KINEXON

WHITEPAPER

Location-based Process Automation

Leveraging Real-time Locating System Technology for Autonomous Operations

Abstract

Manufacturers, suppliers, and logistics companies are finding themselves at an interesting intersection today. Digital transformation, is no longer a trend or a hype. With more pressure from stakeholders, customers, and competitors, companies need to act fast and decidedly to kickstart their smart factory roadmap.

While there is vast consensus on the need for digitalization - around 70% of manufacturing organizations in the US and Europe have adopted a digital transformation (DX) strategy according to IDC research[1] – the enormity and complexity of the transformation at hand are crippling to many. In identifying the best approach to digitize their operations, companies often fall short of capturing some of their most powerful insights: information on the location and dynamics on their shopfloor and supply chains, such as assets and vehicles. As the baseline data for analyzing, optimizing, and automating processes, location-based automation is the key to unlocking cost reductions, quality improvements, and speed increases in production and supply chain. But how can companies truly leverage the data captured by location technologies such as GPS, UWB, BLE or RFID? Location-based process automation (LPA) systems, a new software category, might just be the answer.

> **Location data is the foundation for any meaningful industrial automation,"** says Mehdi Bentanfous, CRO at KINEXON. **"Moving assets make up 99% of all activity on the shopfloor. It is an incredible competitive advantage to utilize this knowledge on where assets are at all times, which process steps they went through, and how long they took along the production line."**

To unleash the value a central operating system for all moving things can create, LPA should fulfill certain criteria and provide a set of key features, including low-code/no-code interface, technology- and vendor-agnostic integration, as well as powerful and forward-looking automation customization opportunities.

In this whitepaper, we walk you through the essential features of LPA software so you can fully leverage the benefits of autonomous operations for your baseline.

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> **The right LPA system enables customized real-time automation at the OT level – a huge advantage for speed and flexibility in today's complex production environments."**

Mehdi Bentanfous,
CRO at KINEXON

[1] https://www.analyticsinsight.net/now-is-the-time-to-reassess-digital-transformation-strategy/

1: The Rising Relevance of Location Data

The Digital Status Quo

Since the introduction of the concept, industrial Internet of Things (IIoT) applications have emerged as one of the key strands of digital transformation. Per a recent Deloitte study, 72% of companies regard IoT as the most central opportunity in digitalization.[2] While most companies understand the essential need to act upon digitalization to increase their revenue (59%), improve their risk management (27%), and reduce costs (29%), the disruptive potential of new technologies still goes widely unused. One might ask: Why has the adoption of IIoT been so relatively slow when compared to smart applications in consumer devices, especially when the benefits are widely known?

In their study, Deloitte identified the following common barriers to digitalization in manufacturing and logistics:

- a lack of transparency regarding profitable, customized solutions
- a lack of digital competency inside and outside of IT
- the complexity of transformation processes

While manufacturers have digitized large parts of their machine parks by now, a striking data gap has become evident: To achieve the goal of end-to-end automation data is required from all parts of the production process, not just machinery. To achieve this, companies are utilizing localization, a process that performs physical measurements like angles or distance to find the accurate position coordinates of objects. The inclusion of location data in IIoT applications allows companies to gain transparency, optimize, and automate processes via an entirely new software category: location-based process automation systems.

Deloitte study

Digitalization Strategies

Dresner Advisory

Ubiquity of Location Data

[2] https://www2.deloitte.com/content

Location-based process automation systems enable a holistic picture of production and warehouse areas. They can be considered as ‘control towers’, and will allow the merger of various tracking technologies and data resources. This creates an easier way to automate linefeed and material handling processes.”

Jan Burian,
Senior Director, Head of IDC
Manufacturing Insights EMEA

According to Dresner Advisory, around 80% of enterprise data currently have a location component, which bears tremendous potential for value-adding IoT applications. The versatility and relative ease of implementation make location-based process automation systems an attractive solution for companies at the cusp of digitalization. With the relatively predictable increase in production efficiency and supply chain resilience through the use of LPA, it comes as no surprise that the market for location-based services market is predicted to reach $318.64 billion by 2030.[3]

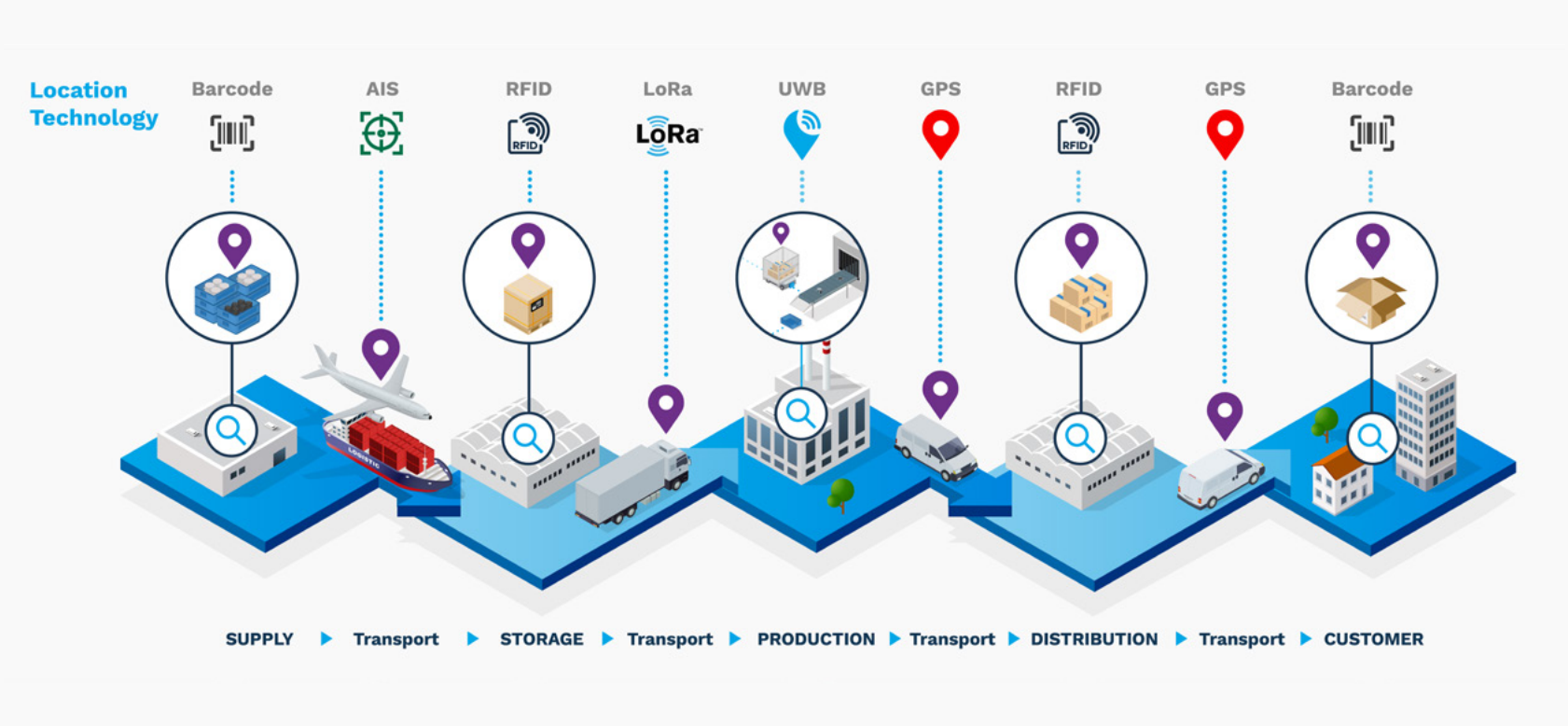
So what makes the difference in a location-based approach to process automation? How does LPA differ from other software solutions and why should companies consider LPA as the first and initial step to automate their shopfloor or warehouse? And finally, what are the key features an impactful LPA should offer? Let’s find out.

[3] https://finance.yahoo.com/news/location-based-services-market-reach-074600700.html

2: Leveraging Location-based Process Automation

Data, Implementation, Automation

Any type of automation is only as good as the baseline data it relies on. A localization sensor infrastructure can contextualize and aggregate comprehensive data about material flow and asset utilization as well as bottlenecks. This data, accumulated along the entire supply chain, is then fed into LPA to deduct analytical insights as well as create custom automation use cases.



2.1. Data Baseline

Companies are currently using a broad set of location technologies to solve common indoor and outdoor localization use cases, depending on their varying localization needs when it comes to precision and latency. The impact of technologies ranges from simple Auto-ID to complex Real-time Locating Systems (RTLS).

Passive Radio Frequency Identification (RFID)

As an ident technology, passive RFID is mostly utilized for static location detection, thus facilitating simple use cases. RFID requires a gate-tag infrastructure, with costs being heavily dependent on the number of RFID gates needed. Due to its static location detection, RFID cannot provide continuous real-time location information and is thus only temporarily precise.

Bluetooth Low Energy (BLE)

BLE is a commonly used technology for spatial localization when precision is not a prime concern. BLE is an attractive locating technology for real-time locating that does not require better than 3-5 meter accuracy, such as scanner tracking or yard management.

Ultra-Wideband (UWB)

Often described as the gold standard of indoor localization, UWB offers the highest localization accuracy. UWB can track almost unlimited assets with up to 10 cm precision in real time. With low latency and little risk of interference, UWB is especially attractive for production-critical processes. As the popularity and utilization of UWB keeps increasing, the technology is now becoming less cost prohibitive.

Wirepas Massive Tracking

Wirepas is a highly scalable wireless, battery-operated Mesh technology, designed for difficult tracking environments where a cabled infrastructure is not possible and an accuracy of 5m is sufficient. There has been a strong adoption of this technology in industrial environments based on its ease of installation and cost effectiveness.

Global Positioning System (GPS)

GPS is a commonly known technology for outdoor tracking. It is a satellite-based radionavigation system. Drawing from multiple satellites, GPS localization works in most weather conditions, anywhere in the world.

LoRa (short for “Long Range”)

LoRa is a commonly used technology for long range, long life, low-powered sensors, but is also used to communicate location information from “Site Based” GPS / GNSS devices. Recently the LoRa frequency has been updated to further enhance its location capabilities for “Yard” use cases, resulting in a 2-5 m accuracy from 1.5 km away.

From RFID for auto-IDing, Bluetooth (BLE) or ultra-wideband (UWB) for time-and cost-intensive indoor use cases, to GPS for outdoor tracking, location technologies create the baseline data for industrial automation.

2.2. The Missing Link: A Platform for End-to-End Automation Across Use Cases

While we have now seen that many different locating technologies are in fact operated across the supply chain, there is a noticeable gap in how the insights gained are utilized. Often, the location data won remains in an isolated data silo and is not utilized to its full potential. What is missing indeed is a universal location-based process automation system that integrates and processes all location data to provide automation opportunities. The approach LPA are following is the creation of a location-based digital twin. Using sensor data, digital twins create a virtual model that can be used to analyze, optimize, and automate the current and future state of physical assets or processes in industrial environments. From product iteration, asset management, predictive maintenance, and downtime prevention, digital twins create many benefits: They allow companies to make data-based decisions around maintenance, sustainability, process efficiency, as well as performance, and ultimately, enable autonomous operations.

> **Location-based process automation software essentially functions as an operating system for moving things by integrating all location technology data into a dynamic digital twin."**
>
> – Mehdi Bentanfous, CRO at KINEXON

While the concept of the digital twin is not a new one, its relevance for industrial automation and the implementation of smart manufacturing processes is continuously increasing. According to Markets and Markets, the market for digital twins is growing to $ 48.2 bn by 2026.[4] To demonstrate the strong business case for a location-based software solution, let's explore through which key features LPA help companies automate, optimize, and save cost.

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According to Markets and Markets[4]

[4] https://www.marketsandmarkets.com/Market-Reports/digital-twin-market-225269522.html

Middleware Elimination:

LPA as IT-Friendly Central Operating Systems

As mentioned above, the variety of location technologies in use along the supply chain is vast. Conventionally, each of those comes with its own proprietary software, creating complex and intransparent data silos. This complex software landscape has put extraordinary strains on central IT teams. LPA systems in contrast should be designed to eliminate those layers of middleware to centrally consolidate all location data – a crucial step for IoT use cases and a key prerequisite for true digital transformation. As a central hub, LPA systems bundle localization data from different data silos in one platform and open up more comprehensive, streamlined automation opportunities and business intelligence. By doing so, LPA closes the digital disconnect and enables real-time decisions that produce real-time RoI impact. Since LAP systems should be open and enable out-of-the-box connectivity through standardized interfaces, they allow for faster deployment times than most IoT platforms.

One Software for All Solutions:

LPA as Unified Hub for Any Vendor and Technology

In addition to leveraging all types of location data, a key feature of any LPA should be its openness when it comes to vendor integration. By keeping all options on the table when it comes to finding the right vendor for each project, companies are free to pick and choose project partners per specific individual requirements. By being able to integrate and utilize the most cost-efficient vendor for various technology solutions, LPA creates the potential for companies to achieve multi-million-dollar savings through their preferred vendor selection, as reported by a KINEXON OS client.

Fast RoI:

LPA as Driver of Higher Productivity, Improved Quality, and Cost Savings

Location data of moving things offers unprecedented insights on process times, bottlenecks, and inefficiencies. The ultimate advantage of LPA lays in its scalability: from unique use cases to large applications covering an entire production facility, LPA software should offer customization potential for any company and use case. With various process mining and analysis functions, LPA systems would then enable comprehensive process evaluations and uncover optimization potentials. The resulting process automation then leads to higher asset utilization, efficient material flow, and optimized fleet management. With benefits ranging from time savings to better quality control, LPA should enable productivity increases and ultimately higher speed to market. Examples include faster cycle times through reduced search and find, or quality improvements through automated tool management. Furthermore, it is important for LPA software to enable preemptive capabilities like predictive maintenance. LPA systems allow companies to increase their machine running times and prevent time - and cost-intensive repair stops in production. This in turn helps companies to rapidly achieve higher throughput rates at lower cost.

Innovating Forward:

LPA as a Tool for Futureproofing in a Fast-Paced World

Any LPA software should address today's industry challenges while accommodating valuable forward-looking solutions, such as predictive analytics. With open and flexible architecture, LAP systems should enable companies to quickly leverage cutting-edge technology, e.g. robotics, AI, machine learning as soon as those use cases are desired or needed.

Digital twins and location-based automation are the groundwork to harvest the benefits of new technologies. Rather than stacking individual new software onto an existing portfolio, LPA software should function as a central automation hub: reducing technology and department silos and fostering collaboration and innovation. This becomes more and more relevant when considering the demand for remote real-time monitoring, troubleshooting, cooperation, and working realities in an increasingly global, fragmented world. Given the predictions for the future of work LPA systems would also enable remote operations and workforce, thus providing value, now and in the future.

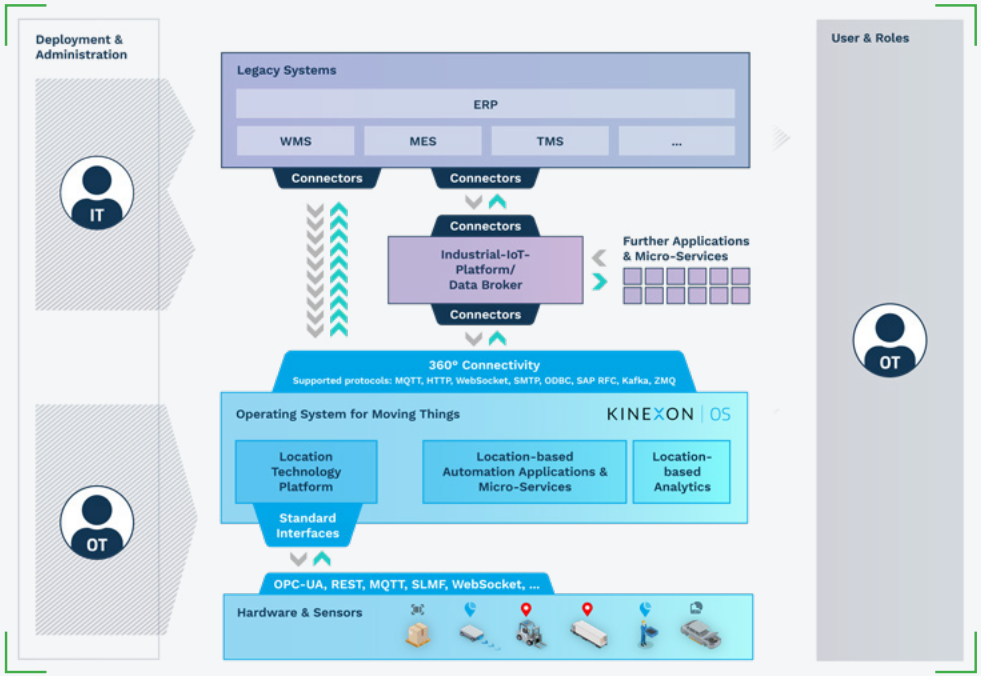
- Standardized interfaces
- Technology-agnostic data integration
- Agile scalability
- Low code / no code-customization

2.3. Empowering OT: LPA as Rapid Low-Code/No-Code Solution

LPA software should be extremely user friendly out of the box and require only minimal IT involvement after initial setup. They should provide OT with unmatched capabilities to achieve business outcomes directly from the shop floor without excessive demands and dependence on the IT department. LPA should follow a low-code / no-code approach, which gives production managers the agility and flexibility they need to automate for speed and quality increases. This secures a steady return on investment and directly improves operational goals and objectives. LPA directly enables OT departments to execute on their own automation and intelligence requirements, through simple no code or low code customization. The rapid implementation and easy customization of LPA software create direct value at the operations level. Real-time insights then allow the OT to directly identify and address challenges within certain production lines and processes. At the same time, the impactful automation opportunities deliver a fast RoI by enabling a large number of automation use cases with a vertical scaling potential.

Automation via LPA is executed via no-code geofencing, custom event and action triggers as well as low-code apps and micro services.

Sample software stack integration of KINEXON OS



3: Proven Results

LPA in Use at Enterprises Across the Globe

The advantages of leveraging real-time location data as well as tracking assets along the supply chain has made RTLS a staple in production facilities and warehouses across industries. Though relatively young in nature, there are well-established LPA systems that have already convinced multiple enterprise-size clients to use them as end-to-end solution for location-based automation.

From large automotive companies leveraging the powerful operating system of moving things in plants across the globe to other companies in highly regulated industries such as aerospace, the benefits of LPA are hard to ignore as businesses keep advancing their digital transformation and upping their supply chain resilience. While the benefits of LPA are near limitless, some of the key values that highlight the business case for an investment in this new software category are:

More than

$10 Mio.

in cost savings

by eliminating middleware silos

21%

lower error rate

by automating material flow processes

90%

higher process reliability

by real-time tracking of orders

Automation Deep Dive: Business & Use Cases with KINEXON OS

KINEXON's LPA software KINEXON OS already powers business critical production and SCM processes around the world, and has received numerous industry awards for its innovative way to add value and maximum scalability potential. To demonstrate the value added, let's explore two use cases from large manufacturers using KINEXON OS in their production:

Manufacturing

5% Faster Assembly Line Speed
through Automated Tool Control

A leading global automotive manufacturer has been utilizing KINEXON's location-based process automation system for automated tool control along the assembly line. The automated configuration of tools, the fast and effective creation of geofences, and the ultra-precise digital visualization of the assembly process have not only created millions in savings, but they also helped reduce manual errors as well as product recalls. KINEXON's solution for the multinational vehicle manufacturer has been acknowledged with multiple industry awards. According to European industry magazine "Produktion", the team responsible for the digitalization of shopfloor systems at the car manufacturer chose KINEXON as the driver for their global solution: "IPS-i (the company's internal name for KINEXON OS) is a platform that unites all location data within a plant. It is perfectly scalable and customizable for different use cases, since we have a standardized IPS-I interface. Through this platform, a technology like UWB can communicate with RFID, and employees can easily create their own use cases via the intuitive dashboards."

Automotive Supplier

Annual Savings and Productivity Increases
through Material Flow Optimization

When initially talking to leading automotive supplier Continental, Jürgen Braunstetter, Head of Automotive SCM at Continental, approached us with the following idea: "We have a clear vision: a fully automated supply chain from planning and production control through to physical flow of material, meaning incoming material to production supplies to product delivery. "Continental now leverages KINEXON OS to achieve supply chain & material flow optimization. AGVs and picking boxes are equipped with RTLS sensors whose data is processed in the digital twin. The solution did not only increase the AVG utilization, it also optimized the material provision and replenishment while providing full transparency over intralogistics processes. More detail on the full implementation of location-based solutions is available in this case study.

4: Conclusion

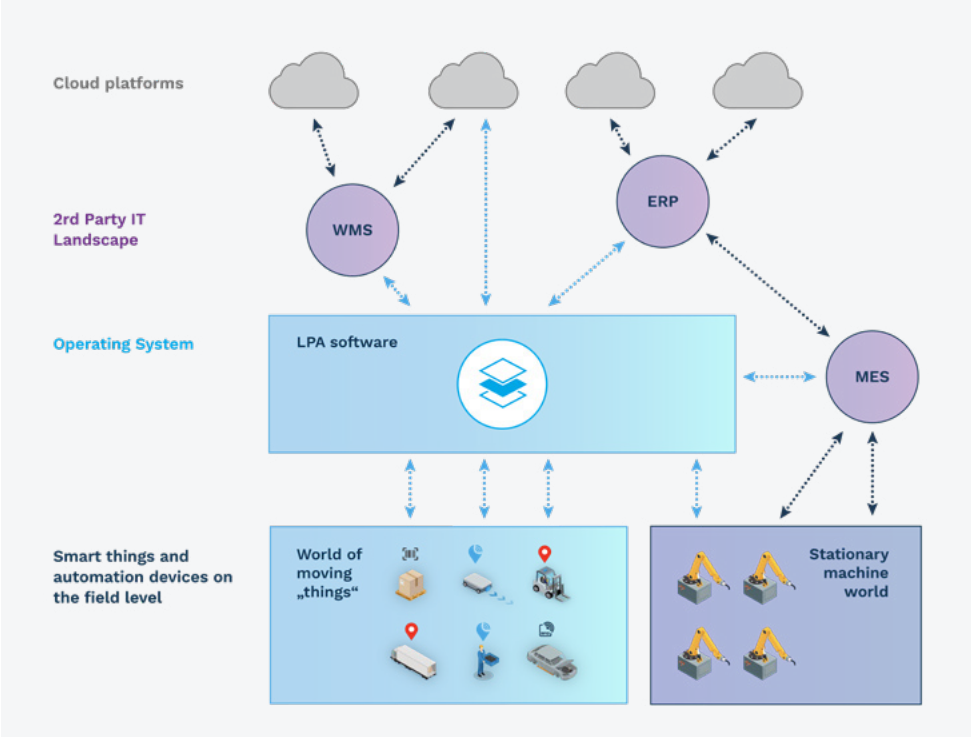
LPA Is Closing IoT Blind Spots on the Journey Towards Autonomous Operations

Location data is the baseline needed for any effective digitalization and automation measures. Powerful location-based process automation systems are the key to translate location data captured via UWB, BLE, or GPS RTLS into actionable insights.

LPA provides a solution that answers to both the challenges of today's production as well as the opportunities when it comes to the technologies of tomorrow. Effective LAP successfully navigates the dual demands of mitigating corporate investment risks while adding benefits across use cases. Companies realize they must achieve digital transformation to stay competitive, increase their resilience, and fulfill customer demands – and for this, they need a competent and experienced partner and location-based process automation system. As Dr. Markus Fischer, Industrial Engineering Lead at KINEXON client Continental puts it:

> **"The smart factory is within easy reach at Continental. Partners such as KINEXON play a major role in this endeavor. (...) I am very optimistic that we will reduce costs very quickly through our smart factory."**

With a focus on interoperability, LPA systems should be able to seamlessly complement any existing software stacks. LPA software should fuel the present infrastructure, such as MES or ERP systems, with comprehensive connectivity data to fulfill the true potential of the smart factory. Without excessive demands on either IT or OT, LPA systems are engineered to directly enable location-based process automation while also providing more relevant data input for other IoT processes and big data analyses in 3rd party software.



Empowering the digital ecosystem by removing data and technology silos through technology-agnostic data integration is one of the most crucial functions and benefits of LPA. When LPA systems are set up optimally, they create a central connectivity layer and enable an unprecedented level of documentation, transparency, and predictive power.

Through intuitive UI and agile scalability, LPA enables companies of any size to automate via quick, iterative steps that align perfectly with their most imminent internal pain points. Implementing a LPA software such as KINEXON OS not only balances new capabilities and old, it also facilitates effective IT/OT convergence, and sets production up for success when it comes to leveraging technologies of the future, including machine learning/AI or robotics.

The pandemic has made clear that businesses need to prepare their production and supply chain for future disruptions. Beyond traditional industry challenges such as infrastructure maintenance and fleet management or energy consumption and environmental challenges, companies have to prepare themselves for more fast-paced innovation through competitor automation, remote working models, as well as superior safety regulations and social distancing norms.

LPA is a solution that provides optimization opportunities for each of these areas and paves the way for autonomous operations.

KINEXON

KINEXON provides the leading AI-powered IoT platform for businesses to connect and automate operations.

As global technology leader in indoor location services KINEXON's real-time locating system and AMR & AGV Fleet Management offer solutions across automotive, manufacturing, and aerospace sectors to achieve real-time visibility and traceability of moving assets, along with actionable insights to drive automation.

Leading customers such as BMW, SIEMENS, Airbus, Continental, or MTU Aero Engines utilize KINEXON's solutions to digitize and orchestrate physical processes, thereby enhancing efficiency, productivity, and quality while preparing for AI-supported operations.

Headquartered in Munich, Germany, with another office in Chicago, USA, over 250 employees drive innovation in the IoT landscape. For more information, visit **www.kinexon.com**.

Are you interested in discussing your use case?
Schedule a meeting with KINEXON's experts now!

Schedule a Meeting

Learn more about how BMW brings their production to the next level. Discover how location-based process automation saves more than $10 million in annual operational costs.

Read the Case Study