Whitepaper:
Digital twins and AIoT

turing
agile **AI**

How can they help me make data-based decisions?

How have organizations implemented them successfully?

Digital twins: a promising business future

Digital twins is now one of the emerging technologies that will transform the outlook of our immediate future. Data show a huge business potential for companies launching now their digital twin-related projects. According to Gartner, the digital twin market will reach a 183 billion USD value in 2031.

What are digital twins?

A **digital twin** is the digital representation of a real-world entity or system, that is, its simulation. On a technical level, it implies modeling the features and states of the "analogical twin". The goal is to replicate complex processes and gather data. In this way, we can predict the performance of the "analogical twin" from a safe environment.

What is AIoT?

Digital twin solutions stand on other technologies, especially **AIoT**, that is, the mix of artificial intelligence (AI) and the internet of things (IoT). On a basic level, digital twins simulate a system based on the data gathered by IoT sensors. When such sensors not only send telemetry or states, but also infer using an AI model to raise alerts, we're dealing with AIoT.

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How are AIoT and digital twins related?

Digital twins and (A)IoT are two technologies that complement each other. Organizations are well aware of that. According to Gartner, 24% of companies with IoT also have digital twins, while 42% plan to incorporate it within the next three years. There are two main reasons to use these two together.

First, **digital twins facilitates (A)IoT solutions**. In an IoT system, data flows through many devices and channels. Managing all these connections can be tough. The digital twin can centralize data reception and processing, which helps solve this complexity problem.

Second, adding AI and digital twins allows you to **take IoT beyond the scope of classic projects**. On the one hand, it enables a more efficient use of data and more ambitious solutions. Many decisions can be automated, at least partially. On the other hand, this technology mix lets you implement digital twins in more sectors, instead of just in the manufacturing use cases it was first designed for.

What can you do with AIoT and digital twins?

- ✓ **Optimize data management and generation:** A digital twin helps both centralize data and generate them using simulations.

- ✓ **Obtain insights:** Data from digital twin simulations feed predictive models. This way, you can achieve a thorough understanding of your product or service.

- ✓ **Automate or semi-automate decision making:** Optimal decisions are implemented using business rules or machine learning models in the analogic twin after being tested in the digital twin.
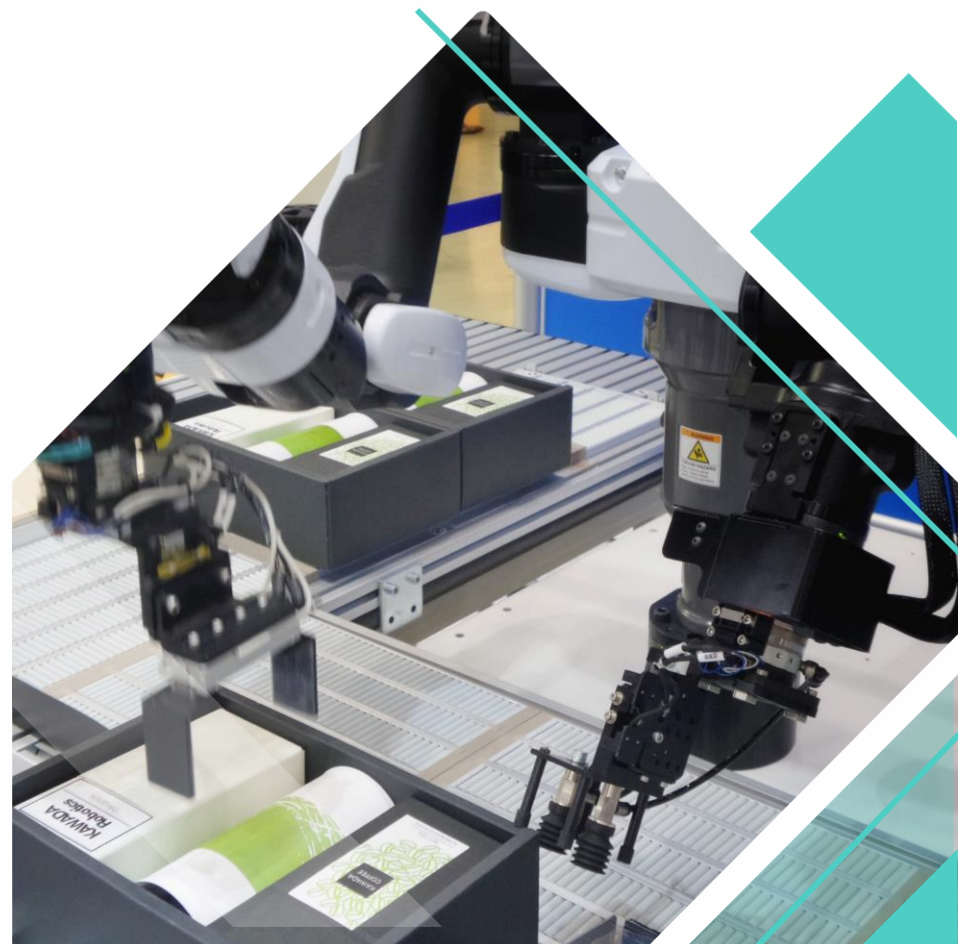
What are the benefits of incorporating AIoT and digital twins?

They offer substantial benefits for businesses and so some competitive edge for the company.

- **Quality:** Digital twin simulations provide a great amount of data that enable more precise models and business decisions. This has a direct impact on the end product or service, because performance can be better understood before release.

- **Agility:** AIoT enables decisions to be taken on the edge, where data is generated, with no need to send it to the cloud for processing. Furthermore, bandwidth is reduced, which is key in real-time applications such as video monitoring.

- **More progressive adoption of AI:** These solutions help gradually introduce smart technologies to your company. They centralize AI implementation in a specific system focused on optimizing well-defined processes. It's easier to scale from that.

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Which technologies enable AIoT and digital twins?

At Turing, we rely on Microsoft Azure for our AIoT and digital twin solutions:

- **Azure Digital Twins (ADT):** It's the IoT service from Microsoft to create digital twins. It can easily connect to all other components in the Azure environment, such as Azure Data Explorer (ADX). In this technical article, we delve into this service: ¿Cómo implementar IoT con Microsoft Azure? – Azure Digital Twins y Azure Data Explorer.

- **Azure Stack Edge:** It's the hardware designed by Microsoft for AI solutions in IoT systems.

- **Azure IoT Hub:** It's the cloud solution from Microsoft for centralizing the communication between devices on the edge (Azure Stack Edge) and the cloud platform.

- **Azure Machine Learning:** It's the cloud service from Microsoft for managing the whole lifecycle of AI models.

Success stories

Turing has implemented digital twins and AIoT solutions in a wide range of industries.

- **Smart manufacturing:** It was the starting case for digital twins. It allows to detect flaws and optimize processes using simulations.

- **Smart roads:** Security and fee toll management are improved and infotainment services are offered.

- **Smart facilities:** It includes management of airports, stadiums, or malls. Anomalies are detected to better security and infotainment services are offered.

- **Smart cities:** These services can also be applied to improve security or waste management.

Learn more

- ✓ Read our technical article: ¿Cómo implementar IoT con Microsoft Azure? – Azure Digital Twins y Azure Data Explorer (turingchallenge.com)

- ✓ You will find our products, more success stories, and whitepapers in our website: https://www.turingchallenge.com/downloads.

- ✓ If you want a full demo of the product and a customized estimate, reach us at hello@turingchallenge.com

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