



UTILISING
IOT & AI
IN **INDUSTRIAL**
MANUFACTURING

AND WHY YOU NEED AN IIOT PLATFORM

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THE BASELINE

With the evolution of Industry 4.0 and the focus placed on lean manufacturing, the contemporary smart factory is expected to have made the transition to a fully connected, flexible, transparent, and maximally automated system. The realm of legacy industrial machines and industrial automation systems is becoming increasingly obsolete as companies are consolidating knowledge and insight and integrating legacy devices into novel IoT infrastructures.

Collecting real-time data from every asset, analysing instantly, and optimising on the go have become the norm in industrial manufacturing. Speed is of the essence as markets and demands are changing rapidly. So the high availability of the data collected from disparate assets has to be combined with the ability for fast decision-making and global transparency across the relevant company functions.

Still, very few enterprises are successful at following a comprehensive approach. What manufacturers need is a single source of truth for all IoT and data analytics systems. The answer may be an IoT & AI platform extending from the edge to the cloud, readily accessible to key decision-makers.

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REDUCING DEPLOYMENT COSTS AND COMPLEXITY

Manufacturing companies can benefit from an enterprise-wide approach that unites IoT and AI to enable multiple use cases. The challenge here is to quickly transition from the proof of concept to the large-scale deployment stage. And this is where most companies fail. Simply because in the manufacturing industry, moving IoT use cases beyond the pilot stage is far from trivial.

The integration and deployment of digital platforms can help at this stage. Platforms make it possible to cover all three ingredients that make IoT initiatives successful:

- a realistic appraisal of the anticipated costs
- a realistic estimation of the involved complexity
- a thorough risk assessment

Without awareness of the complexity of your case, the involved staffing and costs, and the risks to be anticipated, IoT projects get dropped. Or your PoC takes too long, eventually slowing down lean manufacturing efforts. So the first step in any IoT initiative is setting the right foundation for overcoming challenges on the shop floor.



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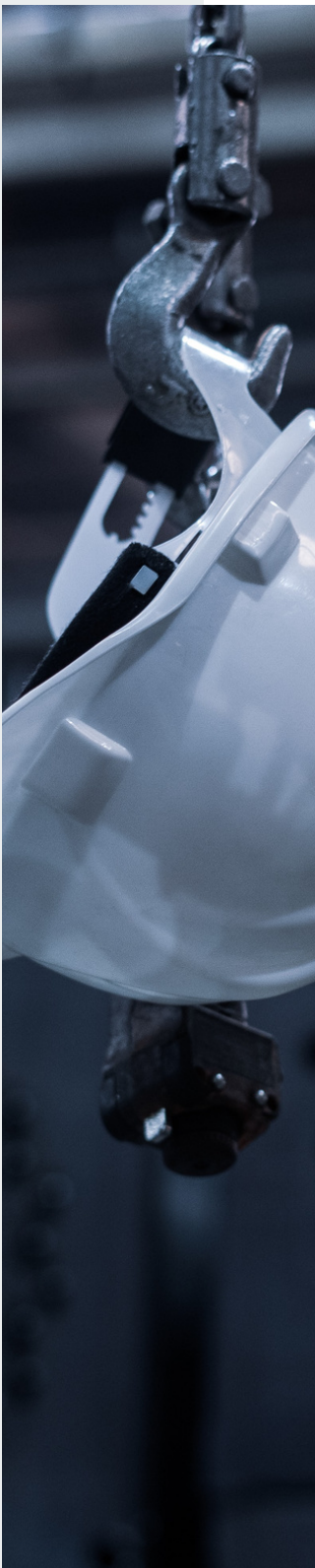
OVERCOMING THE CHALLENGES OF IMPLEMENTATION

A comprehensive IoT & AI platform can help in overcoming the most common implementation and deployment challenges. The advantage of such (SaaS) platforms is that they tend to be low-risk, scalable and flexible. This allows you to test fast, leaving ample room for trial-and-error scenarios. At the same time, you build a complex web of AI & IoT use cases tailored to industrial manufacturing to cover your entire IoT analytics cycle with the possibility to collect IoT data, monitor and control devices, visualise, analyse, and update.

“Setting the right foundation is the first step in any IoT initiative.”

One such full-circle approach enables you to make the transition to a smart factory by connecting all your data sources to a single source of truth. This is how you have access to the full data picture on the shop floor at a glance. That means more transparency and, ultimately, better quality.

Building your IoT case upon a flexible and scalable infrastructure is just one part of the picture, however. Let's look at the challenges.



CHALLENGE 1. SLOW DEPLOYMENT CYCLES WHERE COSTS ARE DIFFICULT TO ESTIMATE

It is no news that a pilot can consume years without contributing much to progress. Costs can become difficult to manage. By the time your AI & IoT cases are ready for deployment, the manufacturing processes or the technology may have become obsolete. Business priorities may have shifted. It is essential to move fast and test in a way that makes it possible to estimate costs reliably.

“In the majority of cases, manufacturers face the issue that they attempt to accomplish everything at once. This adds unnecessary complexity to IoT initiatives and slows down progress.”

This is why over half of manufacturing companies seldom make it past the pilot stage, and in many cases, a pilot or a simple AI & IoT use case takes over a year. Other than that, IoT budgets often get consumed by solving issues on the shop floor, aligning heterogeneous systems, and tweaking technical details. And all of these can be handled by an end-to-end IoT & AI platform.

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CHALLENGE 2. HIGHLY HETEROGENEOUS AND COMPLEX SYSTEMS

The complexity of manufacturing systems and the lack of strategy in dealing with the various types of data sources are additional bottlenecks in IoT deployments. Typically, you deal with a multitude of heterogeneous systems and devices, legacy equipment, and operational technology teams that are continually struggling to align these obsolete technologies with the existing IT.

“Many of the implemented solutions remain isolated, with no link between edge and cloud, and with no clear possibility to scale the existing infrastructure without significant investment.”

If this is simply an issue now, it will make smart manufacturing impossible in the future. An overarching Big Data strategy that seamlessly incorporates IoT analytics is vital as the estimated number of IoT endpoints per industrial manufacturer continues to grow exponentially. At this juncture, enterprises need an overarching, unified foundation for dealing with these data volumes and transforming them into knowledge ready to be consumed by decision-makers.

CHALLENGE 3. NO CLEAR GOAL-SETTING

This may be impossible to imagine – yet many enterprises embark on the IoT journey without a clear goal in mind. At times, not having a well-defined vision and a crystal clear idea of what successful smart manufacturing means to an organisation already undermines implementation efforts at the outset. Instead of chasing trends and vaguely stated goals, the anticipated ROI has to be defined from the very beginning.

“By sketching out the business use case together with the needed technological improvements, goals become measurable and gain credibility in the eyes of decision-makers.”

The bottom line is that any successful deployment rests upon a clear understanding of a project’s vision coupled with clear metrics, progress tracking, and mechanisms for quick pivoting if things do not go as expected. IoT platforms offer the needed transparency to do just that: get on top of all the complexity to derive measurable outcomes with high precision. Developing unique expertise in extracting, transforming, and analysing large amounts of underutilised machine data, you become capable of high-precision insight to drive organisational change faster.

THE IOT & AI PLATFORM

Industrial manufacturers can benefit from a combined IoT and AI platform that is built to scale and has the necessary infrastructure to support smart manufacturing efforts.

A successful deployment depends on the ability to connect to any legacy device, machine, and piece of equipment on the shop floor, work with a clearly structured data management pipeline, and act in an open-ended way that allows you to build on your existing cases and integrate various third-party applications.

Further, you need to be able to effortlessly manage device rollouts as your fleets get larger. You have to orchestrate your IoT application ecosystem from a single venue. And you need an infrastructure that allows you to do analytics on the fly.

With an AIoT platform that brings all these capabilities in one place, you get to observe how your projects progress faster and transition from PoC to deployment within months.

So what is it that you gain with a consolidated IoT and AI platform?



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Achieve hardware-independence

You gain the ability to connect to any device or industrial system, using any protocol. Using the Record Evolution Reflasher, you can turn just about anything Docker-capable and running on Linux into an IoT device.

Build a transparent data management strategy

From within a single venue, you oversee and structure the collection, cleansing, and storage of large volumes of IoT data coming from the shop floor.

Consolidate your advanced analytics as you shift towards a long-term data strategy

Using the platform as a unified venue for your data analytics tasks, you not only oversee isolated KPIs or visualisations in dashboards but can also combine data from various sources, uncover unexpected relations, and collaborate across the entire enterprise. From data cleansing and statistical and analytical queries all the way to building and deploying machine learning models, you have a bird-eye view of all processes in place and can estimate ROI quickly.



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Bring together device and industrial IoT application management

Your entire device lifecycle management takes place on the platform. You start with connecting your assets, perform remote configurations and updates over the air, log inspections, monitoring, and control. You also manage the apps on your devices or device groups; deploy apps and machine learning models to edge devices over the air, and oversee app performance at all times.

Handle complexity from within a single venue

An AIoT platform provides the necessary infrastructure for smart manufacturing deployments from the edge to the cloud. This is where you build and expand on IoT use cases. In integrating all data tasks across the value chain and consolidating key technologies, the platform makes acceleration the norm. One such solid foundation can become the springboard for a variety of IoT use cases. These can be built on top of existing manufacturing solutions to solve even more complex issues on the shop floor.

Consolidates know-how

The AIoT platform makes it possible to collaborate on data tasks from IT all the way to the edge. All different experts across the IoT value chain have access to the same dashboards, tools, and KPIs. Each remote specialist can collaborate seamlessly with others and knows what their priorities are.

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The path to a fully operational smart manufacturing initiative

With the right foundation, industrial manufacturers gain the needed transparency and readiness to scale. Using just one platform, you begin with a small PoC to make sure the initiative is setting off on the right foot. Then you transition to the pilot stage to make sure the proposed solutions check out from the edge to the cloud. Once everything looks good, you begin to scale. Eventually, you can expand your IoT manufacturing use cases to different sites across the globe, and can continually update and upgrade your initial project to maximise ROI.

In selecting the right AIoT platform, industrial companies can create a solid foundation for IoT manufacturing use cases. This is how you reduce complexity and minimise deployment costs. Further, you ensure seamless collaboration across departments, bringing together engineering and IT teams. And it is not only the built-in infrastructure but also the ability to see how everything hangs together.

SO WHAT HAPPENS NEXT?

“Once you have consolidated your assets on the platform, you are ready to collaborate and build multiple use cases.”

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When used to the fullest, a consolidated edge-to-cloud IoT & AI platform becomes your trusted ally in gaining collaborative insight across different teams and expert groups:

+ CREATE TRANSPARENCY BETWEEN THE INDIVIDUAL DEPARTMENTS

+ ACHIEVE CONSENSUS BETWEEN IOT ENGINEERING AND DATA SCIENCE TEAMS MORE QUICKLY

+ AGREE ON OBJECTIVES THAT ARE TANGIBLE TO EVERYONE AND TRACK PROGRESS COLLABORATIVELY

+ DEFINE CLEAR KPIS THAT MAKE SENSE TO YOUR DISPARATE TEAMS

+ CONSOLIDATE YOUR IT, CLOUD, AND EDGE SYSTEMS TO GET TO ALL YOUR DATA, AT ALL TIMES

APPLICATION AREAS FOR AIOT IN SMART MANUFACTURING

An open IIoT platform works not only vertically, by covering everything from the edge to the cloud, but also by allowing you to bring together legacy enterprise systems and new technologies. Further, an open IIoT platform allows you to build on top of your deployment. You reinvent deployment scenarios and even go as far as to build new IoT products using the platform infrastructure, create new business models, and generate new revenue streams.

Once you have created a solid foundation by consolidating and interlinking your assets on a single platform, you can begin expanding on your existing IoT initiatives.

Asset performance management

You enhance performance by being continually updated on how your assets are meeting your KPIs. Further, you get to see if your existing KPIs still make sense. With performance management apps built directly on the AIoT platform, you receive automated alerts whenever a deviation takes place and are able to swiftly respond to anomalous behavior. The real-time data and feedback from machines allow you to refine your KPIs. This is how you get the most out of your machine performance.



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Condition monitoring

Once you connect your devices to the platform, your data flows to one place. That is your single source of truth. Now you can track parameters such as temperature, moisture, or pressure both locally and across manufacturing sites. Also, you monitor pre-defined KPIs to get on top of all the complexity surrounding operating conditions. And you set automated alerts in the event that certain parameters are exceeded or assets are performing below the established parameters.

Predictive maintenance

This is already tapping into more complex manufacturing use cases for AI & IoT that involve advanced analytics. You can utilise machine data to build apps allowing you to inspect the health of assets and identify service needs. You only perform checks and repairs where they are needed. So you dispense with scheduled downtime and unscheduled maintenance costs. You minimise emergency situations and are able to better plan your resources. But more significantly, you achieve full operational efficiency and extend the machine lifecycle by creating the optimal conditions for your assets to perform.

Predictive maintenance is not simply about reducing or eliminating maintenance costs and getting on top of unscheduled downtime. It also allows you to make room for other improvements, investigate further, and get to the very bottom of production issues.



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Energy consumption tracking and management

You minimise energy consumption by making sure you are using the most energy-efficient options for your connected assets. You identify possibilities for improvement and oversee energy consumption over time. This is how you identify patterns and reduce anomalous energy leaks. Further, you track energy peaks, look into ways to cut energy waste, and better comprehend the way each industrial asset contributes to overall energy consumption.

Inventory and supply chain management

An integrated AI & IoT platform with analytics capabilities suitable for a variety of use cases will help you manage inventory at different manufacturing sites. You can improve on existing JIT inventory solutions and resource forecasting. Further, you implement dynamic supply chains to achieve more transparency and greater control over the quality of supplier outputs.

New business models and revenue sources

With more transparency and real-time insight into asset performance, IoT & AI make it possible to discover new ways of meeting the needs of customers. This is how you tap into new revenue streams. But you can also push the boundaries of what your AIoT platform is about. One possibility is to leverage the platform as a springboard for developing your own unique business models and products.



USE CASE

COLLECTING IOT DATA FROM TEST VEHICLES TO IMPROVE SQUEAL DETECTION

Identifying brake squeal noises with Continental AG

Together with the HBS R&D division at Continental, Record Evolution has developed a pilot for identifying brake squeal noises using Big Data and AI approaches on IoT data collected from test vehicles.

Using the Record Evolution platform for end-to-end IoT development, Continental AG was able to implement IoT data collection strategies, Big Data analytics & AI solutions in mobile IoT scenarios. The goal was to improve Noise, Vibration and Harshness (NVH) measurements to better evaluate the circumstances under which brake squeal noise occurs.

The employed end-to-end process starts with data collection from test vehicles, transferring the data to an on-premises cloud environment, data processing in the cloud, and the creation of a database of structured and harmonised high-quality data.



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The next steps are collaboration on the creation of diverse analytical insights into the data and the creation of a custom AI algorithm for edge devices to classify NVH events with high accuracy in near real-time.

To collect raw IoT data, we developed a measurement device based on Raspberry Pi and enhanced it with professional measuring electronics. Devices were installed in multiple test vehicles and were connected to the platform. With the help of the Record Evolution Reflasher, platform users can now easily add new vehicles to their test fleet with just a few clicks and so enrich the existing data pool.

Using the Record Evolution platform for IoT and AI, Continental AG has built a comprehensive system for IoT data collection and analysis. This system can serve as a foundation for the development of multiple use cases, such as apps for NVH detection and real-time NVH prediction based on the identification of patterns that arise prior to an NVH event.

KEY TAKEAWAY

“Using a single IoT & AI platform, you consolidate the IoT assets and know-how within your organisation. Now you are ready to build your use cases and even develop your own products.

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ABOUT RECORD EVOLUTION

IOT & AI PLATFORM

Record Evolution is the collaborative end-to-end IoT & AI platform that enables companies of all sizes to develop their own IoT products.

Built to facilitate the development and wide availability of artificial intelligence (AI) in an IoT context, the simple-to-use platform serves as an organisation-wide decentral hub for organising teams and conducting IoT projects, effectively providing broad AI enablement within any organisation.

www.record-evolution.de



