

Magic Quadrant for Indoor Location Services, Global

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Complex, evolving use cases (e.g., social distancing) are driving requirements in new and existing markets. Infrastructure and operations leaders should assess vendors based on their capability to meet multiple end-user, indoor location opportunities and their ability to address new use scenarios.

Market Definition/Description

This document was revised on 16 February 2021. The document you are viewing is the corrected version. For more information, see the [Corrections](#) page on gartner.com.

Gartner defines the indoor location service market as the hardware, software and service components that provide indoor location services (also called “blue dot”) to a wide variety of organizations, as well as supporting use cases in a single organization, including:

- Offices
- Malls
- Retail stores
- Hospitals and healthcare facilities
- Manufacturers
- Warehouses
- Industrial environments
- Stadiums
- Transportation hubs (e.g., airports and train stations)
- Museums
- University campus
- Hospitality (e.g., hotels and restaurants)

- Conferences and tradeshow
- Government/public buildings

Indoor location solutions use differing algorithms, techniques, frequencies and architectures to achieve the core functionality of the indoor location market, which is to provide the location of a static/mobile asset or person within 1 meter or 3 feet (see Note 1). These solutions may collect location data by using one or more wireless technologies and radio frequencies, including 125KHz, 13.56MHz, 433MHz, 900MHz, 2.4GHz, 5GHz, Wi-Fi, Bluetooth low energy (BLE) or ultrawideband (UWB), which are integrated into passive, ¹ battery-assisted passive or active ² components.

Indoor location data collection may also use visible light communication (VLC), ultrasound, light detection and ranging (lidar), geomagnetism, or any technology or combination of technologies to determine location. In addition, an increasing number of vendors have added camera sensors to supplement sensor detection, especially for use cases such as people counting and access control. Finally, the integration of location engines with radio frequency identification (RFID) systems create the added benefit of knowing the status information and other characteristics of an asset.

The components of an indoor location service solution may include:

- **Hardware:** Beacons, sensors and supplemental beacons, tags, gateways, fixed readers, cameras, Wi-Fi access points and other components collect location data.
- **Software:** Location engines collect data from the hardware components and provide a publicly available northbound API to communicate x-y coordinates. Location engine services may be located on-premises or in the cloud, as well as on-device.
- **Management Applications:** These applications monitor and provide the status of all hardware components required for the solution.

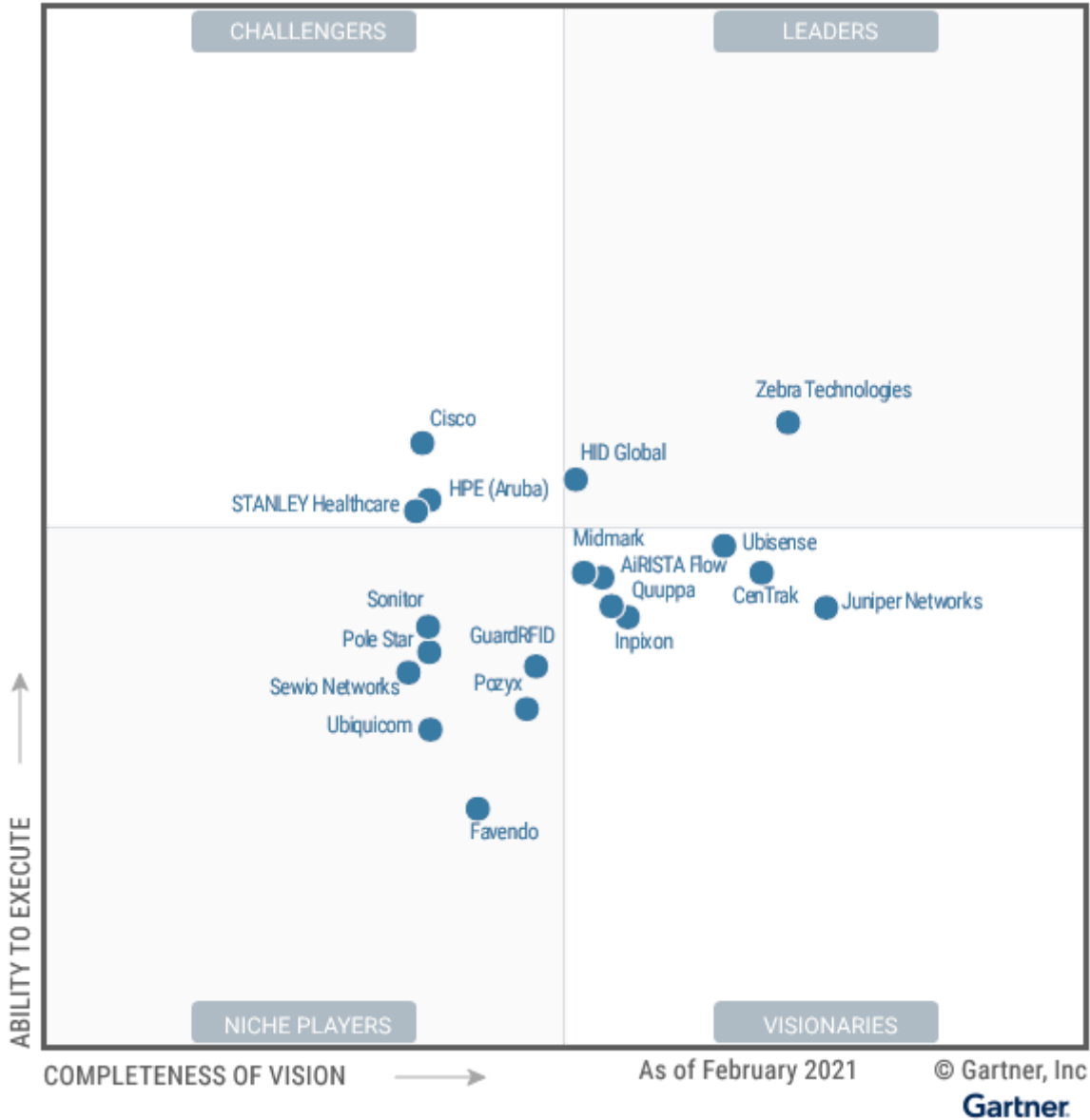
These components are used to address six major indoor location service usage scenarios in the market, including:

1. Static/fixed-asset monitoring applications
2. Mobile assets using beacons to address zonal requirements
3. Mobile/fixed assets with real-time location requirements
4. People tracking
5. Critical-asset tracking
6. Peer-to-peer distancing

This research does not evaluate mapping applications, wayfinding applications, or vertical market application or software development kits (SDKs) that use the indoor location service coordinates.

Magic Quadrant

Figure 1: Magic Quadrant for Indoor Location Services, Global



Source: Gartner (February 2021)

Vendor Strengths and Cautions

AiRISTA Flow

AiRISTA Flow is a Visionary in this Magic Quadrant. AiRISTA Flow delivers real-time location system (RTLS) functionality via its Unified Vision Solution, its own (people and asset) tags (including third-party devices), using Wi-Fi, BLE, IR and UHF/HF RFID technologies that provide as good as submeter accuracy. AiRISTA Flow’s solution integrates with third-party infrastructures, as well as many ERP and health record applications. AiRISTA Flow serves a global customer base across different verticals.

Strengths

- **Market Experience:** AiRISTA Flow is an experienced vendor that offers a range of sensors, tags and infrastructures for deploying location solutions in healthcare, industrial and hospitality for more than 10 years.
- **Wide Range of Technologies and Bluetooth Low Energy (BLE) Precision:** AiRISTA Flow supports a wide range of technologies, including HF/UHF for critical-asset tracking. Its 5.1 BLE latest-generation tags achieve up to submeter location accuracy, including x/y/z-axis information using angle of arrival (AOA).
- **Outdoor Location Capabilities:** AiRISTA Flow supports outdoor-tracking use cases, with supplemental Global Navigation Satellite System (GNSS) integrated into asset tags, in addition to BLE.

Cautions

- **Potential Vendor Lock-In:** For two-way communication and full over-the-air capabilities, the use case may require using the vendor's proprietary asset and people tags.
- **Tracking High-Value Assets:** Clients with the requirement to track high-value assets may need to use third-party hardware (AiRISTA Flow approved partners) with the vendor's software platform.
- **Return-to-Office Solutions:** For specific return-to-office solutions, such as desk reservation, clients will need to turn to AiRISTA Flow's approved partner solutions.

CenTrak

CenTrak, a wholly owned subsidiary of Halma, is again a Visionary in this year's Magic Quadrant. CenTrak delivers an end-to-end RTLS platform to the healthcare sector, including a complete set of hardware software and services. Its RTLS/RFID solutions extend to other verticals, such as correction facilities, hospitality, retail and senior care, leveraging its patented Second Generation Infrared (Gen2IR), passive LF RFID, active and passive UHF RFID, BLE and Wi-Fi providing submeter location accuracy.

Strengths

- **End-to-End Offering for Healthcare Organizations:** CenTrak addresses any patient, staff and asset-tracking use case needed in this vertical, including patient flow, infant protection, staff duress and wayfinding, as well as contact tracing and social distancing during COVID-19.
- **Multimode Functionality:** CenTrak provides clients with the flexibility to choose multiple location technologies, enabling it to address the differing location needs presented by asset management, people tracking or monitoring requirements for static, zonal and RTLS.
- **Strong Partner Ecosystem:** CenTrak's partner program enables integration with other healthcare systems, such as nurse call, electronic health records (EHR) and capacity management. With more than 130 application partners, CenTrak's system ensures that client needs are being met.

Cautions

- **Critical-Asset-Tracking Capabilities:** Although CenTrak can support use cases to prevent lost or stolen equipment using its low-frequency technology, enterprises requiring 433MHz implementations may need to look for a different solution.
- **Deployment Options:** CenTrak's location engine is located on-site when using UHF, whereas the Pulse management application can be located on-premises or in the cloud.
- **Proprietary Overlay Network:** The UHF overlay infrastructure may add costs to the overall solution.

Cisco

Cisco is a Challenger in this Magic Quadrant. Its Cisco DNA Spaces location product provides Wi-Fi, BLE and Zigbee location services over its Catalyst and Meraki infrastructures. Its operations are geographically diversified, and Cisco services clients in all markets from small or midsize businesses (SMBs) to large enterprises. Cisco's compatibility with its wireless installed base enables customers to activate Cisco DNA Spaces. It also continues to invest in its Firehose API, which is used to complement the expansion of its partner ecosystem and device integration.

Strengths

- **Collected Data From Multiple Sources:** Cisco DNA Spaces Connector allows data collected from third-party tags into the DNA Spaces, using Wi-Fi, BLE or Zigbee. Cisco DNA Spaces cloud also collects data from Meraki video and Webex telemetry endpoints.
- **DNA Subscription With Every Cisco Catalyst Access Point:** Cisco enables Cisco DNA Spaces See functionality with each Catalyst access point.
- **Firehose API:** Allows customers and third-party App Center ecosystem partners to access location information and sensor data from Wi-Fi devices and other tested Internet of Things (IoT) devices.

Cautions

- **Meraki Not Included:** Although Cisco DNA Spaces is included with Catalyst, Meraki has additional pricing and is not part of DNA Spaces.
- **Limited Ability Through Partners:** Although ecosystem partners can provide applications, they are limited in their ability to sell DNA Spaces, which limits the availability of the solution.
- **Limited Ability to Track People or Critical Assets:** Cisco supports only third-party Wi-Fi tags and BLE tags. This limits its ability to track people or critical assets.

Favendo

Favendo is a new vendor in this Magic Quadrant and is a Niche Player. The Favendo Commander solution delivers RTLS capabilities within 3 to 5 meters, by leveraging third-party sensors and

tags. Favendo provides submeter accuracy (AOA) and social distancing (BLE) via technology partners. Applications and reporting are also delivered via partners in its key target verticals, including cruise ships, manufacturing and healthcare. Favendo operates in international markets with a focus on Europe and the Americas.

Strengths

- **Specialization in Certain Challenging Environments:** Favendo has several large deployments on cruise liners, addressing use cases in an environment that presents challenges around connectivity and (narrow) spaces in a metal environment. Since the pandemic outbreak, Favendo has engaged in a partnership with DeCurtis to deliver social distancing for staff and travelers.
- **Indoor-Outdoor Use Cases:** Favendo's Commander solution can also address outdoor-indoor transitional location use cases (required often in mining, oil and gas, ports, and warehouses), leveraging long-range (LoRA) and GNSS.
- **Flexible Deployment Options:** Most of Favendo's customers favor an on-premises solution; however, the vendor provides all its capabilities, as well as a cloud-based solution.

Cautions

- **Reliance on Third-Party Applications:** For vertical applications and analytics, Favendo is 100% reliant on third-party applications and capabilities. Enterprises need to verify whether Favendo's location engine can integrate with desired/existing business intelligence (BI) systems and vertical applications.
- **Limited Critical-Asset-Tracking Capabilities:** Favendo supports only 2.4GHz BLE and LoRA; however, enterprises with critical-asset tracking may need to look for a different solution.
- **Limited Static-Asset-Tracking Capabilities:** Enterprises looking for fixed-asset-tracking deployments need to verify whether Favendo can support this.

GuardRFID

GuardRFID is a Niche Player in this Magic Quadrant (in the last iteration of this research, it was not rated). Its AllGuard solution delivers tags that use 433MHz active RFID or Wi-Fi for location solutions. The ability to use wired Ethernet, Wi-Fi or 900MHz RF signaling backhaul provides deployment flexibility for its location engine, workflow rule engine, and its data visualization and analytics applications. GuardRFID delivers services to clients in healthcare, commercial and industrial markets with a focus on North America. GuardRFID offers one of the smallest tag options with a diverse set of tags to deploy indoors, outdoors and in hazardous environments. The company continues to invest in end-to-end solutions in its target markets.

Strengths

- **Smallest Active Tags:** GuardRFID provides a wide variety of tags, including industrial tags rated to meet all use cases in targeted vertical markets.

- **Platform Allows Multiple Frequencies to Gather Location Data:** More options provide additional flexibility and meet more use cases.
- **External API for Third-Party Integration:** Allows integration with additional technology and third-party applications.

Cautions

- **Smaller Sales Organization:** Enterprises must validate product availability in their area, because 80% of sales are in North America.
- **Limited Marketing Communication Voice in the Market:** As a smaller vendor, enterprises may not be aware of the provider's capabilities outside its target markets.
- **Overlay Costs of Infrastructure:** For the 433MHz active RFID solution, a dedicated network infrastructure must be installed to capture data.

HID Global

HID Global (formerly Bluvision) is a Leader in this Magic Quadrant. HID Global's Location Services solution delivers a broad portfolio of tags that use BLE and passive infrared (PiR) for location sensing and range from low-cost, disposable BLE wristbands for healthcare to ATEX-certified tags for industrial solutions. HID Global's Bluzone IoT Platform is cloud-agnostic and uses multiple algorithms to ensure the most accurate location. Its operations are geographically diversified, and HID Global services clients in healthcare, smart building, hospitality and industrial markets. HID Global continues to invest in security and long battery life. Tags can also sense peer-to-peer, which provides social distancing in today's COVID-19 environment.

Strengths

- **Turnkey Solution:** HID's range of tags, in conjunction with Blu-Fi gateways and Bluzone cloud applications, provides a single, scalable architecture that delivers location services.
- **Diverse Algorithms for Best Location Probability:** The location engine uses more than 20 location algorithms to determine the location of assets for each use case.
- **Extensive Ecosystem:** HID's Advantage Partner program provides an extensive ecosystem of partners that support global sales, support and professional services across a broad set of vertical markets.

Cautions

- **Limited People Tracking and Critical-Asset Tracking:** Enterprises tracking people or assets that may be a flight risk may need a different solution.
- **Focus on BLE, Wi-Fi and IR:** The limited capabilities of the current tags mean that enterprises must ensure that business outcomes can be addressed.

- **Availability in the Asia/Pacific (APAC) Region:** With 95% of its revenue in the Americas and Europe, the Middle East and Africa (EMEA), enterprises must ensure that sales and support are available in their geographies.

HPE (Aruba)

HPE (Aruba) is again a Challenger in this Magic Quadrant. Its Meridian solution can leverage the Aruba infrastructure solution, but can also be deployed on any vendor's Wi-Fi infrastructure. Meridian uses Aruba's multivendor AirWave network management application to perform server-side triangulation calculations for Wi-Fi-enabled assets to determine location. In addition, the Meridian SDK allows smart devices to calculate their location, based on triangulation of battery-powered or AP-based BLE beacons. For real-time Wi-Fi location data, Aruba Analytics and Location Engine (ALE) functionality is being integrated into Aruba Central and works in conjunction with Aruba ESP and Airwave to deliver business and space utilization metrics. The location engine can be deployed on-premises or in the cloud. HPE (Aruba) operations are geographically diversified, and the company services clients in a number of markets, including healthcare, corporate enterprise and education markets. HPE (Aruba) has invested in BLE proximity tags and analytics for contact tracing in today's COVID-19 environment.

Strengths

- **End-to-End, Location-Aware Infrastructure:** Aruba Edge Services Platform (ESP) delivers a fully unified infrastructure platform, including Wi-Fi, BLE, or Zigbee tags and integrated IoT gateway capabilities.
- **Able to Use Any Infrastructure:** Aruba Beacons can be deployed alongside any other Wi-Fi infrastructure as overlays to power use cases around proximity campaigns and indoor blue dot locations.
- **Strong Ecosystem:** Aruba's relationship with HID Global and Zebra provide synergy in targeted vertical markets, such as enterprise asset management or industrial manufacturing.

Cautions

- **Limited Ability to Track People or Critical Assets:** HPE (Aruba) supports only Wi-Fi, BLE and Zigbee tags, which limits its ability to track people or critical assets.
- **More Than Proximity May Be Needed:** Some of its location capabilities are limited to proximity, which may not meet use cases that require more-granular location.
- **Some Capabilities May Require Ecosystem Partners:** Enterprises need to be aware that some location capabilities may require additional components or applications from ecosystem partners.

Inpixon

Inpixon is again a Visionary in this Magic Quadrant. Its Indoor Intelligence solution detects wireless signals up to 6GHz that emanate from its own tags, including its new Sensor 5000, or third-party devices. This allows Inpixon to use BLE, Wi-Fi, UWB or cellular signals to determine location and provide robust analytics. The universal API for the Indoor Intelligence platform enables end users to build on their infrastructures by adding Inpixon Sensor Ultra for granular accuracy on secured platforms that lay the foundation for new use cases. Its operations are geographically diversified, and Inpixon services clients in government, healthcare and corporate enterprise markets. Inpixon has invested in a Workplace Readiness solution for pandemic-related challenges in today's COVID-19 environment.

Strengths

- **One Platform:** Inpixon can collect data from multiple technologies, including Wi-Fi, BLE, active RFID, UWB, cameras and cellular.
- **Strongly Positioned in the Public Sector:** Inpixon has a strong presence and brand recognition in government markets.
- **Strong Security Focus:** Inpixon has focused on the security aspects of its location solution, including Secure Shell (SSH) tunneling to sensors and authentication of sensors.

Cautions

- **Limited Sales Channel:** Enterprises should validate the availability of sales and support for their region of the world.
- **Smaller Vendor:** Inpixon continues to grow; however, it is one of smaller vendors in terms of annual revenue.
- **Ecosystem Partners May Be Needed:** Enterprises need to be aware that larger or geographically diverse location projects may require resources from ecosystem partners.

Juniper Networks

Juniper Networks is a Visionary in this Magic Quadrant. Juniper, with the acquisition of Mist Systems, is a global location service provider that delivers real-time location asset and people tracking via a variety of technologies, including BLE, Wi-Fi, UWB, computer vision and lidar. Juniper-Mist provides 1-meter to 2-meter location accuracy, using virtual BLE arrays in combination with machine learning (ML) algorithms and submeter asset visibility with UWB. Juniper-Mist serves a global customer base across various industries, with a strong implementation footprint, specifically in retail, healthcare, education and office spaces.

Strengths

- **Open Architecture:** The indoor location platform is an open, programmable architecture that is built on microservices that enable scalability and open APIs for integration with ecosystem partners.

- **Elimination of Calibration:** Juniper-Mist uses unsupervised ML to deliver high-accuracy location without requiring any manual calibration and/or fingerprinting of the network. The unsupervised ML continually updates the location information for every device type on the Mist infrastructure.
- **Integrated View Approach:** The Marvis SDK delivers a combined view of network (performance) and location data all in one view, including third-party device monitoring providing an integrated approach to solution operational monitoring.

Cautions

- **Potential Vendor Lock-In:** Deployment of the Juniper-Mist indoor location solution requires Mist access points and cloud subscription licenses, which lock end users into a single infrastructure vendor to realize many of the benefits.
- **Vertical Applications:** The vendor's application ecosystem may require enterprises to find application partners to leverage the location information with vertical market experience for use cases that are not covered by existing partnerships.
- **Limited People- or Critical-Asset-Tracking Capabilities:** Although the Juniper-Mist solution offers interoperability with other technologies, enterprises with asset-tracking requirements that are critical may need to look for a different solution.

Midmark

Midmark is Visionary in this Magic Quadrant. Its Midmark RTLS solution optimizes patient experiences by using 433MHz RFID, infrared (IR) signals and Wi-Fi and is planning additional technology options. Badge and tag data is collected by sensors or Wi-Fi access points that, depending on the technology used, communicate with the Midmark RTLS server or edge device directly, or via a network of concentrators and collectors (wired sensory network), or links and gateways (wireless sensory network). Historically, Midmark RTLS has hosted its applications; locally, however, the company is branching into cloud-based products. Its operations are North America-centric, and Midmark focuses its solution and services to clients in healthcare, but is expanding to new markets. Midmark has invested in its Base and Express Level Patient Flow Optimization application for contact tracing and exposure tracking in today's COVID-19 environment.

Strengths

- **Multiple Technology Platforms:** In addition to 433MHz and IR, Midmark also uses Wi-Fi, including Cisco CCX certification with additional technologies being added.
- **Extensive Ecosystem:** Midmark RTLS has more than 30 system integration partners, including Cisco CCX certification.
- **Strong Expertise and Support:** Thirty years of experience in healthcare provides workflow consulting, technical training and clinical education.

Cautions

- **Gaps in Vertical Market Solutions:** Midmark has partners to deploy some requirements in their target verticals (e.g., healthcare).
- **Limited Presence Outside of Healthcare:** Midmark is focused on Acute care and Ambulatory care. Enterprises outside of healthcare may need to look for other solutions.
- **Not Available in EMEA:** Midmark RTLS is not sold to the European market.

Pole Star

Pole Star is a Niche Player in this Magic Quadrant. The vendor was not included in last year's Magic Quadrant. Its NAO suite platform addresses location of mobile phones, real-time asset- and people-tracking use cases across various industries, including healthcare and transportation. Leveraging BLE and Wi-Fi in combination with Long Term Evolution (LTE), GNSS and smartphone sensors, the vendor achieves 1-meter to 3-meter location accuracy. Pole Star provides mobile and server-based location engines, proprietary beacons, tags and an overlay of gateways that connect with the NAO platform (cloud-based or on-premises), which delivers built-in applications and integrates with third-party hardware and applications.

Strengths

- **Long History of Mobile Tracking:** Pole Star is a pioneer in smartphone-based indoor location services; hence, its platform has been developed on that premise, achieving sub-2-meter location accuracy for iOS and Android smartphones, with standard infrastructure density.
- **Indoor-Outdoor Use Cases:** Pole Star delivers people and asset tracking for indoor-outdoor transition situations, adapted to certain environments, such as hospital/corporate campuses or underground/tunnels.
- **Strong Partnership Network:** Pole Star's long-standing partnerships comprise value-added resellers (VARs), system integrators (SIs), OEMs, and application providers that deliver and integrate with the NAO platform.

Cautions

- **Limited People- or Critical-Asset-Tracking Capabilities:** Enterprises with people or critical-asset-tracking requirements may need to look for a different solution.
- **Limited Vertical Market Experience:** Pole Star's application ecosystem may require enterprises to find application partners to leverage the location information with vertical market experience for use cases that are not covered by existing partnerships.
- **Smaller Vendor:** Despite being a pioneer in the indoor location market, this vendor is one of the smaller ones in this Magic Quadrant.

Pozyx

Pozyx is Niche Player in this Magic Quadrant. Its industrial positioning system provides location sensing from Pozyx UWB tags, which communicate through anchors on the network to its positioning server, which provides accuracy from 10 cm to 30 cm. The Pozyx application can be deployed in an on-premises industrial computer or in the cloud. Its operations are global and focuses on clients in manufacturing, automotive and agriculture. Pozyx has invested in social distancing in today's COVID-19 environment, as well as its e-ink tag and updates to its analytics module during the past 12 months.

Strengths

- **Industrial Grade:** The Industrial Positioning Solutions offer submeter positioning with IP66-rated components in industrial environments.
- **Open API:** Pozyx has an open interface that allows integration with third-party applications.
- **Innovative Tag Development:** A new e-ink tag can display QR codes and additional information to automate asset identification and reduce the paper trail in manufacturing processes.

Cautions

- **Limited Ability to Track People or Critical Assets:** Pozyx supports only UWB and BLE tags, which limits its ability to track people or critical assets.
- **EMEA-Focused:** Enterprises not in EMEA, where 75% of solutions are implemented, may have difficulty deploying Pozyx.
- **Targeted to Industrial Customers:** Enterprises deploying solutions outside the targeted industrial markets may need to look for different solutions.

Quuppa

Quuppa is a Visionary in this Magic Quadrant. The Quuppa Intelligent Locating System uses AOA and angle of departure (AOD) methodology, together with advanced proprietary algorithms to deliver asset and people tracking at centimeter-level accuracy. The Quuppa system can be configured in proprietary mode, or it can be compatible with the standard BLE technology. The vendor sells mainly through its channel partners (service providers), which deliver the full solution. Quuppa serves a global client base across several industries, including manufacturing, logistics, sports, healthcare and mining.

Strengths

- **High Location Accuracy:** Quuppa's system can provide centimeter-level location accuracy and low latency (100 milliseconds), which enables high accuracy and reliability for critical use cases, such as collision avoidance between humans and machines, social distancing and hand-hygiene compliance.
- **Large Partnership Network:** Quuppa continues to add new partners to its hardware and software ecosystem to provide a wide variety of tags, sensors (including cameras) wearables

and vertically oriented middleware. At the end of 2020, the vendor started to license its AOA/AOD/BLE-based technology to infrastructure hardware OEMs.

- **Critical-Asset Tracking:** Quuppa can address certain critical-asset-tracking use cases, with BLE in combination with camera tracking. Another technology combination is the identification of a user's BLE tag and lidar sensors to detect a human being in (restrictive) access use cases.

Cautions

- **Proprietary Overlay Network:** The Quuppa solution is an overlay infrastructure that works in conjunction with the existing network vendor, but adds complexity and cost.
- **Vertical Applications:** For vertical applications and analytics, Quuppa relies on third-party applications and capabilities. In specific user requirements, enterprises need to verify whether the Quuppa ecosystem can deliver on vertical and analytics applications.
- **Limited People Tracking and Critical-Asset Tracking:** Enterprises with people- or critical-asset-tracking requirements may need to look for a different solution.

Sewio Networks

Sewio Networks is a Niche Player in this Magic Quadrant. Its RTLS Studio senses from Sewio UWB tags, which communicate through anchors on the network to its positioning server and SAGE analytics application. The Sewio solution is typically deployed on-premises, but will have future availability in the cloud. Its operations are global, although the majority of installations are in EMEA. Sewio focuses on smart manufacturing, automotive and oil and gas customers. Sewio has placed its RTLS Studio application in a docker container, which will make it OS-agnostic. It has also worked to create anchors with directional antennas for large coverage areas.

Strengths

- **End-to-End Solution:** Sewio provides the tags, anchors and location applications, which are network- and location-agnostic.
- **Open API:** The RTLS Platform's API is used by ecosystem applications.
- **Sensor Fusion:** The new Leonardo tags include an accelerometer, magnetometer, gyroscope, barometer and thermometer, in addition to UWB information.

Cautions

- **Limited Ability to Track People or Critical Assets:** Sewio only supports UWB tags, which limits their ability to track people or critical assets.
- **Limited Peer-to-Peer Tag Sensing:** The tags do not communicate to each other; however, the location of each tag is determined by the location engine to indicate whether tagged assets are close to each other.

- **Potential Vendor Lock-In:** All tags have a Sewio unique identifier, which is required by anchors, which makes third-party tags difficult to be used in location solutions.

Sonitor

Sonitor is a Niche Player in this Magic Quadrant. Its Sonitor Sense Suite uses ultrasound tags for RTLS. They combine ultrasound with active, low-frequency (125KHz) RFID and Wi-Fi for positioning. Using ultrasound allows Sonitor to support a variety of use cases down to the bay, bed and chair level in a room. The Sonitor location engine is deployed on-premises, but the application suite can be deployed on-premises or in the cloud. Its operations and installations are global, with the majority in the Americas and EMEA. Sonitor's primary focus is on healthcare, specifically focusing on acute healthcare, clinics and long-term care facilities. Sonitor has invested in contact-tracing and social-distancing functionality in today's COVID-19 environment.

Strengths

- **Healthcare Focused:** Sonitor provides a solid location solution in healthcare that leverages its partnership with many global partners, such as Cerner and STANLEY Healthcare.
- **Excellent Zonal Solution:** Sonitor's Sense ultrasound-based RTLS provides a granular, consistent and reliable level of location and positioning accuracy down to room and subroom (i.e., bay, bed and chair) resolution.
- **Continued Investment in Location Technologies:** Sonitor continues to invest in new location technologies, such as Forkbeard, which combines audio and BLE.

Cautions

- **Limited Ability to Track People or Critical Assets:** Sonitor supports only ultrasound, LF and Wi-Fi tags, which limits its ability to track people or critical assets.
- **Targeted Primarily to Healthcare Customers:** Enterprises deploying solutions outside the targeted healthcare markets may need to look for different solutions.
- **Not a Total Solution Provider:** Because Sonitor is a focused solution, enterprises must look for additional components to provide an end-to-end location solution, even in healthcare.

STANLEY Healthcare

STANLEY Healthcare is a Challenger in this Magic Quadrant. It is a pioneer in the 2.4GHz RTLS market that has been delivering solutions to healthcare clients for more than 30 years. The AeroScout Location Engine supports a complete portfolio of tags and sensors designed to meet asset tracking (1-foot to 3-foot accuracy) and people-locating (in-room/in-bed) requirements in any healthcare and senior living environment. STANLEY Healthcare serves a global client base, with a focus on North America.

Strengths

- **Strong End-to-End RTLS Offering for Healthcare:** STANLEY Healthcare has one of the most comprehensive solutions for people and asset tracking for the healthcare industry. The use cases this vendor addresses include infant protection, elder care wander management, patient tracking, staff tracking, and asset location and security. Tag options provide motion, temperature, differential pressure and humidity-monitoring capabilities, as well as location data.
- **Artificial Intelligence (AI) and Fall Prediction in Senior Living:** STANLEY uses ML algorithms in its Foresite solution measuring step gate and movements in and out of bed to learn a resident's particular pattern of movement. This allows the solution to predict when a resident may be more prone to falls.
- **Security:** The vendor's RTLS tag technology has strong security and management capabilities.

Cautions

- **Distance Between Assets:** STANLEY Healthcare uses Bluetooth proximity technology for social-distancing implementations, which may not be as robust as some UWB solutions.
- **Limited RTLS Experience Outside Healthcare:** Although STANLEY Healthcare has a substantial industrial client base especially for asset management and staff duress, STANLEY's move into selling and supporting RTLS solutions in these and other verticals is more recent. Enterprises need to verify whether STANLEY can support required features in other industries, such as manufacturing, higher education and retail, some of which the vendor is targeting.
- **Critical-Asset Tracking:** Although STANLEY can support many use cases in people (safety) tracking, it has less experience with 433MHz implementations.

Ubiquicom

Ubiquicom is a new vendor in this Magic Quadrant and is a Niche Player. Its Ubiquicom Locator and TrackVision Platform delivers a portfolio of asset tags (including third-party tags), third-party sensors, integration with mobile devices and several vertical applications. For RTLS asset- and people-tracking use cases, Ubiquicom provides submeter location accuracy using UWB. Its operations focus on the Italian market, particularly transportation/logistics and manufacturing industry.

Strengths

- **Multitechnology Platform and Integration:** Ubiquicom is location technology-agnostic, supporting many common technologies (e.g., BLE, Wi-Fi, UWB and LoRa) and also adding to it, including sensors (such as lidar). In addition to producing its own hardware, the vendor also has partnerships with a number of tag providers, and is able to incorporate multiple technologies in a single tag to support different use cases (including indoor-outdoor spaces).
- **Track Record of Worker Safety Use Cases:** Ubiquicom has been specifically addressing worker safety issues, such as accident prevention with its telematic product (TrackVision) and man-

down, and mustering with its Locator platform. Its wearable-based, social-distancing and contact-tracing product (Sentinel) has been launched and deployed during the COVID-19 pandemic, using BLE and UWB technology. All of its products are General Data Protection Regulation (GDPR)-compliant.

- **Rich Data Provision and Visualization:** Ubiquicom provides real-time visibility of assets via its TrackVision and other applications. A newly launched analytics product, Synchrono, applies ML algorithms to optimize logistic operations.

Cautions

- **Limited Capabilities for Fixed-Asset Tracking:** Enterprises with requirements of critical-asset tracking and looking may need to use other technologies.
- **Limited Geographic Reach:** At the time of the evaluation for this Magic Quadrant, Ubiquicom's business focus has been its home market, Italy, with expansion to international markets planned to start in 2021.
- **Limited Vertical Focus:** Ubiquicom has developed vertical applications and use cases mainly for industrial environments (e.g., transportation and logistics, manufacturing, oil and gas, and construction). Enterprises need to verify whether Ubiquicom can address (legacy) functionalities in healthcare and other verticals.

Ubisense

Ubisense is a Visionary in this Magic Quadrant. Ubisense's SmartSpace software platform delivers RTLS, based on UWB and other technologies delivering centimeter-level accuracy. SmartSpace is able to take in location feeds from a range of other technologies, including 2.4GHz, GNSS and computer vision. The system integrates with common ERP, MES and IoT systems. Ubisense serves large organizations in the automotive, transportation and military industries.

Strengths

- **Precision and Reliability:** With its UWB system, which calculates location with AOA and TDOA approaches, 3D (x-, y- and z-axis) location is achieved with submeter accuracy (95% confidence) for assets and people. Its low-energy UWB tags have a battery life as long as 15 years. Its recently introduced omnidirectional UWB sensors (360 degrees) reduce the total number of sensors to be deployed, compared with previous generations.
- **AI-Based Performance Monitoring:** The Ubisense RTLS Quality Monitor system uses ML algorithms to detect and alert to any anomalies in performance, including third-party sensors.
- **Contact Tracing/Social Distancing:** Ubisense offers two different technologies/architectures for contact tracing and social distancing. One is based on its UWB/infrastructure-based approach, whereas the other is a lower-cost, 2.4GHz, peer-to-peer implementation.

Cautions

- **Critical-Asset Tracking:** Although Ubisense supports asset tracking in various environments and industries, it has less experience with flight-risk asset use cases and 433MHz implementations.
- **Proprietary Sensors:** Customers that require high-precision UWB technology to support certain use cases will have to use Ubisense Dimension4 sensors (along with Ubisense D4 tags or third-party tags).
- **Specialist Healthcare Use Cases:** Although Ubisense can address several use cases in the healthcare environment, including patient wandering management, fall detection and contact tracing, healthcare providers, such as large hospitals, may have to turn to Ubisense's technology partners for certain specialist use cases.

Zebra Technologies

Zebra Technologies is a Leader in this Magic Quadrant. Its Motionworks platform uses one of the broadest ranges of tags and technologies. The Motionworks solution can collect data from 433MHz tags, 900MHz passive tags, 2.4GHz active tags, BLE tags and Wi-Fi active tags, as well as UWB. The Motionworks solution is typically deployed on-premises or on a Zebra-hosted cloud. Zebra's operations are global, although the majority of installations are in the Americas and EMEA, focusing on manufacturing, transportation and logistics, retail and healthcare. Zebra has invested in contact-tracing and social-distancing functionality for today's COVID-19 environment.

Strengths

- **Multiple Technology Location-Sensing Platform:** The Motionworks platform provides the ability to collect and integrate multiple different technologies to address diverse use cases.
- **Continued Technology Innovation:** Zebra continues to innovate to gather location data, including the addition of computer vision and UWB to the broad portfolio of existing technologies.
- **End-to-End Solution:** Zebra can provide and manage location sensors/receivers, as well as battery-operated data collection devices, as part of a solution that leverages the Zebra Data Services platform for cloud connectivity and analytics.

Cautions

- **Limited Global Channel Availability:** Zebra has only recently allowed channel partners to provide the location platform, in addition to their end-user applications. Enterprises must ensure that the Zebra partner is trained and can support the Motionworks solution.
- **More Than Proximity May Be Needed:** Although Zebra location technologies support full RTLS location, some common Zebra sensor capabilities are limited to proximity, which may not satisfy use cases that require more-granular location.
- **May Be Considered Expensive:** Motionworks Enterprise pricing is positioned for larger-enterprise solutions. SMB enterprises or organizations with smaller location requirements may

need to look at other vendors.

Vendors Added and Dropped

We review and adjust our inclusion criteria for Magic Quadrants as markets change. As a result of these adjustments, the mix of vendors in any Magic Quadrant may change over time. A vendor's appearance in a Magic Quadrant one year and not the next does not necessarily indicate that we have changed our opinion of that vendor. It may be a reflection of a change in the market and, therefore, changed evaluation criteria, or of a change of focus by that vendor.

Added

- Favendo
- GuardRFID
- Pole Star
- Pozyx
- Sewio
- Ubiquicom

Dropped

- Acuity Brands

Inclusion and Exclusion Criteria

Honorable Mentions

Acuity Brands

Acuity Brands is a leader in lighting and controls. It has developed its Atrius platform to provide indoor location solutions, including using BLE integrated into Acuity Brands luminaires, as well as supporting third-party hardware. The Atrius applications with sensory network hardware provide static and zonal asset location capabilities; however, Acuity Brands changed its product positioning and, therefore, is not covered in this Magic Quadrant.

Cloudleaf

Cloudleaf has a mesh underlay platform to the campus network infrastructure that provides indoor visibility and intelligence. Its edge sensors provide real-time location for its supply chain clients. In addition to addressing the static, zonal and RTLS use cases, Cloudleaf introduced its peer-to-peer sensor wristband and Safe2Go application to address COVID-19 social distancing. However, Cloudleaf did not meet the minimum number of customers defined in our inclusion criteria for this Magic Quadrant.

Esri

ArcGIS Indoors offers capabilities to map the interior of an organization’s buildings to support wayfinding, space management, asset management, and safety and security. It provides visitors, workers and building occupants map-centric apps to find people, places, assets, work orders, and other on-site activities and events. ArcGIS Indoors supports Wi-Fi- and BLE-based positioning. It will launch Esri’s IPS technology in 2H21. At the time of this research, Esri did not have the product functionality to meet the minimum inclusion criteria.

Fortinet

Fortinet FortiPresence Analytics is a cloud-based analytics solution designed to use Wi-Fi data to provide data analytics and customer engagement marketing. The solution provides flow analytics and density information, using heat maps. However, the Fortinet solution does not have the product functionality to meet the minimum inclusion criteria for this research.

HERE Technologies

The HERE Indoor platform provides positioning, wayfinding, routing, tracking and geofencing. HERE offers a seamless, end-to-end experience for outdoors and indoors. Moreover, HERE supports HD Indoor Maps, using lidar and 360-imagery technology next to the existing SD Indoor Maps (floor plan, CAD-based). On top of the indoor platform capabilities, HERE offers complete applications for Indoor Parking, Asset Tracking and Last Mile (delivery, pickup and transit). HERE did not have the product functionality to meet the minimum inclusion criteria.

Polte

Polte empowers enterprises with its cloud-based cellular location technology, which addresses indoor and outdoor use cases globally. Polte uses its patented algorithms and cloud-based location engine to provide asset visibility with Powered by Polte 4G and 5G Massive IoT devices. At the time of our research, Polte did not have the minimum number of customers defined by our inclusion criteria.

Evaluation Criteria

Ability to Execute

Table 1: Ability to Execute Evaluation Criteria

Evaluation Criteria ↓	Weighting ↓
Product or Service	High
Overall Viability	Low

Evaluation Criteria ↓	Weighting ↓
Sales Execution/Pricing	Medium
Market Responsiveness/Record	High
Marketing Execution	Medium
Customer Experience	Low
Operations	NotRated

Source: Gartner (February 2021)

Completeness of Vision

Table 2: Completeness of Vision Evaluation Criteria

Evaluation Criteria ↓	Weighting ↓
Market Understanding	High
Marketing Strategy	High
Sales Strategy	Medium
Offering (Product) Strategy	High
Business Model	Medium
Vertical/Industry Strategy	Medium
Innovation	High
Geographic Strategy	NotRated

Source: Gartner (February 2021)

Quadrant Descriptions

Leaders

Vendors in the Leaders quadrant will have demonstrated an ability to fulfill a broad variety of customer requirements through the breadth of its indoor location service solution. Leaders will have the ability to provide complete and differentiating capabilities as part of their indoor location offerings. This includes global service and support. Leaders should have demonstrated the ability to shape the market, maintain strong relationships with their channels and customers, and have no obvious gaps in their portfolios.

Challengers

Vendors in the Challengers quadrant will have demonstrated sustained execution in the marketplace and will have clear and long-term viability in the market, but may not have a complete access layer product portfolio for products or network applications. In addition, Challengers may not have shown the ability to shape and transform the market with differentiating functionality.

Visionaries

Vendors in the Visionaries quadrant demonstrate an ability to increase features in their offerings to provide unique and differentiated approaches to the market. A Visionary will have innovated in one or more of the key areas of its indoor location solution within the enterprise (such as granularity, differing usage scenarios, locating all assets requiring location services or reducing the overall solution costs). The ability to apply differentiating functionality across the entire access layer will affect its position.

Niche Players

Vendors in the Niche Players quadrant demonstrate a near-complete product offering, but may not be able to control development or provide differentiating functionality, because part of the solution is being offered through a strategic partnership, whether it is a hardware component or the location engine. Niche Players may also lack strong go-to-market capabilities that limit their regional or global reach or service capabilities in their product offerings. Niche Players often have deep vertical knowledge and will be an appropriate choice for users in specific vertical markets where they have specialized offerings and knowledge.

Context

Market requirements still vary widely by industry vertical. It has become clear this year that users are looking for more-complete solutions — perhaps even more than ever, due to COVID-19. Return-to-work initiatives are not just to help with social distancing and contact tracing, but should be integrated with space utilization, room booking and facility cleaning on demand. The list becomes even longer, because our clients have shown more interest in integration with access management systems and health screening.

We see requests for end-to-end solutions supporting multiple use cases outside COVID-19-related initiatives. Specifically, in the healthcare sector, this need becomes imminent as end users want a

technology partner with vertical expertise that can provide proper system integration, along with the strong security regime.

Market Overview

As the COVID-19 pandemic has significantly affected the indoor location services market, 2020 has been an exceptional year. Gartner registered between 600 and 800 inquiry requests specifically to discuss contact tracing and social-distancing solutions across all industries and continents. This was driven by implementing safety measures in industrial environments to avoid COVID-19 outbreaks at such workplaces, followed by “return to office” and campus initiatives. The market responded to this, and we saw a flurry of vendors (more than 100) addressing these needs.

All vendors in this Magic Quadrant brought a location technology-based solution for contact tracing and/or social distancing (see [Market Guide for Social Distancing Technology](#)). This also highlighted a new market requirement — peer-to-peer distancing. Although this was used in 2020 to determine the location and distance between two people, we found that it also applied to safety and compliance use cases. In these situations, the location and associated distance of automatic guided vehicles (AGVs) and other assets or people were needed to prevent collisions and provide better safety.

In addition, 2020 further highlighted the absorption issues associated with Wi-Fi and BLE, when they are used for people tracking. The ability of these technologies to provide only proximity location, as well as issues with intermittent signal connectivity, showed that, in use cases in which tracking people or assets was critical, other technologies, such as 433MHz, were needed. This is because of the ability to not be absorbed by the human body or other materials.

Last year, we noted the strong trend among competing vendors to cooperate and go to market with a joint implementation when specific customer requirements, such as higher location accuracy or an additional use case, were required. This trend has continued during the past 12 months, evidenced by numerous technology partnerships and third-party application and hardware integration capabilities. At the same time, vendors are adding vertical applications, new location technologies (as a source for location determination) and new hardware to their existing portfolios to address clients’ needs.

Another important trend in the past 12 months among RTLS providers is the enhancement of their analytics capabilities and increased use of AI and ML for processing location. AI is used in various areas. For example, several vendors use ML algorithms to recalibrate their RTLS, which needs to be done from time to time, as changes in the environment occur. Another instance of ML is used to produce higher location accuracy with continuous signal monitoring or to improve “zonal” location determination.

We continue to see vendors making use of many different technologies and algorithms. The number and type of IoT-enabled sensors are increasing and all the solutions we have reviewed for this research. Integration of computer vision for location tracking is becoming increasingly mainstream in certain environments such as retail and industrial environments. Some vendors

have also started to explore 5G cellular technology as an additional data source for location determination.

Acronym Key and Glossary Terms

AI	Artificial intelligence
AOA	Angle of arrival
AOD	Angle of departure
ATEX	ATmosphere EXplosible
BLE	Bluetooth low energy
BMS	Building management system
CAGR	Compound annual growth rate
CCTV	Closed-circuit TV
EMR	Electronic medical record
ERP	Enterprise resource planning
GNSS	Global Navigation Satellite System
HF	High frequency
I&O	Infrastructure and operations
IoT	Internet of Things
IR	Infrared
lidar	Light detection and ranging
LF	Low frequency
MES	Manufacturing execution system

ML	Machine learning
RFID	Radio frequency identification
RSSI	Received signal strength indicator
RTLS	Real-time location system
SDK	Software development kit
sonar	Sound navigation and ranging
TDOA	Time difference of arrival
UHF	Ultrahigh frequency
UWB	Ultrawideband
WLAN	Wireless local-area network

Evidence

¹ More than 100 indoor location vendor briefings discussing the direction of indoor location services technology during 2020.

² More than 350 inquiries on indoor location services with current and proposed Gartner clients during 2020.

³ Vendor survey conducted as part of the 2021 Indoor Location Services Magic Quadrant.

Note 1. Location Accuracy

Location accuracy within 1 meter (or 3 feet) is required by the majority of end-user clients. There are vendors/technologies that can achieve a centimeter accuracy level, as well as x/y/z-axis.

Evaluation Criteria Definitions

Ability to Execute

Product/Service: Core goods and services offered by the vendor for the defined market. This includes current product/service capabilities, quality, feature sets, skills and so on, whether offered natively or through OEM agreements/partnerships as defined in the market definition and detailed in the subcriteria.

Overall Viability: Viability includes an assessment of the overall organization's financial health, the financial and practical success of the business unit, and the likelihood that the individual business unit will continue investing in the product, will continue offering the product and will advance the state of the art within the organization's portfolio of products.

Sales Execution/Pricing: The vendor's capabilities in all presales activities and the structure that supports them. This includes deal management, pricing and negotiation, presales support, and the overall effectiveness of the sales channel.

Market Responsiveness/Record: Ability to respond, change direction, be flexible and achieve competitive success as opportunities develop, competitors act, customer needs evolve and market dynamics change. This criterion also considers the vendor's history of responsiveness.

Marketing Execution: The clarity, quality, creativity and efficacy of programs designed to deliver the organization's message to influence the market, promote the brand and business, increase awareness of the products, and establish a positive identification with the product/brand and organization in the minds of buyers. This "mind share" can be driven by a combination of publicity, promotional initiatives, thought leadership, word of mouth and sales activities.

Customer Experience: Relationships, products and services/programs that enable clients to be successful with the products evaluated. Specifically, this includes the ways customers receive technical support or account support. This can also include ancillary tools, customer support programs (and the quality thereof), availability of user groups, service-level agreements and so on.

Operations: The ability of the organization to meet its goals and commitments. Factors include the quality of the organizational structure, including skills, experiences, programs, systems and other vehicles that enable the organization to operate effectively and efficiently on an ongoing basis.

Completeness of Vision

Market Understanding: Ability of the vendor to understand buyers' wants and needs and to translate those into products and services. Vendors that show the highest degree of vision listen to and understand buyers' wants and needs, and can shape or enhance those with their added vision.

Marketing Strategy: A clear, differentiated set of messages consistently communicated throughout the organization and externalized through the website, advertising, customer programs and positioning statements.

Sales Strategy: The strategy for selling products that uses the appropriate network of direct and indirect sales, marketing, service, and communication affiliates that extend the scope and depth of market reach, skills, expertise, technologies, services and the customer base.

Offering (Product) Strategy: The vendor's approach to product development and delivery that emphasizes differentiation, functionality, methodology and feature sets as they map to current and future requirements.

Business Model: The soundness and logic of the vendor's underlying business proposition.

Vertical/Industry Strategy: The vendor's strategy to direct resources, skills and offerings to meet the specific needs of individual market segments, including vertical markets.

Innovation: Direct, related, complementary and synergistic layouts of resources, expertise or capital for investment, consolidation, defensive or pre-emptive purposes.

Geographic Strategy: The vendor's strategy to direct resources, skills and offerings to meet the specific needs of geographies outside the "home" or native geography, either directly or through partners, channels and subsidiaries as appropriate for that geography and market.

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