market segments, the PAC INNOVATION RADAR, on the other hand, positions providers in new and innovative market segments.

Thus, the focus of the evaluation is on the portfolio, vision, strategy, and early client engagements rather than on existing revenue numbers and resources.

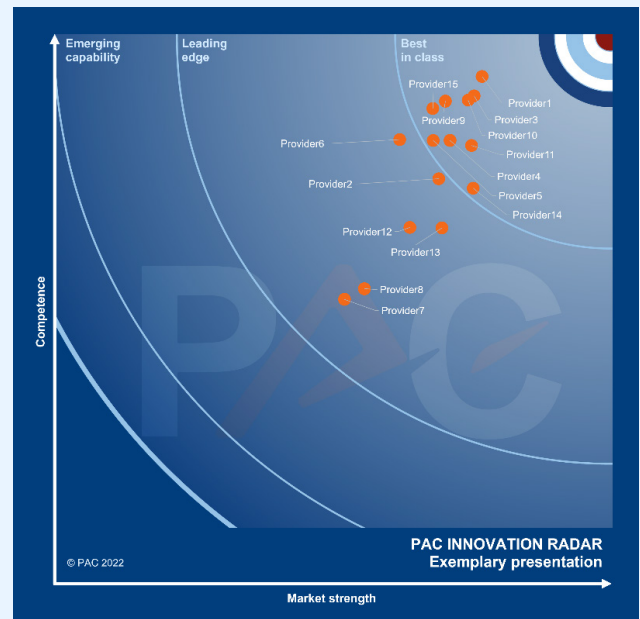


Fig. 2: PAC INNOVATION RADAR graph (exemplary presentation)

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:

- Size of revenues 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 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 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 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 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 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

Open Digital Platforms for Cloud-centric Industrial IoT	Open Digital Platforms for Machine-edge-centric Industrial IoT	Open Digital Platforms for Factory-edge-centric Industrial IoT	Open-source-based industrial IoT
<ul style="list-style-type: none"> • ADAMOS • AVEVA • AWS • FORCAM • Google • Microsoft • MPDV • Plex Systems • PSI • PTC • SAP • Siemens 	<ul style="list-style-type: none"> • B&R (ABB) • Beckhoff Automation • Bosch Rexroth • CONTROLLINO • KUNBUS • Litmus • Mitsubishi Electric • Phoenix Contact • Rockwell Automation • Schneider Electric • Siemens • Wago 	<ul style="list-style-type: none"> • Canonical • Edgeworx • German Edge Cloud • IoTium • Mirantis • Red Hat • SUSE Rancher • VMware • Wind River 	<ul style="list-style-type: none"> • EMQ • Eurotech • Kaa • Kuzzle • Mainflux • MathWorks • OpenRemote • ThingsBoard • UMH Systems

Open Digital Platforms for Connected Workers (AR)	Open Digital Platforms for Software-defined Vehicles and Robots	Open Digital Platforms for Secure Industrial IoT Deployments
<ul style="list-style-type: none"> • Apple • Atheer • AWS • Diota • Google • Librestream • Microsoft • oculavis • PTC • Scope AR • SightCall • TeamViewer 	<ul style="list-style-type: none"> • Apex.AI • Arm • BlackBerry QNX • Elektrobit • Embedded Office • ETAS • Green Hills • Hightec • Microsoft • Siemens • SYSGO • Wind River • Wittenstein • Zebra Zhixing 	<ul style="list-style-type: none"> • Arm • AWS • Canonical • Eurotech • Giesecke+Devrient (G+D) • Microsoft • NXP • Red Hat • STMicroelectronics • Thales

The concept

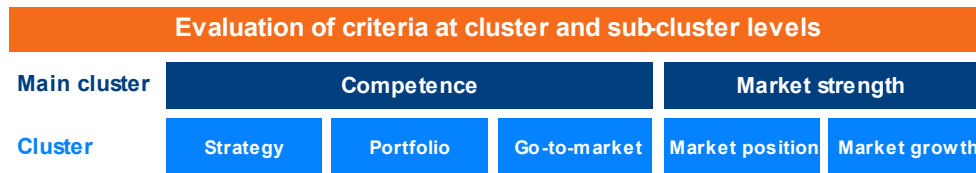


Fig. 3: PAC INNOVATION RADAR – evaluation method

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:

- The provider's detailed self-disclosure about resources, distribution, delivery, portfolio, contract drafting, pricing, customer structure, customer references, investments, partnerships, certifications, etc.;
- If applicable, a poll among customers by PAC;
- The analysis of existing PAC databases;
- Secondary research;
- Dedicated face-to-face interviews as relevant.

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

If the provider does not participate, the assessment is performed using the proven 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 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.

Reissue of published RADARs

The assessments in the PAC INNOVATION RADAR represent an assessment of the providers within the given peer group in the year in which the respective PAC INNOVATION RADAR was published.

The evaluations may not be directly comparable with those of any previous version due to subsequent content modifications. In particular, they do not depict a development of individual providers over time.

Methodological and/or organizational modifications may be made due to changing market conditions and trends and may include:

- Different peer group in the focus of the analysis;
- Modification of individual criteria within clusters and sub-clusters;
- Increased or altered expectations by user companies;
- Adjustment of the weighting of individual criteria.

Evaluation criteria

Open Digital Platforms for Cloud-centric Industrial IoT	Open Digital Platforms for Machine-edge-centric Industrial IoT
<p>Main cluster “Competence”</p> <ul style="list-style-type: none"> • Sub-cluster “Strategy” <ul style="list-style-type: none"> ○ Strategic focus on the topic ○ Strategic activities over the last 12 months ○ Unique selling proposition (USP) • Sub-cluster “Portfolio” <ul style="list-style-type: none"> ○ Application capabilities ○ Platform capabilities ○ Service quality based on client references • Sub-cluster “Expansion” <ul style="list-style-type: none"> ○ Expansion of go-to-market ○ Expansion of use cases & applications ○ Expansion to new technology 	<p>Main cluster “Competence”</p> <ul style="list-style-type: none"> • Sub-cluster “Strategy” <ul style="list-style-type: none"> ○ Strategic focus on the topic ○ Strategic activities over the last 12 months ○ Unique selling proposition (USP) • Sub-cluster “Portfolio” <ul style="list-style-type: none"> ○ Application development ○ Application deployment & management ○ Open ecosystem approach • Sub-cluster “Expansion” <ul style="list-style-type: none"> ○ Expansion of go-to-market ○ Expansion of use cases & applications ○ Expansion to new technology
<p>Main cluster “Market Strength”</p> <ul style="list-style-type: none"> • Sub-cluster “Market Growth” <ul style="list-style-type: none"> ○ Market perception in Europe ○ Momentum • Sub-cluster “Market Position” <ul style="list-style-type: none"> ○ Partner ecosystem ○ Client base and relationships in Europe 	<p>Main cluster “Market Strength”</p> <ul style="list-style-type: none"> • Sub-cluster “Market Growth” <ul style="list-style-type: none"> ○ Market perception in Europe ○ Momentum • Sub-cluster “Market Position” <ul style="list-style-type: none"> ○ Partner ecosystem ○ Client base and relationships in Europe

Open Digital Platforms for Factory-edge-centric Industrial IoT

Main cluster “Competence”

- Sub-cluster “Strategy”
 - Strategic focus on the topic
 - Strategic activities over the last 12 months
 - Unique selling proposition (USP)
- Sub-cluster “Portfolio”
 - Horizontal platform capabilities
 - Industrial IoT capabilities
 - Complementary service capabilities & service quality based on client references
- Sub-cluster “Expansion”
 - Expansion of go-to-market
 - Expansion of use cases & applications
 - Expansion to new technology

Main cluster “Market Strength”

- Sub-cluster “Market Growth”
 - Market perception in Europe
 - Momentum
- Sub-cluster “Market Position”
 - Partner ecosystem
 - Client base and relationships in Europe

Open Digital Platforms for Open-source-based Industrial IoT

Main cluster “Competence”

- Sub-cluster “Strategy”
 - Strategic focus on the topic
 - Strategic activities over the last 12 months
 - Unique selling proposition (USP)
- Sub-cluster “Portfolio”
 - Open-source-based capabilities at the edge
 - Open-source-based capabilities of the IoT platform
 - Complementary services & service quality based on client references
- Sub-cluster “Expansion”
 - Expansion of go-to-market
 - Expansion of use cases
 - Expansion to new technology

Main cluster “Market Strength”

- Sub-cluster “Market Growth”
 - Market perception in Europe
 - Momentum
- Sub-cluster “Market Position”
 - Partner ecosystem
 - Client base and relationships in Europe

Open Digital Platforms for Connected Workers (AR)

Main cluster "Competence"

- Sub-cluster "Strategy"
 - Strategic focus on this topic
 - Strategic activities over the last 12 months
 - Unique selling proposition (USP)
- Sub-cluster "Portfolio"
 - Addressed industrial use cases
 - Portfolio quality based on client references
 - HW-& SW-related interoperability
- Sub-cluster "Expansion"
 - Expansion of go-to-market
 - Expansion of use cases
 - Expansion to new technology

Main cluster "Market Strength"

- Sub-cluster "Market Growth"
 - Market perception in Europe
 - Momentum
- Sub-cluster "Market Position"
 - Partner ecosystem
 - Client base and relationships in Europe

Open Digital Platforms for Software-defined Vehicles and Robots

Main cluster "Competence"

- Sub-cluster "Strategy"
 - Strategic focus on the topic
 - Strategic activities over the last 12 months
 - Unique selling proposition (USP)
- Sub-cluster "Portfolio"
 - Addressed use cases
 - RTOS capabilities
 - Complementary software & services
- Sub-cluster "Partnerships"
 - Strategic partnerships with chip providers
 - Strategic partnerships with OEM's
 - Strategic partnerships with communities

Main cluster "Market Strength"

- Sub-cluster "Market Growth"
 - Market perception in Europe
 - Momentum
- Sub-cluster "Market Position"
 - Partner ecosystem
 - Client base and relationships in Europe

Open Digital Platforms for Secure Industrial IoT Deployments

Main cluster "Competence"

- Sub-cluster "Strategy"
 - Strategic focus on the topic
 - Strategic activities over the last 12 months
 - Unique selling proposition (USP)
- Sub-cluster "Portfolio"
 - Addressed use cases
 - Zero-touch deployment capabilities
 - Integrated security capabilities
- Sub-cluster "Expansion"
 - Expansion of go-to-market
 - Expansion of use cases
 - Expansion of solution

Main cluster "Market Strength"

- Sub-cluster "Market Growth"
 - Market perception in Europe
 - Momentum
- Sub-cluster "Market Position"
 - Partner ecosystem
 - Client base and relationships in Europe

General PAC research method

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

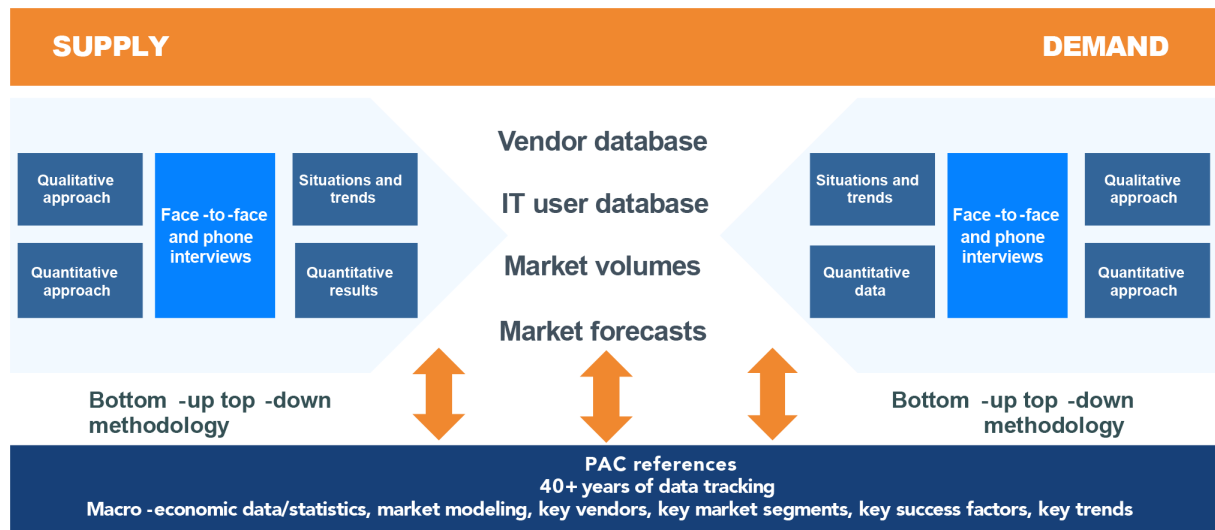


Fig. 4: Description of the PAC methodology

Local research and face-to-face communication are two core elements of 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.



PAC RADAR REPORT LICENSE

PAC INNOVATION RADAR “Open Digital Platforms for the Industrial World”

As part of the report license, content from the PAC RADAR report may only be reproduced either in whole or in part (e.g., the PAC RADAR graphics) for internal purposes (e.g., internal presentations). All content used – even in part – must clearly indicate “PAC” as the source. However, content must not be modified or used out of context of the overall document.

It is not permitted to use the content of the PAC RADAR report for external communication materials (including communication with clients, partners, and the media).

Moreover, copyright conditions for the PAC RADAR apply (see “ABOUT THE PAC RADAR”).



ABOUT THE PAC RADAR

The PAC RADAR is protected by Pierre Audoin Consultants (PAC) GmbH's copyright.

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.

The selection, positioning, and characterization of companies within the PAC RADAR is not subject to any vested interests whatsoever. PAC does not support any providers that are represented in the PAC RADAR, and does not give any recommendations to technology users. The PAC RADAR represents a result from market research only and must not be taken as a recommendation for action.

The contents of the PAC RADAR have been created with utmost diligence and care. However, PAC cannot be held responsible for any errors or omissions.

PAC excludes all express or implied claims, also if derived from warranties with respect to the PAC RADAR report, including any implied warranties of merchantability or fitness for a particular purpose.

The PAC RADAR may only be used for a license fee and with the consent of PAC. Moreover, the use and publication of the contents and the results of the PAC RADAR are subject to the "Terms & Conditions for the Usage of Pierre Audoin Consultants' SITSI® License".

Copyright Pierre Audoin Consultants (PAC) GmbH 2022. All rights reserved.



ABOUT TEKNOLOGY GROUP

teknowlogy Group is your partner of choice for European focused IT market data, insights and advice. 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 50 experts.

For more information, please visit www.teknowlogy.com and follow us on [Twitter](#) or [LinkedIn](#).