



Digital Innovation & IoT | Europe | 2023

# Open Digital Platforms for the Industrial World

SITSI® | Vendor Analysis | PAC INNOVATION RADAR

## Smart logistics services

### Positioning of Bosch Mobility Platform & Solutions

Lead analysts: Arnold Vogt, Mopia Kamdoun  
July 2023

**RADAR**

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## DOCUMENT INFORMATION

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## PAC INNOVATION RADAR GRAPH

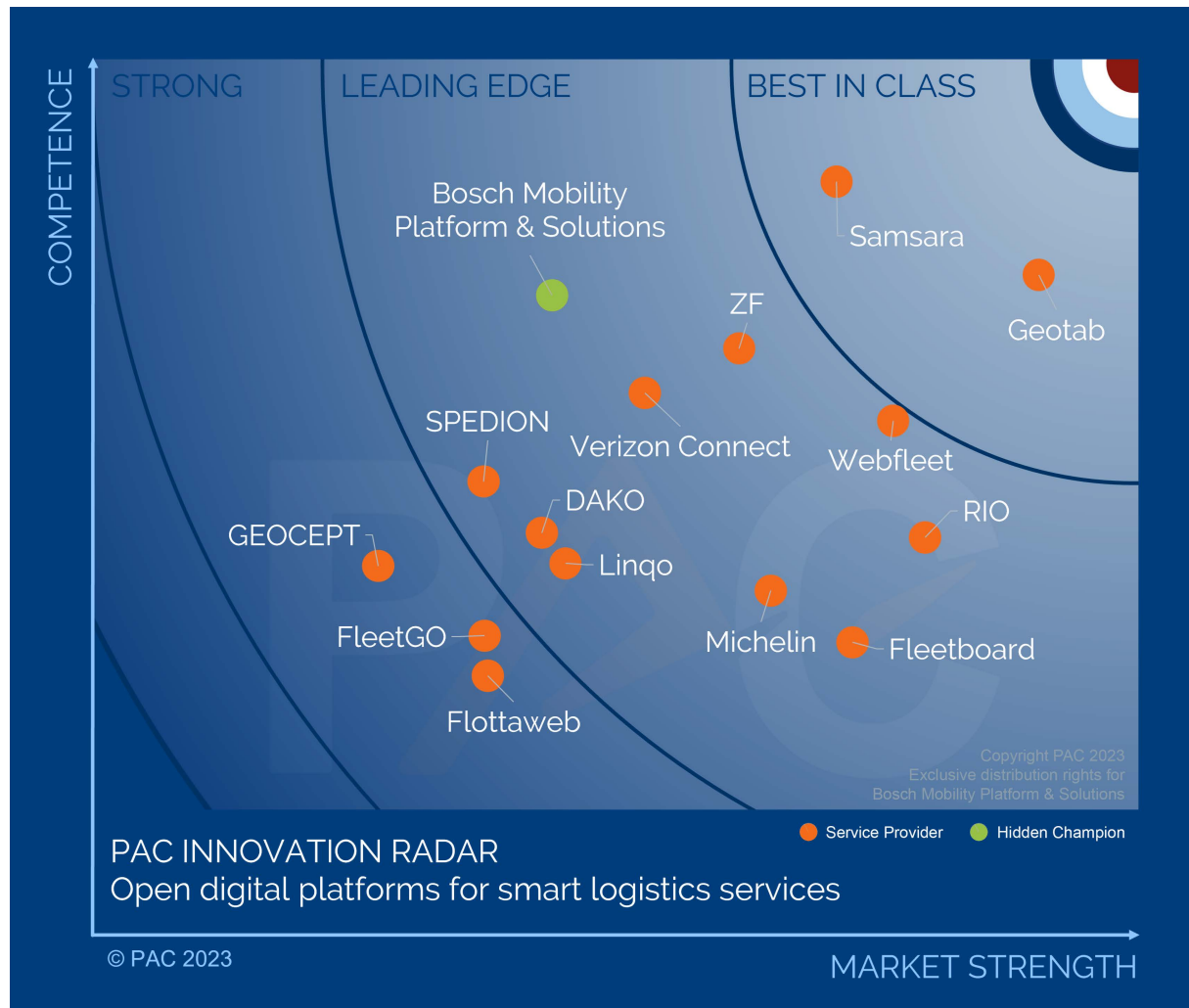


Fig. 1: PAC INNOVATION RADAR graph

The classification of providers is based on the overall score:

|                 |           |
|-----------------|-----------|
| “Best in Class” | 1.0 – 1.9 |
| “Leading edge”  | 2.0 – 2.9 |
| “Strong”        | 3.0 – 3.9 |

# THE STATE OF THE ART: DIGITAL TRANSFORMATION IN TRANSPORT & LOGISTICS

Large parts of the transport & logistics sector (aviation, freight, rail & public transport, and postal services) across Europe have been hit hard by the Covid-19 crisis and by Russia's war against Ukraine. As a result, the short-term focus of most companies has been on resilience and efficiency. In parallel, companies in the transportation sector are well aware that there is no plan B to digital transformation. These are the current trends in this field:

**Investments in digital transformation continue** – Supply chain transparency and resilience have always been major topics on transport companies' agendas. But the pandemic and Russia's war against Ukraine, as well as regulations related to traceability and sustainability within supply chains, have added to the pressure to invest. Many players in the sector have emphasized the importance of their digitalization initiatives in recent years as they have put themselves in a position to quickly adapt to extremely challenging circumstances. And they have become even more aware that stopping investments in digital transformation is no option, even in challenging times. Deutsche Post DHL, e.g., plans investments of €2 billion until 2025 in digitalization to enhance the customer experience, improve the employee experience, as well as increase operational excellence.

**Aiming for data-centric innovations** – At the heart of most investments are strategies to extract more value from data. The sector is among the most data-rich vertical markets, as these companies have a large number of customers (e.g., passengers or e-commerce/parcel clients) and assets (e.g., trains, buses, ships, trucks, planes, stations, ports, warehouses, rail networks). Data from these various sources can be used to either optimize processes within existing business models or create new business models. In particular, Internet of Things (IoT) technologies have begun to play a major role in the digital transformation initiatives of all sub-segments of the transport sector in Europe. Therefore, virtually all major players have adapted their organizations or established dedicated units to drive innovation and digital ecosystems. Very often, digital use cases combine various innovation areas, such as IoT, cloud, analytics, and AI.

**Cloud platforms become the new normal** – Data-led innovation increasingly takes place on cloud platforms. Transport companies have been looking for ways to streamline their operations, cut costs, and make IT consumption more flexible (including the option to downscale, which has recently become relevant). IT infrastructures, whether on-premises or outsourced, are increasingly being replaced by cloud solutions. More and more companies are considering SaaS solutions for specific processes, such as CX, HCM, procurement, and vertical platforms.

**AI drives potential for process automation** – Operational efficiency can be improved in a range of different ways. One way is the automation of internal business processes by using RPA (robotic process automation) and AI (artificial intelligence) technology. Another way are virtual assistants (agents/chatbots), which can improve customer service by providing relevant information to customers and removing pressure from customer support teams. Safety and security are other use cases; for instance, applying AI on top of sensor or video data and enabling intelligent surveillance.

**Training employees in the metaverse happens** – Deutsche Bahn trains its employees with the help of augmented/virtual reality software (allowing trainees to practice safety-critical processes risk-free). Since 2019, approximately 20,000 Lufthansa flight attendants have completed part of their annual training in a virtual aircraft cabin, with VR glasses.

**Exploring quantum computing** – Given complex supply chains, logistics processes, and routes in the transport sector, there are plenty of use cases for future quantum computing-based algorithms. PAC does not expect short-term business value, but transport players can reach a leadership position in this field by engaging in the exploration. One example in this context is SANTANA (Services and Data Network Port of Hamburg), a project by Hamburg Port Authority (HPA) and DAKOSY. The focus is on the development of a digital infrastructure that more closely integrates privately organized logistics and public harbor infrastructures and traffic management.

# MARKET SITUATION – FROM IOT-BASED FLEET MANAGEMENT TO OPEN DIGITAL PLATFORMS FOR SMART LOGISTICS SERVICES

## Vision and relevant use cases

Taking the above-described trends into consideration, we recognize that the vision of digital platforms which provide digital services for different use cases from an open ecosystem of partners is a very promising approach for the transport & logistics industry. As the market environment for transport management software, with many small vendors, is fragmented and complex, we start our analysis with a clear focus. We focus our analysis on IoT-based fleet management services (telematics) for vehicle fleets and explore the ambitions of relevant vendors in this field to become a platform provider in the broader context of smart logistics services. No doubt, IoT-based services to manage vehicle fleets is certainly not a new topic, as vendors of telematic services have addressed this need for many years. Anyhow, we believe that this starting point makes sense for three reasons: First, the cost pressure in this field is quite intense and existing players have to consider three strategies – escape by innovation, stay price-competitive by scaling the business, or focus on a niche market. Second, smart logistics services need data, and IoT is the perfect data source to increase transparency in transportation and to generate more data-driven insights. Third, we see the opportunity to build an app store with services for different use cases, based on a joint IoT data layer. We consider the following relevant use cases in the context of IoT fleet management:

- **Fleet maintenance and condition monitoring** – a real-time approach to identify defects and necessary maintenance tasks in order to optimize costs, ensure safety, and reduce downtime of vehicles.
- **Fleet tracking** – real-time GPS asset tracking to achieve transparency of vehicle location and utilization.
- **Fleet routing and dispatching** – advanced route management tools with real-time insights that help with optimizing driving times and assigning new jobs to the most appropriate vehicle.
- **Digital vehicle access** – An app-based digital key allows multiple drivers to share vehicles without the need for physical key handoffs.
- **Driver coaching** – Benchmarking (potentially with gaming elements) and driver training tools can help promote efficient driving behavior. In addition, real-time feedback to drivers via rules and alerts can help drivers to instantly adapt their behavior. This allows businesses to reduce costs and be more sustainable by actively managing the fleet's fuel consumption and the wear on brakes and tires. The sensible use of electric vehicles to prolong battery life also belongs in this category.
- **Driver safety** – This includes the use of fleet cameras to identify risky driving behavior. AI-powered fleet cameras even predict a potential collision and alert the driver to avoid a vehicle crash.
- **Compliance** – Compliance management is simplified by automated reporting based on vehicle data.

Finally, as we recognize that the integration between IoT-based fleet management services and existing applications for Transport Management Systems (TMS) is highly relevant, we have included this aspect in our analysis. The core elements of a transport management system are the functions for route planning, optimization, and monitoring of transport.



## Market trends & insights around platforms for smart logistics services

When you compare the core functions of a TMS with the above use cases around IoT fleet management, the overlap between both is obvious. It becomes very clear that a platform for smart logistics services (in our definition around IoT fleet management use cases) basically represents a microservice-based TMS with flexible add-on capabilities. This follows the general trend we see in the IT world, which moves away from monolith applications to microservice-based architectures.

The vendor landscape of smart logistics platforms is composed of four different groups of players. Across all these groups, an ongoing wave of acquisitions is consolidating the market. The first group contains independent vendors of telematics and IoT-based fleet management software. From this group we have evaluated vendors such as Geotab, Samsara, SPEDION, DAKO, Linco (acquired by Ruptela in 2021), GEOCEPT, FleetGO, and Flottaweb. For next year, we are planning to add further relevant vendors like Trimble (acquired Transporeon in December 2022 for \$1.9b) and Idem. The second group includes vendors that belong to one of the automotive OEMs, such as Fleetboard (Daimler Truck) and RIO (TRATON GROUP). The OEMs use these solutions mainly as an add-on offering for their own vehicle fleet. For example, the TRATON GROUP leverages the RIO Box, an IoT gateway that has been pre-installed in most MAN trucks since 2018. The RIO cloud platform allows central data management and provides a marketplace with apps and connectors to different TMS solutions. In addition, RIO completed the acquisition of the TMS provider Loom Technologies in 2021. The Daimler Truck subsidiary Fleetboard acquired the TMS provider habbl in 2019 and integrated the solution into its own offering. The third group includes the tier-1 automotive OEMs ZF and Bosch. ZF acquired the fleet management solution Transics FMS via the acquisition of WABCO in 2020. In addition, in 2021 ZF took over the fleet orchestration solution SCALAR from Bestmile. The fourth group includes subsidiaries of tire manufacturers, such as Webfleet (Bridgestone) and Michelin (Masternaut). Webfleet Solutions (known as TomTom Telematics until 2019) was acquired by Bridgestone in 2019 and has since been operating as an independent subsidiary. Telcos that expand their capabilities from connectivity/telematics into IoT fleet management represent the last vendor group. Not all telcos have the ambition to be a stand-alone fleet management provider. Some prefer to focus on telematics services and follow a partnership approach with fleet management software providers. Others, such as Verizon, are more ambitious. Verizon acquired Irish Fleetmatics, an NYSE-listed, SaaS-based fleet management provider, for \$2.4 billion in 2016. In 2018, Verizon combined Fleetmatics with two sister companies, Telogis and Verizon Telematics. The rebranded new entity is called Verizon Connect. To complete the above picture, cloud hyperscalers cannot be considered as fleet management providers today. We observe that AWS has made a first step in this direction by announcing the public preview of AWS IoT FleetWise in November 2021 (general available since September 2022). The service allows to collect vehicle data, harmonize data formats, and transfer it to the cloud in near real time. Today, AWS support other vendors like Verizon Connect and Bosch with their ambitions around IoT-based fleet management. As always this can change in the future and we will keep an eye on this.

## Important capabilities of leading platforms

What makes a platform for smart logistics services attractive to users? First, we want to see that vendors are moving away from monolith software applications towards a data platform with an integrated app store. Second, a strong and growing portfolio of apps for different use cases. Third, advanced marketplace capabilities like instant buying and using of new apps. Fourth, a strong and growing partner ecosystem to become an open platform. Fifth, proof points that the platform is resonating in the market. Sixth, a simplified approach for integrating the platform with existing applications.

## Leading vendors

PAC considers **Geotab** as the market-leading vendor in this space today. Canadian Geotab provides solutions for many different use cases under the fleet management umbrella. They include fleet maintenance, condition monitoring, fleet tracking, fleet routing and dispatching, digital vehicle access, driver coaching, driver safety, and compliance management. With 47,000 customers and 3+ million connected vehicles, Geotab sees itself as one of the leading telematics data platforms in the world. Today, 85% of its connected vehicles are based in North America. However, the company also has strong partnerships to grow further in Europe. Telcos like Telefónica and Vodafone and vehicle manufacturers like Ford, Mercedes, PSA, Renault, and Caterpillar support its go-to-market.

Its portfolio is basically composed of three elements. First, Geotab GO, a vehicle-tracking device that collects vehicle data. Second, MyGeotab, a cloud-based fleet management software that displays all vehicle and driver information. Third, an open and growing marketplace for European clients that today contains around 150 elements such as third-party mobile apps, software add-ins, and hardware add-ons that can be combined with Geotab's platform. In November 2022, Geotab announced "Order Now", a new marketplace function that allows customers in Europe to order solutions directly from the Geotab Marketplace ecosystem. On top of this, Geotab is an innovation leader in adding AI (including large language models) to IoT fleet management.

PAC rates **Samsara** as a best-in-class platform vendor for smart logistics services. The US-based company went public via an IPO in March 2022 and invests heavily in the global growth of its business.

Samsara claims to have deployed more than one million IoT devices globally. It serves more than 20,000 customers from different industries, mainly transportation and logistics. Samsara offers IoT gateways for vehicles and other equipment, and its Connected Operations Cloud to collect IoT data. The Samsara Driver App provides guided workflows and real-time updates to drivers. The app comes with no-code capabilities to build your own workflows and an app marketplace to connect many third-party vehicles and devices to the Connected Operations Cloud. While the European app store today contains around 60 elements, the US version has grown from 100 to 200 over the past 12 months. That is why we expect the European app store to also grow significantly in the near future.

What makes Samsara unique today is the fact that it provides connectors to as many TMS solutions as possible. The US app store currently offers more than 50 ready-to-use TMS integrations. Another USP (unique selling proposition) is that Samsara also addresses logistics-specific IoT use cases beyond the vehicle. Clients can integrate cameras into their warehouses and distribution centers to provide end-to-end transparency in goods transportation via Samsara's Connected Operations Cloud. We believe that cameras in warehouses and distribution centers will play an important role in further process automation. Going forward, these cameras will increasingly be equipped with AI capabilities. This will enable systems to automatically recognize incoming, stored, and outgoing goods.

PAC considers the newly founded Bosch subsidiary, **Bosch Mobility Platform & Solutions GmbH**, as a Hidden Champion in this field. In 2022, Bosch announced that it was going to build a platform for smart logistics services together with its strategic partner Amazon Web Services (AWS). They started a proof-of-concept phase in India. In July 2023, the platform, called Bosch L.OS (Logistics Operating System), became available in Europe. L.OS is a new digital services platform focused on the horizontal integration of data and services for logistics and fleet management processes. It provides end-to-end integration capabilities, a joint data layer, a marketplace (initially with 23 apps in EU), and a single user interface.

Bosch is a true newcomer in this business and is not perceived as a competitor to any vendor in this field so far. This allows Bosch to position itself as a neutral partner for everybody. While the acquisition strategies of telematics and TMS vendors are typically aimed at creating tightly integrated systems in a 1-to-1 mode (1 telematics solution combined with 1 TMS), we acknowledge that independent vendors



of telematics and TMS solutions can only follow a 1-to-many/1-to-any approach (1 telematics solution combined with many or any TMS, and vice versa). This is simply down to the rivalry between established vendors.

PAC strongly believes in the value of platforms and ecosystems with maximum openness. Bosch has the unique chance to create an open system (many-to-many/any-to-any) for telematics and TMS vendors and beyond. Bosch is already thinking beyond IoT fleet management and has added apps to the marketplace that cover digital learning for logistics workers and recruiting for logistics. The challenge ahead is to convince as many partners as possible to join this platform-based digital ecosystem. Two things are essential for this, a fair business model for all participants and a clear plan on how the platform is meant to generate traffic and business for everybody.



## PAC INNOVATION RADAR “OPEN DIGITAL PLATFORMS FOR SMART LOGISTICS SERVICES IN EUROPE 2023”

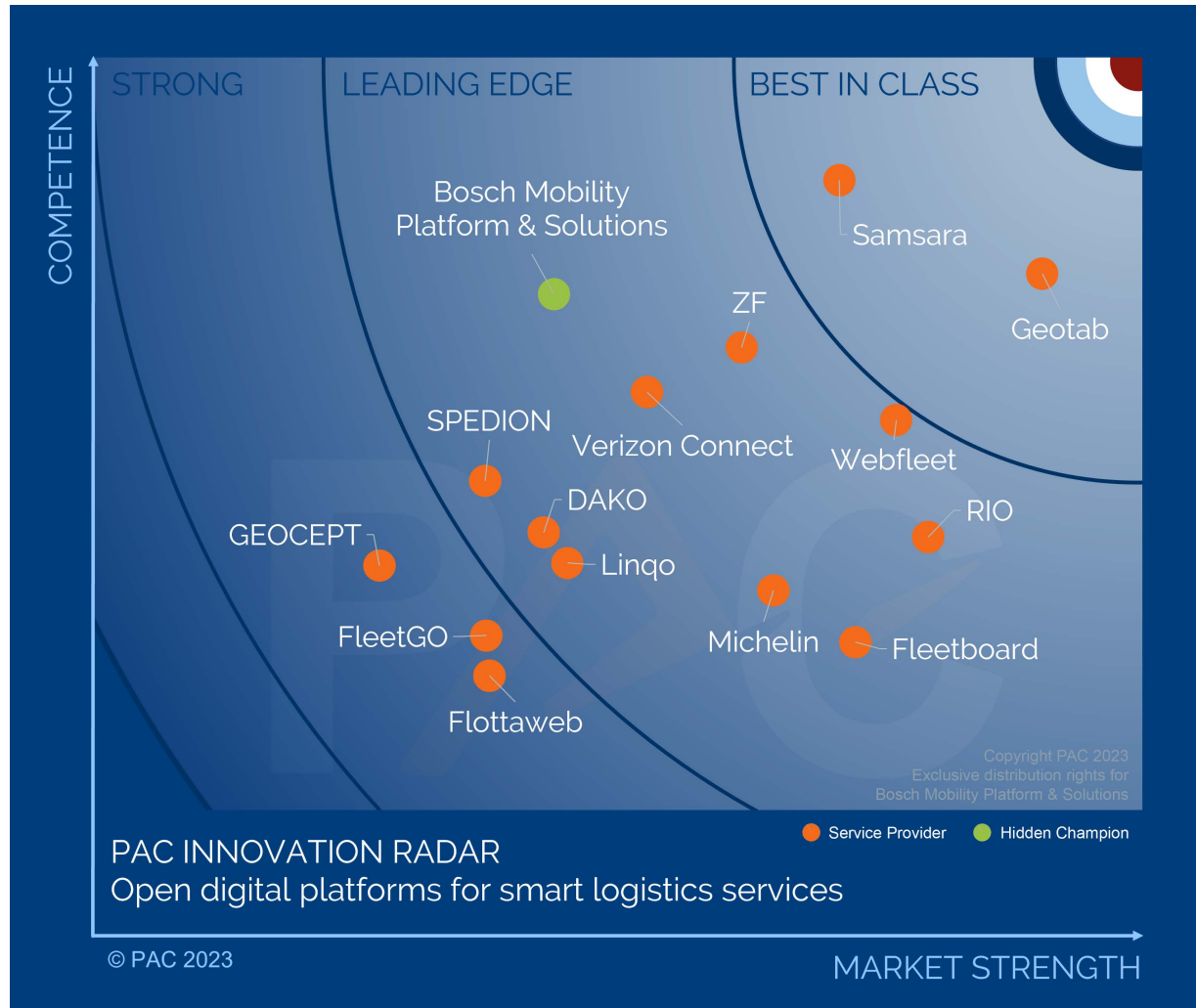


Fig. 1: PAC INNOVATION RADAR Open Digital Platforms for Smart Logistics Services in Europe 2023

|  |                 |           |
|--|-----------------|-----------|
| The classification of providers is based on the overall score: | “Best in Class” | 1.0 – 1.9 |
|  | “Leading edge”  | 2.0 – 2.9 |
|  | “Strong”        | 3.0 – 3.9 |

# REVIEW OF TOP-SEEDED PROVIDER BOSCH MOBILITY PLATFORM & SOLUTIONS

## Bosch Mobility Platform & Solutions

Open Digital Platforms for  
Smart Logistics Services

Leading Edge

| Cluster                  | Average     | Bosch Mobility Platform & Solutions |
|--------------------------|-------------|-------------------------------------|
| Relative Market Strength | 2.68        | 3.25                                |
| Competence               | 2.45        | 1.86                                |
| <b>Total Score</b>       | <b>2.56</b> | <b>2.55</b>                         |

### Criteria rated as significantly ABOVE AVERAGE (more than 0.5)

- Strategic activities in the last 12 months
- Digital transportation management
- Complementary services
- Expansion of go-to-market
- Expansion to new use cases
- Partner ecosystem

### Criteria rated as significantly BELOW AVERAGE (more than 0.5)

- Market perception
- Client base

## 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.

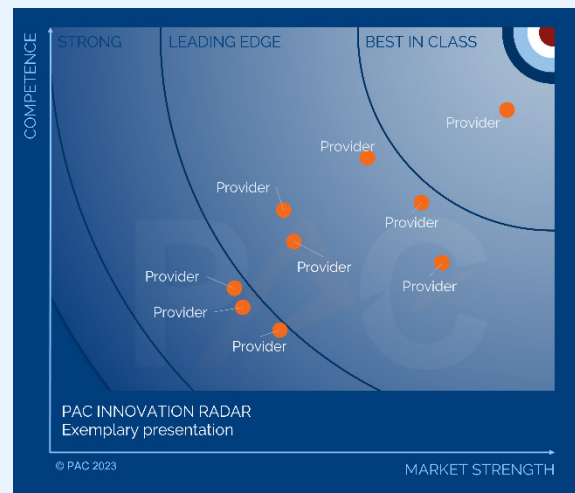


Fig. 2: PAC INNOVATION RADAR graph (exemplary presentation)

## SCOPE & DEFINITIONS

### What is the basic PAC definition of an open digital platform?

A **digital platform** provides digital services for different use cases (more than one) and constantly strives to expand to new use cases and digital services to serve the holistic demand of its targeted client base. To achieve this, digital platform providers also integrate their partner ecosystem into the platform. A technical integration layer and a governance framework are helpful tools to ensure interoperability and fairness across all digital services on the platform. Based on the changing economic conditions, we will also focus more on the resilience of digital platforms in 2023. This applies in particular to profitability and the underlying business model.

An **open digital platform** expands the above concept by various different aspects:

- Openness to adding **digital services** (applications) from 3rd-party vendors – this creates an open ecosystem.
- Openness of the **technical integration layer** in order to integrate different types of hardware and/or software – this is key for industrial IoT.
- Openness regarding the underlying source code – these platforms are based on **open source**.
- Openness to **sharing data** with independent parties – but within a controlled environment.
- Openness of the OT world to leveraging **new concepts from the IT world** (such as containers and app stores).

### What is the specific PAC definition of the different types of open digital platform evaluated in this RADAR?

- **Cloud-centric industrial IoT platforms:** On these platforms, application processing mainly happens in the cloud. In hybrid models, application processing can also happen at the edge, but in a strictly cloud-controlled way (like AWS Outposts). In an advanced model, users can also use a cloud-based app store to choose from a range of integrated IoT applications provided by an open ecosystem of partners (like Industry Clouds from Microsoft).
- **Machine-edge-centric industrial IoT platforms:** These platforms use container technology for simplified application deployment and real-time processing directly at the edge of the machine (PLC, IPC). In hybrid models, the cloud can be used in extension to the edge platform for AI training and as a central app store. In an advanced model, users can choose from a range of different IoT apps provided by an open ecosystem of partners, via an app store.
- **Factory-edge-centric industrial IoT platforms:** These platforms use container technology for simplified application deployment and powerful edge infrastructures for the processing of demanding AI applications across the factory. Container orchestration (Kubernetes, K8s) enables hybrid/multi-cloud models, where the cloud becomes a flexible edge extension – a cloud-provider-independent Kubernetes cluster to run containerized applications.
- **Connected worker (AR) platforms:** These platforms are open to different HW devices (smart glasses) and provide low-code application development, data visualization and a growing number of ready-to-use applications dedicated for industrial workers.
- **Open-source-based industrial IoT platforms:** These platforms are based on open-source technology and enable large-scale IoT deployments across industrial, mobile and other enterprise-related use cases, with a clear focus on IoT security. The use of open source as a basis has three advantages for clients: cost efficiency, vendor independence, and customization capabilities.
- **Manufacturing as a Service (MaaS):** Digital marketplaces for different manufacturing services (such as 3D printing, injection molding or CNC machining) orchestrate the interaction between

service providers and clients and provide additional digital services to both sides of the market (instant quoting and design optimization services to users, and MES capabilities to providers).

- **Smart logistics services:** These platforms contain a growing number of IoT-based services to manage vehicle fleets. In addition, transportation management is increasingly becoming another key element of these platforms, by offering a marketplace and additional services (such as tracking and quotes management) to logistics providers and users.
- **Industrial metaverse:** This topic is strongly centered around the interaction of people with and around digital models of complex industrial operations (simulation of large production lines, logistics processes and entire factories). This RADAR analysis evaluates the current status, vision and approach of vendors from different groups (like plant simulation vendors, providers of rendering engines and cloud hyperscalers) to create 3D models of complex industrial operations for optimization purposes. The intention is to create interactive experiences of realistic, real-time simulations.
- **Sustainability-related platforms:** In this RADAR analysis, we focus on platforms that help companies in the manufacturing industry track, monitor and report on their environmental footprint, but also on platforms that support companies in their endeavors to reduce their emissions by implementing core principles of circularity (i.e., reduce, reuse, remanufacture, refurbish, repair, and recycle). As such, we especially look at platforms that include at least one of the following sustainability-related topics: carbon accounting, ESG reporting, and circular economy.

### How does PAC segment the provider landscape for open digital platforms?

PAC has evaluated the providers of open digital platforms in Europe in nine PAC INNOVATION RADAR segments dedicated to specific use cases:



Fig. 3: Overview of the nine PAC INNOVATION RADAR reports on open digital platforms

### How will the providers be matched to the different types of open digital platform?

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



# 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 players in the segment under consideration.

## Considered providers by segment

| Open Digital Platforms for Industrial Cloud Applications | Open Digital Platforms for Industrial Edge Management | Open Digital Platforms for Industrial Hybrid/Multi-Cloud Application Management | Open Digital Platforms for Manufacturing as a Service |
|--|---|---|---|
| ABB  | AVEVA   | ABB   | Dassault Systèmes                                     |
| AVEVA  | Bosch Rexroth   | Canonical   | Facturee  |
| AWS  | FLECS   | Critical Manufacturing  | Fast Radius   |
| Google   | Foundries.io  | D2iQ  | Fictiv  |
| IFS  | Hilscher  | Edgeworx  | Hubs  |
| Microsoft  | Litmus  | German Edge Cloud   | Jellypipe   |
| Plex Systems   | Phoenix Contact                                       | Mirantis  | PROTIQ  |
| PSI  | Rockwell Automation                                   | Platform9   | Replique  |
| SAP  | Siemens   | Red Hat   | Xometry   |
| Siemens  | TTTech Industrial                                     | SUSE Rancher  |   |
|  |   | VMware  |   |
|  |   | Wind River  |   |

| Open Digital Platforms for Connected Workers (AR) | Open-source-based Industrial IoT | Open Digital Platforms for Smart Logistics Services | Open Digital Platforms for the Industrial Metaverse | Open Digital Platforms for Sustainability |
|---|----------------------------------|---|---|---|
| Atheer  | Dianomic                         | Bosch Mobility                                      | AnyLogic  | IBM                                       |
| Augmentir   | EMQ                              | Platform & Solutions                                | AutoMod   | IntegrityNext                             |
| Dassault Systèmes                                 | Eurotech                         | DAKO  | Dassault Systèmes                                   | Microsoft                                 |
| Glartek   | Kaa                              | Fleetboard  | ExtendSim   | OneTrust                                  |
| Help Lightning                                    | Kuzzle                           | FleetGO   | FlexSim   | Oracle                                    |
| Librestream                                       | Mainflux                         | Flottaweb   | ipolog  | Plan A                                    |
| Microsoft   | OpenRemote                       | GEOCEPT   | Lanner  | Salesforce                                |
| oculavis  | ThingsBoard                      | Geotab  | Mitsubishi Electric                                 | SAP                                       |
| PTC   | United Manufacturing Hub         | Linqo   | Rockwell Automation                                 | ServiceNow                                |
| Scope AR  |                                  | Michelin  | Siemens   | Siemens                                   |
| SightCall   |                                  | RIO   | Simio   | SmartHead                                 |
| TeamViewer  |                                  | Samsara   | Simul8  | VelocityEHS                               |
|   |                                  | SPEDION   | Visual Components                                   | Visma                                     |
|   |                                  | Verizon Connect                                     |   | WatchWire                                 |
|   |                                  | Webfleet  |   | Wolters Kluwer                            |
|   |                                  | ZF  |   |   |

## The concept

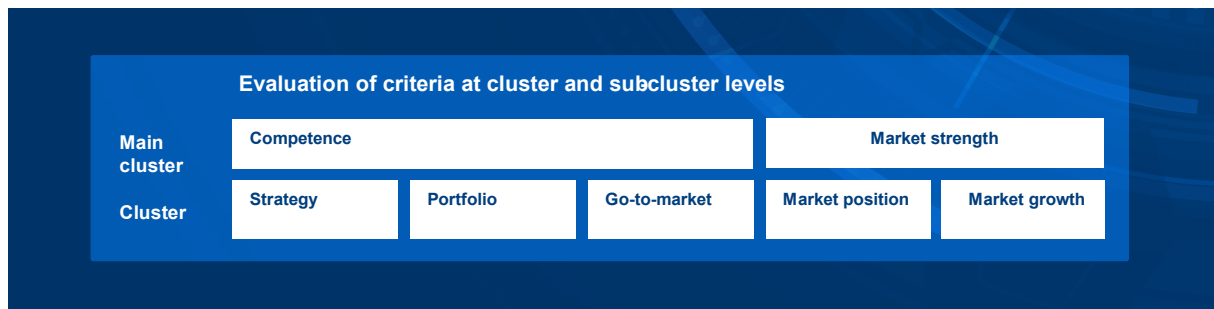


Fig. 4: PAC INNOVATION RADAR – evaluation method

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 Industrial Cloud Applications   | Open Digital Platforms for Industrial Edge Management  |
|--|--|
| <p><b>Main cluster “Competence”</b></p> <ul style="list-style-type: none"> <li>• <b>Sub-cluster “Strategy”</b> <ul style="list-style-type: none"> <li>◦ Strategic focus on the topic</li> <li>◦ Strategic activities in the last 12 months</li> <li>◦ Unique selling proposition (USP)</li> </ul> </li> <li>• <b>Sub-cluster “Portfolio”</b> <ul style="list-style-type: none"> <li>◦ Application capabilities</li> <li>◦ Platform capabilities</li> <li>◦ Service quality based on client references</li> </ul> </li> <li>• <b>Sub-cluster “Expansion”</b> <ul style="list-style-type: none"> <li>◦ Expansion of go-to-market</li> <li>◦ Expansion of use cases &amp; applications</li> <li>◦ Expansion to new technology</li> </ul> </li> </ul> <p><b>Main cluster “Market Strength”</b></p> <ul style="list-style-type: none"> <li>• <b>Sub-cluster “Market Growth”</b> <ul style="list-style-type: none"> <li>◦ Market perception in Europe <ul style="list-style-type: none"> <li>◦ Awareness</li> <li>◦ Image</li> </ul> </li> <li>◦ Ability to grow <ul style="list-style-type: none"> <li>◦ Agility</li> <li>◦ Momentum</li> </ul> </li> </ul> </li> <li>• <b>Sub-cluster “Market Position”</b> <ul style="list-style-type: none"> <li>◦ Partner ecosystem <ul style="list-style-type: none"> <li>◦ Size and quality of partner ecosystem</li> <li>◦ Activities in relevant communities</li> </ul> </li> <li>◦ Client base and relationships in Europe <ul style="list-style-type: none"> <li>◦ Client base in Europe</li> <li>◦ Client relationships in Europe</li> </ul> </li> </ul> </li> </ul> | <p><b>Main cluster “Competence”</b></p> <ul style="list-style-type: none"> <li>• <b>Sub-cluster “Strategy”</b> <ul style="list-style-type: none"> <li>◦ Strategic focus on the topic</li> <li>◦ Strategic activities in the last 12 months</li> <li>◦ Unique selling proposition (USP)</li> </ul> </li> <li>• <b>Sub-cluster “Portfolio”</b> <ul style="list-style-type: none"> <li>◦ Application development</li> <li>◦ Application deployment and management</li> <li>◦ Open ecosystem approach</li> </ul> </li> <li>• <b>Sub-cluster “Expansion”</b> <ul style="list-style-type: none"> <li>◦ Expansion of go-to-market</li> <li>◦ Expansion of use cases &amp; applications</li> <li>◦ Expansion to new technology</li> </ul> </li> </ul> <p><b>Main cluster “Market Strength”</b></p> <ul style="list-style-type: none"> <li>• <b>Sub-cluster “Market Growth”</b> <ul style="list-style-type: none"> <li>◦ Market perception in Europe <ul style="list-style-type: none"> <li>◦ Awareness</li> <li>◦ Image</li> </ul> </li> <li>◦ Ability to grow <ul style="list-style-type: none"> <li>◦ Agility</li> <li>◦ Momentum</li> </ul> </li> </ul> </li> <li>• <b>Sub-cluster “Market Position”</b> <ul style="list-style-type: none"> <li>◦ Partner ecosystem <ul style="list-style-type: none"> <li>◦ Size and quality of partner ecosystem</li> <li>◦ Activities in relevant communities</li> </ul> </li> <li>◦ Client base and relationships in Europe <ul style="list-style-type: none"> <li>◦ Client base in Europe</li> <li>◦ Client relationships in Europe</li> </ul> </li> </ul> </li> </ul> |

## Open Digital Platforms for Industrial Hybrid/Multi-Cloud Application Management

### Main cluster “Competence”

- **Sub-cluster “Strategy”**
  - Strategic focus on this topic
  - Strategic activities in 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 technologies

### Main cluster “Market Strength”

- **Sub-cluster “Market Growth”**
  - Market perception in Europe
    - Awareness
    - Image
  - Ability to grow
  - Agility
  - Momentum
- **Sub-cluster “Market Position”**
  - Partner ecosystem
  - Size and quality of partner ecosystem
  - Activities in relevant communities
  - Client base and relationships in Europe
    - Client base in Europe
    - Client relationships in Europe

## Open Digital Platforms for Manufacturing as a Service (MaaS)

### Main cluster “Competence”

- **Sub-cluster “Strategy”**
  - Strategic focus on the topic
  - Strategic activities in the last 12 months
  - Unique selling proposition (USP)
- **Sub-cluster “Portfolio”**
  - Addressed use cases
  - Services for buyers
  - Services for suppliers
- **Sub-cluster “Expansion”**
  - Expansion of go-to-market
  - Expansion of services for buyers
  - Expansion of services for suppliers

### Main cluster “Market Strength”

- **Sub-cluster “Market Growth”**
  - Market perception in Europe
    - Awareness
    - Image
  - Ability to grow
  - Agility
  - Momentum
- **Sub-cluster “Market Position”**
  - Partner ecosystem
  - Size and quality of partner ecosystem
  - Activities in relevant communities
  - Client base and relationships in Europe
    - Client base in Europe
    - Client relationships in Europe

## Open Digital Platforms for Connected Workers (AR)

### Main cluster “Competence”

- **Sub-cluster “Strategy”**
  - Strategic focus on this topic
  - Strategic activities in 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 to new use cases
  - Expansion to new technology

### Main cluster “Market Strength”

- **Sub-cluster “Market Growth”**
  - Market perception in Europe
  - Awareness
  - Image
  - Ability to grow
  - Agility
  - Momentum
- **Sub-cluster “Market Position”**
  - Partner ecosystem
  - Size and quality of partner ecosystem
  - Activities in relevant communities
  - Client base and relationships in Europe
  - Client base in Europe
  - Client 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 in 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 to new use cases
  - Expansion to new technology

### Main cluster “Market Strength”

- **Sub-cluster “Market Growth”**
  - Market perception in Europe
  - Awareness
  - Image
  - Ability to grow
  - Agility
  - Momentum
- **Sub-cluster “Market Position”**
  - Partner ecosystem
  - Size and quality of partner ecosystem
  - Activities in relevant communities
  - Client base and relationships in Europe
  - Client base in Europe
  - Client relationships in Europe



## Open Digital Platforms for Smart Logistics Services

### Main cluster “Competence”

- **Sub-cluster “Strategy”**
  - Strategic focus on this topic
  - Strategic activities in the last 12 months
  - Unique selling proposition (USP)
- **Sub-cluster “Portfolio”**
  - Digital services for vehicles and drivers
  - Digital transportation management
  - Complementary services
- **Sub-cluster “Expansion”**
  - Expansion of go-to-market
  - Expansion to new use cases
  - Expansion to new technology

### Main cluster “Market Strength”

- **Sub-cluster “Market Growth”**
  - Market perception in Europe
  - Awareness
  - Image
  - Ability to grow
  - Agility
  - Momentum
- **Sub-cluster “Market Position”**
  - Partner ecosystem
  - Size and quality of partner ecosystem
  - Activities in relevant communities
  - Client base and relationships in Europe
  - Client base in Europe
  - Client relationships in Europe

## Open Digital Platforms for the Industrial Metaverse

### Main cluster “Competence”

- **Sub-cluster “Strategy”**
  - Strategic focus on the topic
  - Strategic activities in the last 12 months
  - Unique selling proposition (USP)
- **Sub-cluster “Portfolio”**
  - Addressed use cases
  - Real-time 3D & low-code capabilities
  - Complementary services & pricing
- **Sub-cluster “Expansion”**
  - Expansion of go-to-market
  - Expansion to new use cases
  - Expansion to new technology

### Main cluster “Market Strength”

- **Sub-cluster “Market Growth”**
  - Market perception in Europe
  - Awareness
  - Image
  - Ability to grow
  - Agility
  - Momentum
- **Sub-cluster “Market Position”**
  - Partner ecosystem
  - Size and quality of partner ecosystem
  - Activities in relevant communities
  - Client base and relationships in Europe
  - Client base in Europe
  - Client relationships in Europe

## Open Digital Platforms for Sustainability

### Main cluster “Competence”

- **Sub-cluster “Strategy”**
  - Strategic focus on this topic
  - Strategic activities in the last 12 months
  - Unique selling proposition (USP)
  - Go-to-market
- **Sub-cluster “Portfolio”**
  - Addressed use cases
  - Data management
  - Addressed customer types
  - Complementary services
- **Sub-cluster “Expansion”**
  - Expansion of go-to-market
  - Expansion to new technologies
  - Expansion to new customer types
  - Expansion to new use cases

### Main cluster “Market Strength”

- **Sub-cluster “Market Growth”**
  - Market perception
  - Momentum
  - Growth
- **Sub-cluster “Market Position”**
  - Partner ecosystem
  - Client base and relationships in Europe
  - Participation in relevant consortia and industry groups
  - Expansion of partner ecosystem
  - Expansion of client base in Europe

## General PAC research method

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

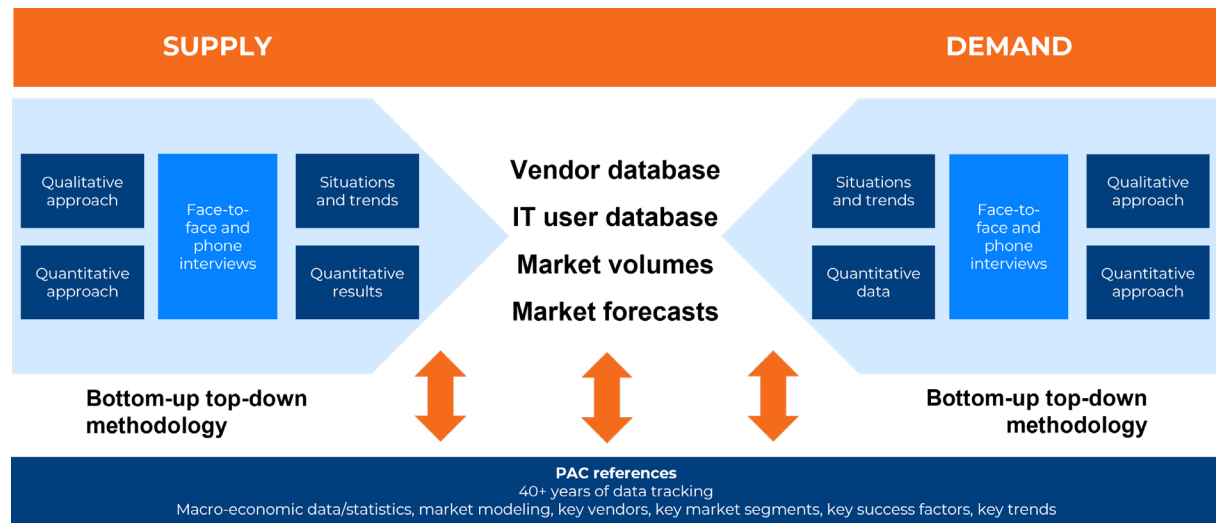


Fig. 5: Description of the PAC methodology

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.

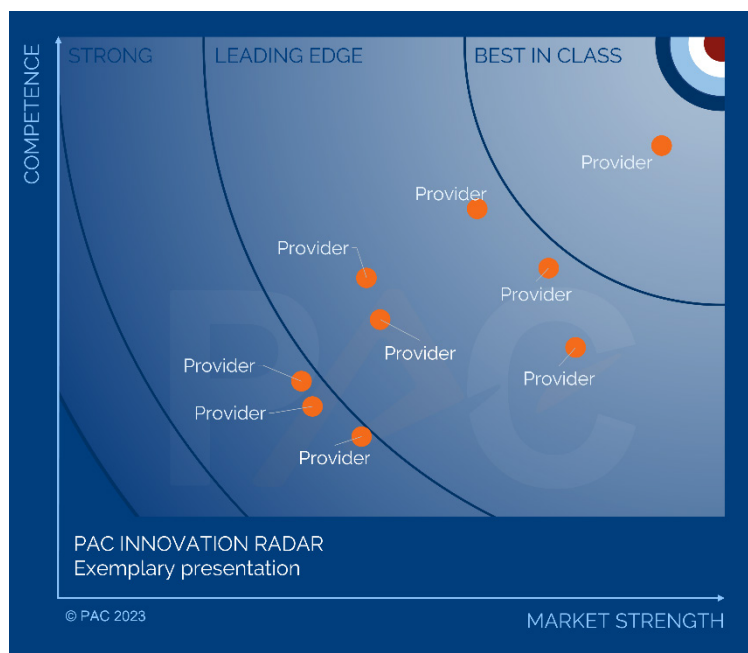
## Positioning within the PAC INNOVATION RADAR

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.

The classification of providers is based on the overall score:

|                 |           |
|-----------------|-----------|
| "Best in Class" | 1.0 – 1.9 |
| "Leading edge"  | 2.0 – 2.9 |
| "Strong"        | 3.0 – 3.9 |

Fig. 6: Classification of providers in the PAC INNOVATION RADAR graph (example)



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