# Planning ahead with Industry 4.0

It is all about the data

The fourth industrial revolution has nothing to do with the steam that powered machines in the first industrial revolution, nor the mass production that characterized the second one. But there is a connection to the computer-driven changes of the third revolution we have been part of in recent decades. And now, the fourth industrial revolution is building upon this with topics like connectivity, big data, artificial intelligence and a blurring of the boundaries between the physical, digital and biological worlds. As well as having a significant impact on our personal lives, it will transform production processes as smart factories improve efficiency and open up a range of exciting new possibilities.

PLANTING THE SEEDS OF INNOVATION

By embracing this revolution, or Industry 4.0 as it is also known, industry is reacting to customers' needs that call for new manufacturing processes within a smart interconnected environment – the Industrial Internet of Things (IIoT). Those who want to stay ahead must proactively integrate developments across the organization while simultaneously working closely with customers and suppliers. A clear strategic vision driven by performance helps to manage the huge disruption that goes hand in hand with digitalization. Seeing it as an opportunity for growth, progress and innovation will show how smart products and processes can be developed. Addressing Industry 4.0 will raise awareness of many crucial topics for sustainable and profitable, long-term operation.
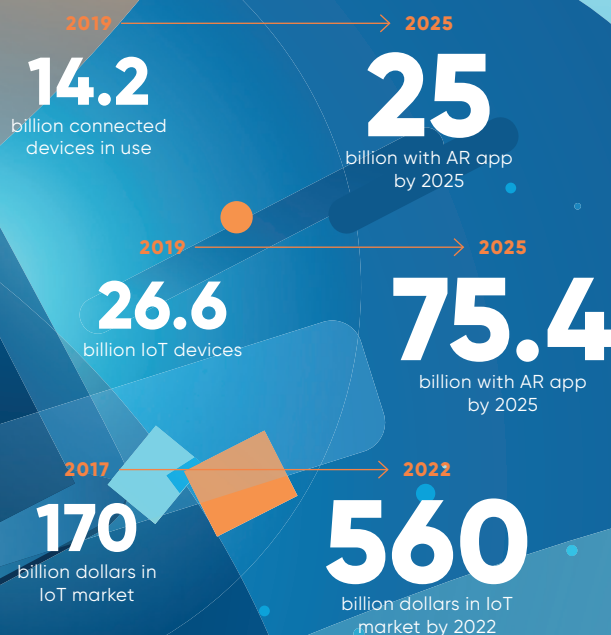
The potential of Industry 4.0 and IIoT is monumental; it will redefine how we work and operate over the coming decades. It is re-inventing industry thanks to a huge array of innovations, including sensors, big data, digital twins, augmented reality, artificial intelligence, machine learning, 3D printing, and robotics. Underpinning it all is the crucial aspect of cybersecurity. Address that from the beginning and the future of IIoT promises to be a bright one.

FACTS

- 127 new IoT devices connect to the Internet every second
- 75% of organizations do not use the full potential of their IoT technology due to the lack of data scientists
- Digital transformation is a top strategic objective for 94% of executives
- Companies expect IoT and other digital technologies to improve efficiency by 12%
- In Germany, 91% of industrial/manufacturing businesses invest in "digital factories" that include IoT solutions
- IoT in manufacturing grew by 84% between 2016 and 2017, the highest increase in any industry
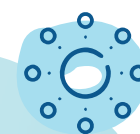
DIGITALIZATION

Digitalization means using digital technologies and digitized data to improve or transform business operations and/or business functions. It is the process of moving towards digital business by grasping value-producing opportunities that use digital technologies. In smart manufacturing, this can be achieved with a mix of autonomous, semi-autonomous and manual operations.

IIOT (INDUSTRIAL INTERNET OF THINGS)

Rapid innovation has led to increasing connections between the physical and the digital world. In manufacturing, instrumentation, sensors and other devices are being used in machinery and vehicles. In comparison with standard IoT solutions, industrial uses place greater focus on precise sensors and location-aware technologies with advanced controls and analytics. IIoT can massively improve connectivity, efficiency and scalability as well as saving time and costs for industrial organizations. And it will enable more efficient management of the entire supply chain as smart manufacturing is characterized by a high level of adaptability, intelligent automation, in-depth cybersecurity, and advanced human-machine interaction. The automotive segment and branches of industry like manufacturing and the energy sector are currently the biggest users of IIoT technologies, followed by the retail sector and health care.

BIG DATA

IIoT is creating and collecting more data than ever before. But data has no value unless it is structured in a way that enables it to be analyzed. Analyzing the data generates deeper insights into operating processes. Feeding larger and larger amounts of data to machine-learning models enables them to make increasingly more accurate predictions. In medicine for example, supercomputers draw upon millions of data points and studies to identify algorithms. Amongst other uses, machine learning helps to detect malignant tumors. A similar theory can be applied in manufacturing – potential malfunctions that could impact the profitability of an entire plant are identified, analyzed and optimized.

2019 → **2025**

14.2 billion connected devices in use

25 billion with AR app by 2025

2019 → **2025**

26.6 billion IoT devices

75.4 billion with AR app by 2025

2017 → **2022**

170 billion dollars in IoT market

560 billion dollars in IoT market by 2022

In 2020, each person will generate **1.7 megabytes of data per second**

97.2% of organizations are **investing in big data and AI**

90% of digital data was created **in the past two years**

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MACHINE LEARNING

Humans have trained machines to learn from the past by remembering data, studying it and identifying algorithms. By remembering patterns and repetitive data, the machine knows how to perform a specific task without the need for any explicit instructions. Machine learning algorithms are capable of resolving many everyday issues or specific problems, for example in manufacturing and engineering. Training the neural network is the key to machine learning, which is why data scientists take care of choosing suitable features to put the machine learning algorithms into productive use. Smart machines are not only faster, but they can also become smarter over time.

ARTIFICIAL INTELLIGENCE (AI)

Digitalization combined with artificial intelligence opens up enormous and exciting possibilities in many industries. The pace of the progress made is strong and this will lead to major changes in the interaction between human beings and machines in the next few years. This combination is becoming ever more present in our everyday lives – just think of using Alexa, reading about self-driving cars or knowing that AI makes the world more inclusive, e.g. with solutions that help blind people to identify groceries by scanning the bar code with an app. We are even able to beat a grandmaster at chess using an AI program. AI is part of our everyday lives in things that are commonly incorporated in various tools, like

e-mail spam filters, predictive Google search suggestions or finding the fastest way from A to B with the help of Google Maps. In manufacturing, digital twins – virtual copies of physical assets or products – use AI technology to collect real-time data from sensors in order to evaluate this data and simulate it in a virtual copy of the asset.

VIRTUAL REALITY AND AUGMENTED REALITY

Virtual reality (VR) has its origins in 1960s film making, but was first brought to the mass consumer market by the gaming industry before entering other areas like real estate and medicine. Unlike VR, the aim of augmented reality (AR) – also called mixed reality – is to bring the virtual object to the real world and integrate it. If you have already used face filters on Instagram, then you have experience of a very basic form of AR. In manufacturing and engineering, there are several AR approaches along the value chain. AR can assist with instructions for maintenance, training sessions or a simple display of relevant data to improve productivity, processes and operations, creating an end-to-end experience between the user and the machine or product.

Technology helps us make progress. But we need to ensure that we adopt the best of IIoT technologies to achieve positive changes, such as more efficient operations, time savings, innovative solutions and ways of making our everyday lives simpler. •

POSITIVE CHANGES WITH IIOT

- Connectivity and communication
- Fewer errors in operation
- Automation and control
- Predictive maintenance
- Time and cost savings
- Data collection and monitoring
- Greater efficiency and new capacities
- Cross-facility operations analysis
- Supply chain visibility
- Plant safety

Foresee Digitally

How does ANDRITZ integrate the exciting new possibilities that come with Industry 4.0?
As a technology leader with extensive and long-term experience in supplying industrial measurement, control, and optimization solutions for various industries, ANDRITZ is combining its process and equipment expertise with the latest advancements in the digital era. The result of this powerful combination is Metris: a portfolio of ANDRITZ Digital Solutions.

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