



BOSCH Generating Value from AIoT in 4 Proven Steps User Guide

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Invented for life

**Generating value from AIoT
in 4 proven steps
A practical guide to IoT and AI maturity
Bosch Global Software Technologies**



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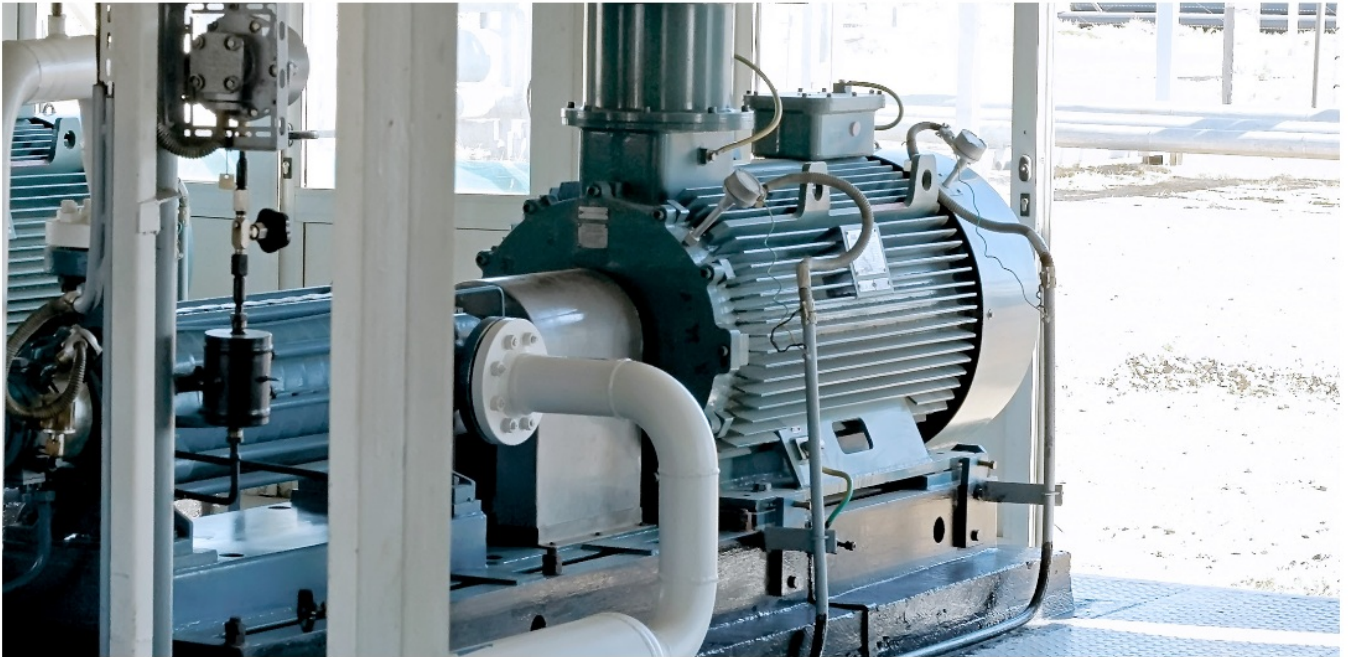
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Executive Summary

Artificial Intelligence of Things (AIoT) offers a new dimension to the classical value-creation cycle, making it faster, more customer-centric, and more disruptive. Connected products generate data that can be analyzed using AI and machine learning. By turning this data into actionable and valuable insights, functionality and features can be improved constantly. Also, the identification of promising business models before kicking off an IoT project is now possible – models that facilitate lasting relationships with customers and offer them new personalized digital experiences. Beyond that, AIoT players can join forces in open ecosystems – enabling strong network effects with value creation on a global scale.

But how do establish new AIoT business models and become a leading player in an open ecosystem? Which

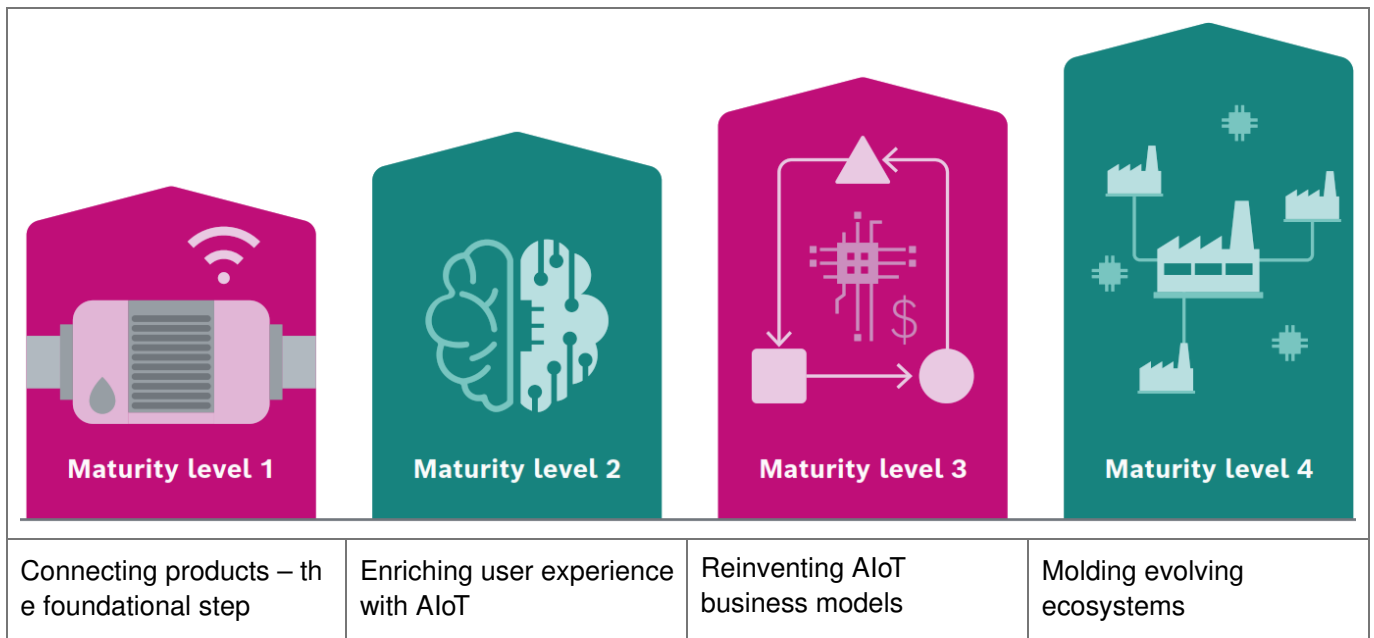
milestones must be reached and what are the benefits for OEMs? Based on sound experience as a leading AIoT user and provider of digital services and solutions, Bosch Global Software Technologies has established a four-step plan for OEMs. It focuses on the value creation at each maturity level and provides guidelines, on how these steps can best be reached in a subsequent order.



Welcome to the world of AIoT!

Internet of Things (IoT) has become a major enabler for OEMs to connect products and services. However, connectivity alone is not enough to keep up with the fast-paced market. Today, it's all about knowing and fulfilling customers' needs, even before they have realized the need for a certain feature. AIoT holds enormous potential for creating and capturing additional value from a single product, both for users and for OEMs. Organizations have a pressing need to establish new business models. The amalgamation of IoT with AI will play a pivotal role in this transformation.

Our four-step guide starts with establishing the initial connection with devices in the field, enabling OEMs to communicate with customers throughout the product lifecycle and to adapt their offering to suit changing customer requirements. AI helps to leverage the newly gained data, turn it into valuable insights, and continuously improve and personalize user experience. OEMs can offer new business models or enable external service providers to enhance their existing customer services. The most important transition for OEMs, however, is to leverage the cross-business AIoT ecosystem with a growing community and its network effects. They can then become orchestrators of the ecosystem and help shape the world of AIoT.



Connecting products – the foundational step



When it comes to adding value to existing solutions, communication is key. In maturity level 1, we, therefore, start by establishing connectivity that allows sender and receiver to exchange information regardless of their location. Connectivity, however, is not merely an interface. Instead, it is a comprehensively managed cloud service, which lays the foundations for gaining useful insights. When starting the journey towards full connectivity, organizations face multiple challenges, such as compatibility issues or bandwidth limitations.

Once these hurdles have been overcome with the right software and partners, connected products offer both OEMs and their customer's significant benefits: they create new opportunities for interaction and new points of contact between them. OEMs can increase their value proposition by gaining real-time information on product status and use, such as time frames and frequency. End consumers are able to access information about their product at any time and receive remote technical support if needed. OEMs, in turn, can leverage these new opportunities to boost sales revenue and to prepare for further maturity levels.

The Indigo Connect, a robotic lawnmower made by Bosch Power Tools, is a perfect example of such a connected product. With its embedded SIM card (eSIM), the Indigo Connect transfers data to the cloud via the GSM mobile communications standard. Its owners can use a smartphone app to control their lawnmower at their convenience, even from a great distance. Indigo Connect can then mow without any further need for manual intervention. This digital service consisting of cloud and app connectivity adds significant value to the product and makes life easier for its users.



Maternity level 2



Enriching user experience with AI

The second level of maturity concerns the enhancement of manufactured products to meet customers' actual requirements. Over-the-air software updates allow OEMs to deploy new services and software versions on the device and improve their products during their entire life cycle. In the past, gaining information about user experience was difficult, and in many cases only complaints were communicated – the product in its actual field of application was a black box.

AIoT now makes it much easier to incorporate the user perspective into the value creation process. But how to translate the incoming data from thousands of connected products into valuable information? Here, analyzing tools using AI and machine learning algorithms help gain the insights needed to complete the value creation cycle faster and in a more disruptive way. Moreover, insights derived from data on product use can help OEMs to identify problems at an early stage and respond quickly.

Let's take a closer look at an example. A renowned tire OEM was looking for an intelligent tire management system that could be beneficial for both the OEM and fleet operators. The main goals: diagnose and predict wear and tear ahead of time; improve product efficiency with proactive maintenance; reduce operational costs; provide the end-user with a positive user experience through predictive analytics. The solution: a sensory system that monitors the tire operating parameters and performance using a cloud-based AIoT application.

Dashboards for vehicle performance monitoring, as well as statistics and analytics, create the ideal environment for AI-based predictive maintenance insights. Real-time data of the actual tire usage helps the OEMs to examine and improve existing specifications. For example, they can compare the life expectancy of their tires depending on vehicle performance, driving patterns or road/terrain conditions, allowing them to adjust existing and new products to specific customer circumstances. Moreover, failures can be predicted much earlier, which shortens response times for product recalls. In our tire example, this also increases safety, as a defective lot can be identified early on, before human life could be in danger. This, in turn, leads to an enhanced end-user experience.



Maturity level 3

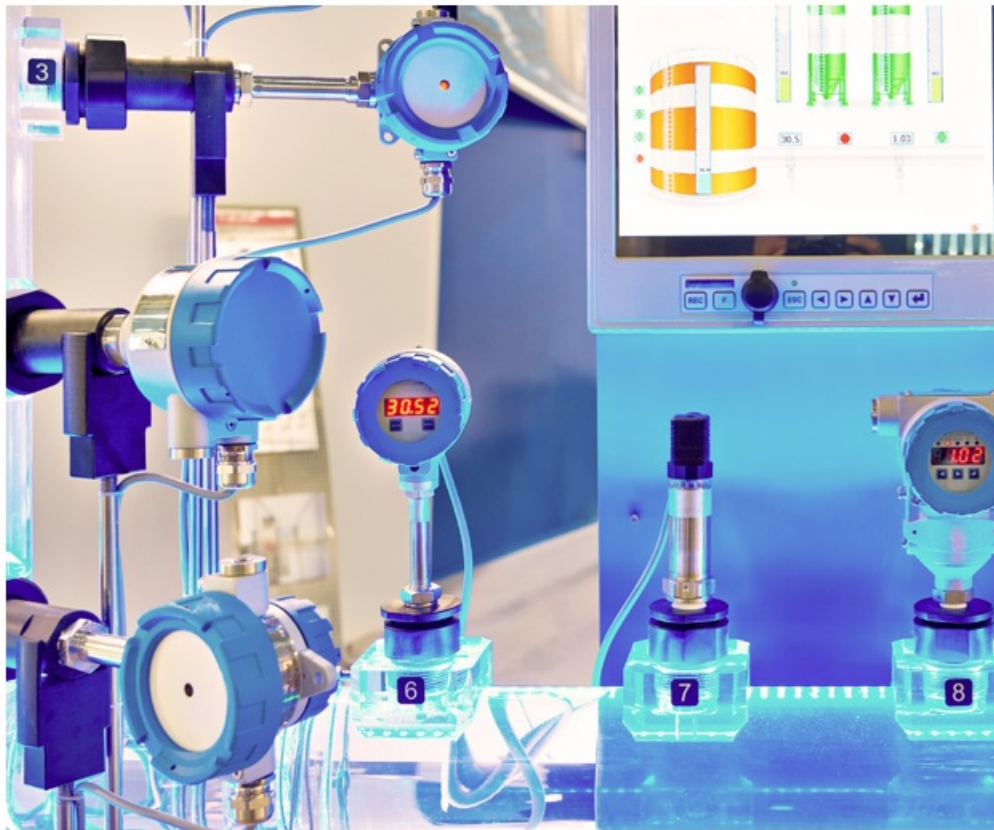


Reinventing AIoT business models

A lot of organizations are already using AIoT. Organizations who want to differentiate themselves from the competition, need to reinvent business models or tap into the latest ones from other players. This way, connected machines, devices, or components can evolve from being traditional capital assets to fully integrated parts of new business approaches – or even become as-a-service assets in the long run. Our own experience as an AIoT OEM, as well as research from the [Bosch IoT Lab](#), enable us to recommend newer business models. Examples are physical freemiums (free trial usage of services with some premium customers), digital lock-in (to ensure only original components), object self-services (items can order supplies independently), or products as a point of sales (the physical product offers further digital sales and marketing services). They offer best possibilities to unlock maximum value across the entire product life cycle and have already been tried and tested.

Predictive maintenance is an optimal starting point to the world of AIoT business models and a good example to explain a digital add-on pattern. While corrective and preventive maintenance can reduce costs and boost customer satisfaction, predictive maintenance requires intelligent algorithms to analyze data over a longer period, learn from it, and make the best possible forecasts. Take the current way of operating industrial pumps. Too often, they do not work at the best efficiency point (BEP), which leads to a reduced lifespan, as well as unplanned downtimes and higher operational expenditure.

Once maturity levels 1 and 2 are reached, intelligent connected pumps can be monitored regarding their performance and efficiency in real-time, thus ensuring the BEP. Moreover, solutions are in place to create insights from the collected data, e.g., on wear and tear, cavitation, and health condition of the pump and its vetted parts. This information, as well as the derived optimizations, are important for both OEMs and the companies that handle installation and maintenance for customers. In maturity level 3, we are therefore turning data and assets into services and new revenue streams across the product life cycle.



A portal allows authorized maintenance companies to connect to their customers' pumping systems, enabling them to offer better customer service, reduce unplanned downtimes, and most importantly, improve the pump's lifespan. In case of a malfunction, the portal provides technicians with information such as error code, cause, measures, and replacement parts, as well as time and cost estimates. Equipped with all this data, the technicians can contact the equipment owner and schedule proactive troubleshooting. OEMs can furthermore offer complete pumps-as-service packages, relieving small and medium-sized companies from the investment risk by providing a pay-per-hour system, including maintenance, spare parts management, and repairs tasks. By using additional data from the cloud, predictive maintenance can turn into prescriptive maintenance in the future: historical data, customer behavior, market analyses, and economic forecasts are used to predict the optimal timeframe to maintain every item individually.

While every physical product can only be sold once, associated digital services like smart maintenance can be multiplied and represent a new potential recurring revenue stream. Hence, OEMs need the end customers to connect their pumps to the cloud solution to make them accessible for these smart services. Additional incentives like free portal access and useful apps, e.g., for energy management, make the services more appealing and maximize the chance of long-term usage and brand loyalty. For example, maintenance companies not even owning a pump from the OEM might reach out to participate, offering even more benefits to their customers. This makes AIoT solutions interesting for all parties in the value chain.



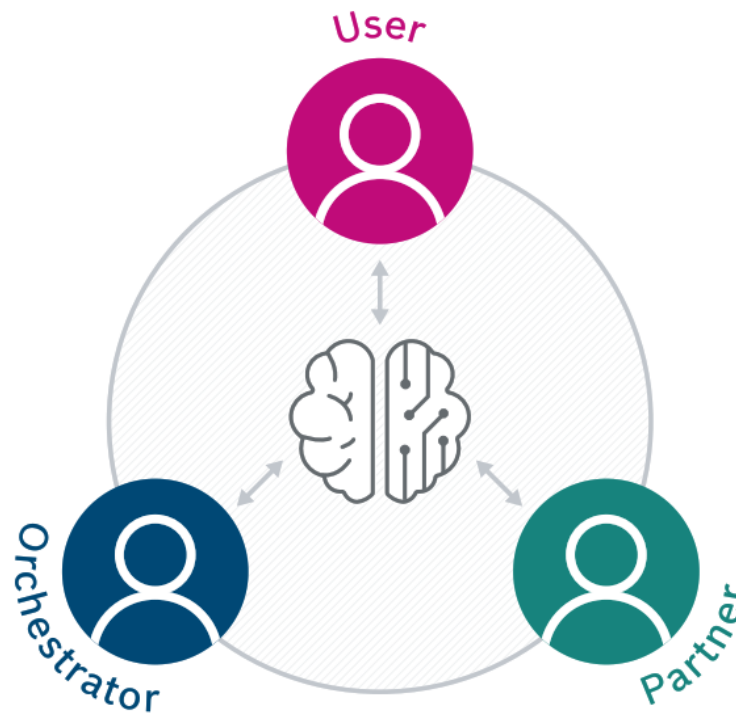
Maturity level 4



Molding evolving ecosystems

The first three maturity levels have enabled connectivity, communication, data analyses, and digital services for different players based on cloud solutions. However, everything is still centered around a specific asset from a specific company. One OEM alone cannot connect every type of device, sensor, or equipment in various fleets or factories, and implement digital services on that basis. There are simply too many technologies at play. In maturity level 4, it's therefore time to zoom out and think bigger by evolving towards an ecosystem-based business model.

The first step consists in being open to different collaboration possibilities, such as providing open access to application programming interfaces (APIs). By doing so, key ecosystem participants do not need to implement all services themselves. If an ecosystem provider uses an API, service or solution integration is simplified for developers from third-party providers and cross-industry players. A “value network” is born. Each new contributor who joins the ecosystem increases the network effects. This leads to a better and more personalized customer experience, but also to new opportunities to build on operational expertise. But what exactly is a network effect and how is it linked to value creation?



Let's refer to our tire example. Each new user in the network provides more insightful and valuable data, resulting in optimized products that, in turn, attract additional users – a classical same-side network effect. The increased use of a specific element like a tire can further augment the value of other elements in the ecosystem, such as services for truck maintenance and fleet management. Thanks to these cross-side network effects, the ecosystem is opened up for other business areas and invites even more cross-industry players to join in.

If OEMs take the opportunity now to become ecosystem orchestrators, they will be able to reap the full benefits of such value networks. They can also oversee key control points along the value chain and play an active role in the development and growth of the network. In the long term, this will result in new benefits for both the OEMs and their customers, putting OEMs the decisive step in front of the competition.

Six stumbling blocks to avoid in your organization's AIoT journey

Our practical tips

If you consider launching an AIoT project along the four maturity levels, there are some important obstacles that need to be considered and overcome. Trust us, we know from experience!

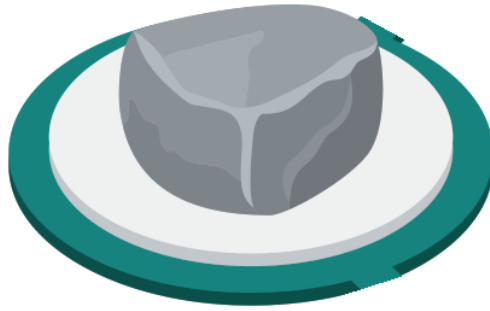
1. Initial investment

Achieving the first maturity level is the highest obstacle from a monetary perspective. Do not underestimate the costs of hardware and connectivity and have a good business plan with ROI and KPI calculations in place.



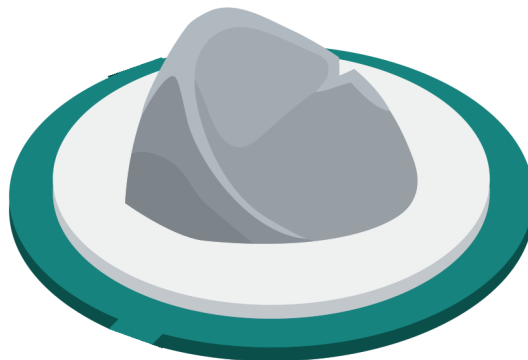
2. Life-cycle costs

Each product or device that is connected to the cloud will involve further costs during its service life. Don't forget to consider these operating costs in your initial calculation of new potential business models.



3. Business model

Test and evaluate your business model thoroughly. Optimizing maintenance and improving products is not enough. The added value must cover the costs of connectivity for AI applications (ROI). Winning in AIoT involves quick value creation and use case testing, which will require your organization to change.



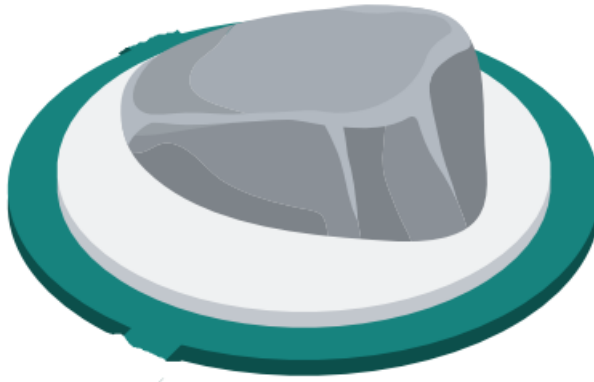
4. A company in transition

Organizations must undergo a digital transformation, and everybody must embrace a new mindset. This includes building new capabilities and skills, good change management, and an open marketing approach with the corresponding expertise.



5. Need for scale

The objective of AIoT implementation is to capture a clear value. AIoT is not just another digital initiative; it is a true enabler for comprehensive operating model transformation. Therefore, scalability is one of the most important prerequisites that should be carefully thought through.



6. Ecosystem management

Your role as an orchestrator of AIoT ecosystems must appeal to partners and third-party providers. This includes establishing a balanced usage model to ensure the interoperability of use cases and solutions.



Leading the way to a successful AIoT transformation

AIoT has immense potential to create and capture value across the product lifecycle. By following the four-step maturity plan, OEMs can not only defend their market position; they can excel in global competition. If OEMs recognize this unique opportunity, they will be ready to transform their stake across the value chain.

Once connectivity has been established, flexibility is paramount: use cases must be adapted to specific user groups. Referring to our examples: it might be beneficial for OEMs to move from connected pumps to an infrastructure-as-a-service model, or from connected tires to a fleet management offer. Whatever business model seems suitable, validation and scale-up are especially important.

When engaging in an AIoT ecosystem, OEMs are well-advised to promote interoperability to ensure sustainable success. But most importantly, AIoT-led digital transformation is still about people, both customers and OEM staff. Only when new business models and product offerings are accepted by those who work or live with them every day, will AIoT transformation really succeed.

When turning these stumbling blocks into opportunities, OEMs can leverage important – and maybe even vital – business opportunities from AIoT ecosystems.

Learn more

Contact our AIoT experts for further information and vital tips.



[Schedule a call with one of our experts](#)



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Bosch Global Software Technologies Private Limited (BGSW)

123, Industrial Layout,
Hosur Road
Koramangala, Bengaluru – 560095
India

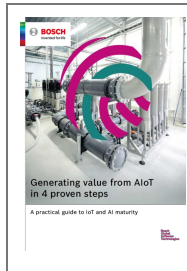
www.bosch-softwaretechnologies.com

Bosch.IO GmbH

Ullsteinstraße 128
12109 berlin
Germany

www.bosch.io

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Documents / Resources

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