LeverX

Industry 4.0: Connect Product Lifecycle Across an Enterprise

CONTENTS:

4 STEPS TO AN INDUSTRIAL FUTURE

How production has developed up to now

The Industrial Revolution is the society restructuring, which occurred under the influence of technological and technical innovations and is accompanied by a performance jump. The history of industrial society development has had three industrial revolutions, and now we are at the heart of the fourth one. To figure out what inventions will change industrial production shortly, let's explore what inventions and discoveries formed the basis of previous revolutions.

Industry 1.0

The first industrial revolution began at the end of the 18th century. Agriculture, as the economic basis, gave way to the manufacturing industry. People mastered coal mining, and the steam engine became the basis for discovering a new energy type — all this encouraged the creation of new transport and production mechanization.
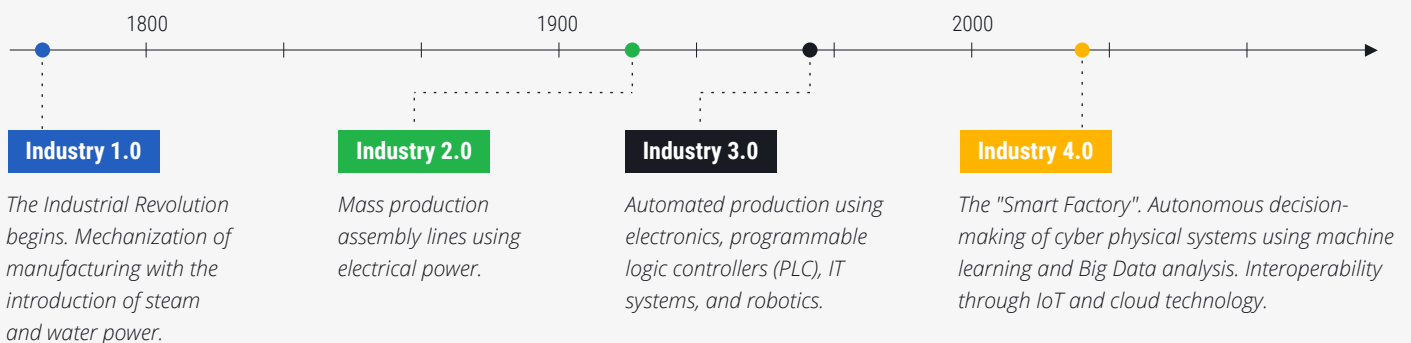
Industry 2.0

100 years after the first industrial revolution had begun, the world had entered the second one. Electricity made mass production available. The manufacturing industry developed rapidly, and new energy sources — electricity, gas, and oil — appeared. The result was the development of the internal combustion engine. The second industrial revolution resulted in the invention of the automobile and airplanes.

Industry 3.0

The third industrial revolution began in the 1960s with the advent of digital technology. It is marked by the explosive growth of electronics, telecommunications, and computers. Due to new technologies, this revolution opened the doors to space expeditions, research, and biotechnology, culminating in the development of the Internet.

Industry 4.0

The Internet became the basis for the fourth industrial revolution. The previous ones freed humanity from hard physical labor, made mass production available, and provided access to digital technologies. But it is fundamentally different: Industry 4.0 is characterized by new technologies connecting the physical, digital, and biological worlds and affecting all industries.

1800   1900   2000

Industry 1.0

The Industrial Revolution begins. Mechanization of manufacturing with the introduction of steam and water power.

Industry 2.0

Mass production assembly lines using electrical power.

Industry 3.0

Automated production using electronics, programmable logic controllers (PLC), IT systems, and robotics.

Industry 4.0

The "Smart Factory". Autonomous decision-making of cyber physical systems using machine learning and Big Data analysis. Interoperability through IoT and cloud technology.

leverx.com

CAPTURING THE VALUE OF INDUSTRY 4.0
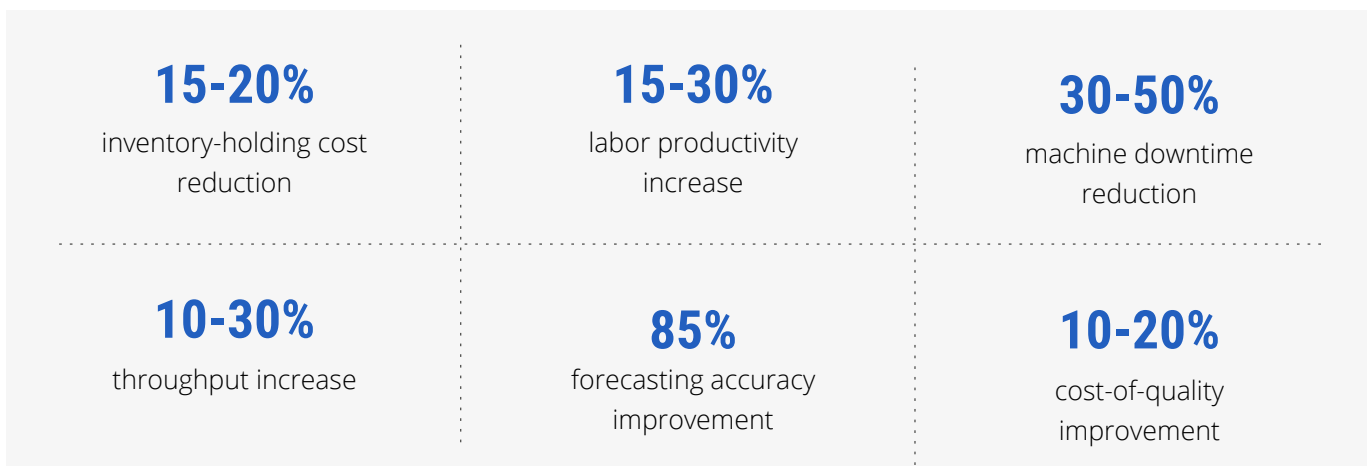
Technologies that create it

Industry 4.0 is a new production and consumption approach that is based on Big Data collection, processing, and use to execute manufacturing processes without human input. Due to intelligent technologies, Industry 4.0 brings a new level of supply chain automation, monitoring, and analysis.

At its core, there are industrial Internet of Things (IIoT) and cyber-physical systems — intelligent autonomous systems that use computer algorithms to monitor and manage physical enterprise assets. Industry 4.0 makes all the supply chain processes "smart", ranging from productions and factories to warehouses and logistics. Moreover, it links backend systems such as enterprise resource planning and ensures transparency and control over company performance.

The result is:

- **Production flexibility** is achieved through the rejection of rigid "conveyor" solutions. It allows businesses to accept and execute custom orders, implement new solutions into production, and freely use outsourcing.
- **Production customizability** is ensured by its control at all levels and functioning on a unified technology platform.
- **Production efficiency** is associated with human factor reduction: errors, downtime, and high cost of human labor.

Industry 4.0 Value Potential

15-20% inventory-holding cost reduction	**15-30%** labor productivity increase	**30-50%** machine downtime reduction
10-30% throughput increase	**85%** forecasting accuracy improvement	**10-20%** cost-of-quality improvement

Source: McKinsey & Company

Industry 4.0 Technologies

Industry 4.0 rests on nine pillars that serve as a bridge between the physical and digital worlds and ensure the functioning of intelligent and autonomous systems. Enterprises and supply chains already use some of these technologies, but the entire Industry 4.0 potential can be realized when they are used in combination.
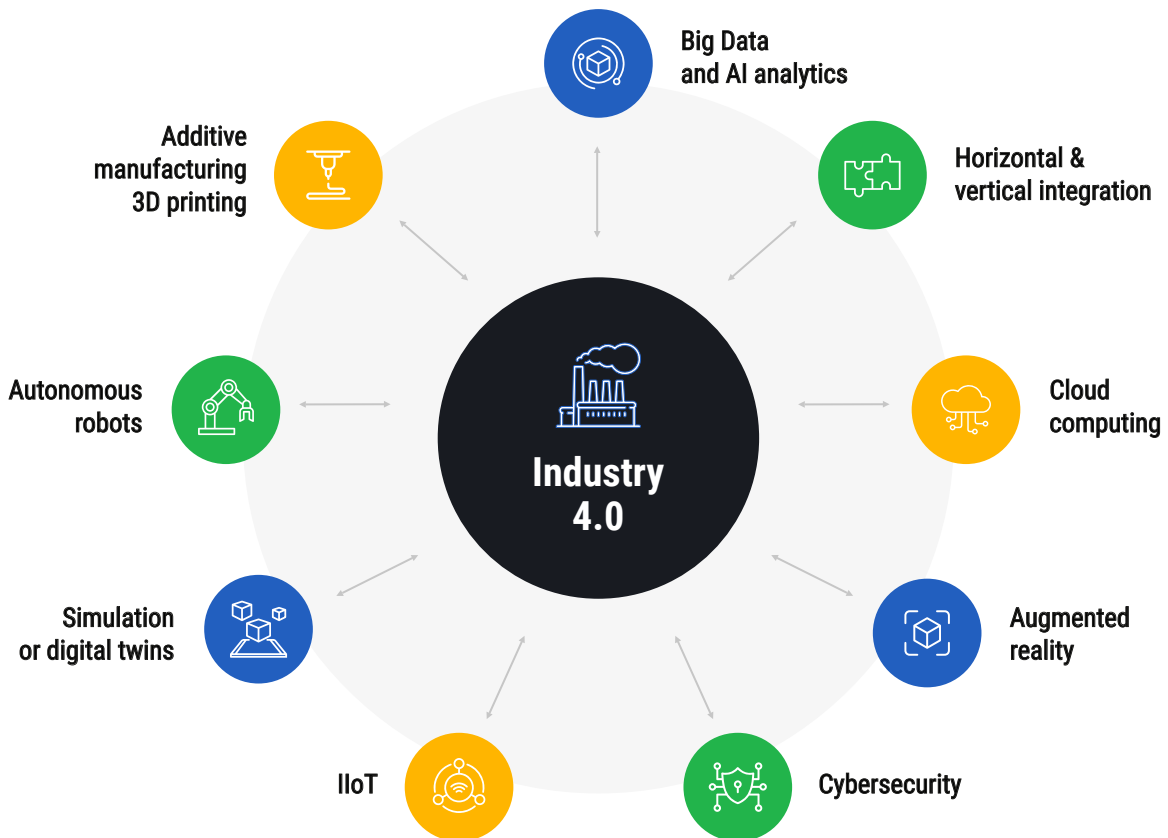
Example of Applying Industry 4.0 Technologies in a Factory Network

Data, computational power, connectivity

· Cloud technology
· IIoT
· Sensors

Analytics & Intelligence

· Automation of knowledge work
· Big data, analytics, and AI

Human-machine interaction

· Virtual & Augmented reality
· Robotics & Automation (collaborative robots, automated guided vehicles)
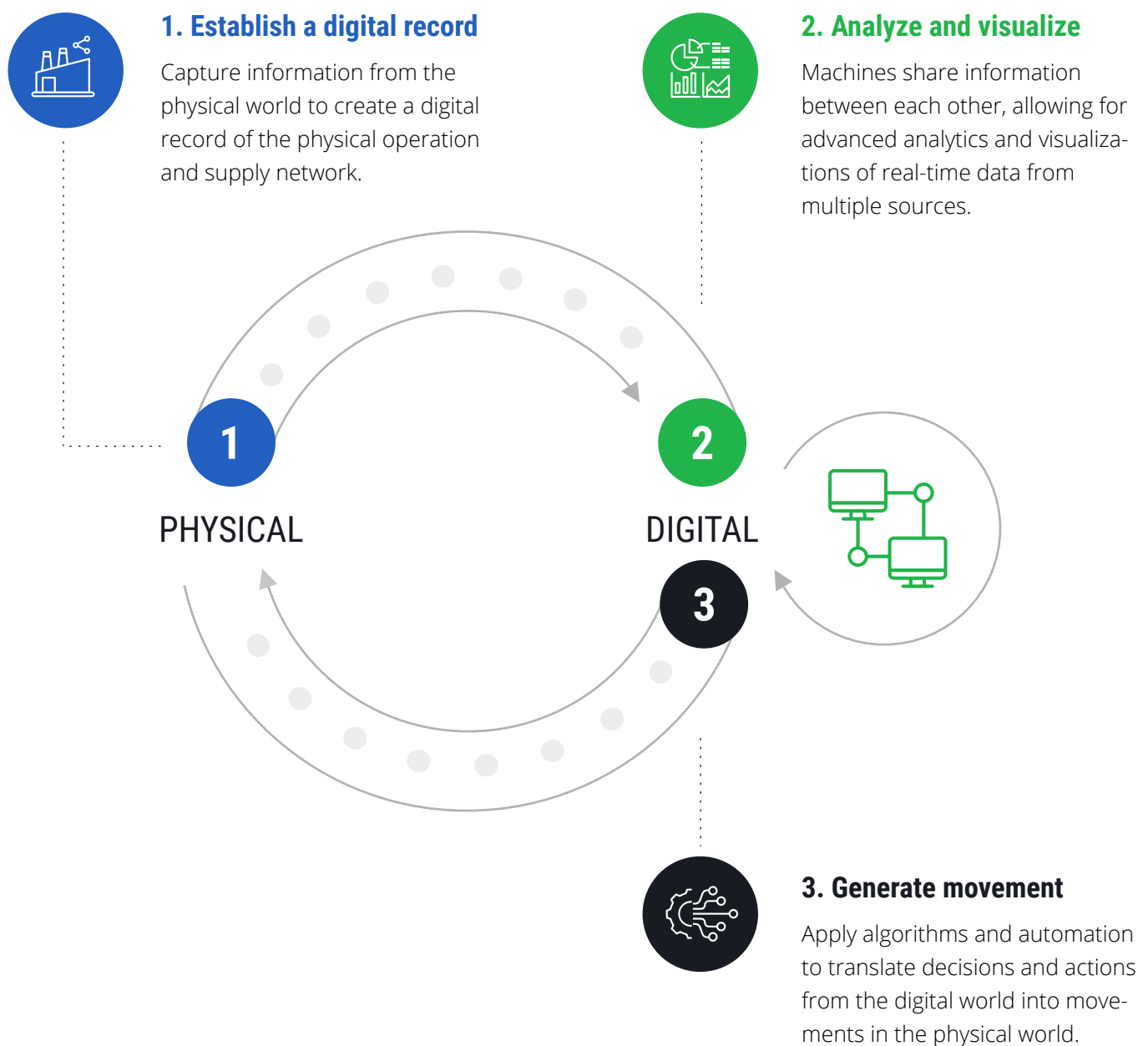· Robotic process automation, chatbots

Advanced production methods

· Additive manufacturing (including 3D printing)
· Renewable energy

leverx.com

PLM AS A DATA ENABLER FOR INDUSTRY 4.0

Applying IIoT technologies to connect the physical and digital

Industry 4.0 is also known as "Smart Manufacturing" or "Manufacturing 4.0". Its essential role is creating information and converting it into action, while actions are recorded, analyzed, and converted into digital data. Thus, a physical-digital-physical (PDP) loop appears.

1. Establish a digital record

Capture information from the physical world to create a digital record of the physical operation and supply network.

2. Analyze and visualize

Machines share information between each other, allowing for advanced analytics and visualizations of real-time data from multiple sources.

1

PHYSICAL

2

DIGITAL

3

3. Generate movement

Apply algorithms and automation to translate decisions and actions from the digital world into movements in the physical world.

Source: Deloitte Center for Integrated Research

What Role do IIoT Technologies Play in These Processes?

IIoT technologies are one of the key tools for collecting data and combining company resources into an integrated ecosystem, allowing businesses to increase production efficiency and save money. Let's consider the key PLM stages in detail.

PRODUCT LIFECYCLE MANAGEMENT WITH IIOT

Design

With real-world datasets collected by IIoT sensors, engineers can model how a product performs in different scenarios, diagnose potential problems, optimize performance, or improve the product's design, thereby making the design process more efficient.

Production

IIoT sensors collect data from the physical enterprise assets and increase their efficiency with analytics and machine learning. If a machine breaks down, connected sensors automatically detect where the problem is and initiate a service request. The IIoT technologies can also predict when a machine is likely to break down.

Warehousing

Telematic devices and GPS feed ensure that vehicles follow the recommended optimal route along with the constant update of ETA. With real-time remote sensors, you can track your shipping containers and products as they move through the supply chain.

Delivery

Telematic devices and GPS feed ensure that vehicles follow the recommended optimal route along with the constant update of ETA. With real-time remote sensors, you can track your shipping containers and products as they move through the supply chain.

Maintenance

With IIoT, products can be tracked during their entire lifetime. If a product fails, the support people will already have detailed information on what the problem is and what needs to be done to restore it. IIoT also helps manufacturers understand the product behavior over its lifecycle and this data helps optimize its use as well as the maintenance.

leverx.com

SMART MANUFACTURING WITH SAP

Improving manufacturing processes with SAP products

SAP's strategy for Industry 4.0 goes far beyond intelligent manufacturing in factories and plants. It connects production with end-to-end process execution, so you can reach a new level of connectivity and adapt to change on the fly.

This strategy includes initiatives such as:

| Intelligent products | Intelligent factories and logistics | Intelligent assets | Empowered people |

Let's figure out their goals and what SAP solutions can help them achieve.

Intelligent Products

This approach allows the development of connected, self-aware products that share data about their health, location, usage level, storage conditions, and more. This information helps improve everything, ranging from product quality and customer service to logistics and R&D. They can also anticipate service needs and receive remote upgrades.

SAP solutions for Intelligent Products:

- SAP Enterprise Product Development to digitize product development processes
- SAP S/4HANA Manufacturing solution to optimize production processes
- SAP IoT solution to address IIoT use cases

leverx.com

Intelligent factories and logistics

Smart factories include real-time data analysis, AI, and machine learning in manufacturing. Sensors on equipment acquire and process real-time data, allowing a complete data-driven view of all operations, ranging from suppliers and supply chains, equipment, processes, and manufacturing practices, to final product testing and customer satisfaction.

SAP solutions for Intelligent Factories and Logistics:

- **SAP S/4HANA Manufacturing solution** to optimize production processes
- **SAP Extended Warehouse Management** to digitize warehouse operations
- **SAP Digital Manufacturing Cloud** to improve operations visibility
- **SAP Edge Services** to enable low latency, autonomous operations, and cloud-based orchestration for mission-critical processes

Intelligent Assets

This strategy reduces downtime and increases efficiency throughout the product lifecycle. With intelligent assets, you can monitor real-time asset performance, anticipate and prevent downtime, employ dynamic and predictive maintenance, take advantage of digital twins, and tightly integrate assets and business processes.

SAP solutions for Intelligent Assets:

- **SAP Asset Performance Management** to improve asset performance and enhance maintenance strategies
- **SAP Business Network for Asset Management** to collect and track equipment usage information in a central repository
- **SAP IoT solution** to embed in and extend business processes

Empowered people

Automation, AI, or ML can't supplant the human mind. People are the most valuable business resource, and their empowerment is critical to success in Industry 4.0. Using IoT-enabled monitoring, geo-fencing, and real-time analytics can improve employees' health and safety and enable them to manage complex tasks and unforeseen events.

SAP solutions for Empowered People:

- **SAP Environment, Health, and Safety Management** to ensure the safety of employees and customers
- **SAP 3D Visual Enterprise** to integrate 3D visualization and business data across your value chain
- **SAP Asset Manager** to transform maintenance and field operations

ABOUT LEVERX GROUP

LeverX Group started over 19 years ago as a company specializing in SAP solution implementation and customization. Today, we are a consulting and software engineering company focused on developing and implementing software on the platform of SAP products and tools, as well as creating web, mobile, and cloud/server software solutions.

800+	**1,500+**	**950+**	**19**
clients	employees	successful projects	years of close collaboration with SAP

14 offices

10 countries

LEVERX GROUP

LeverX

Helps companies leverage investments in SAP solutions

SAP Global Strategic Supplier

emer||ine

Operates as a part of LeverX Group and provides full software development services for startups and established companies in both consumer and enterprise areas

SAP Gold Partner | member of the SAP AppHausNetwork | aws partner network | ISO 27001 LL-C (Certification) | ISO 9001 LL-C (Certification) | ISO 55001 LL-C (Certification)

leverx.com

Our primary mission is to deliver full-cycle technology services to businesses for their successful transformation. LeverX Group's deep expertise is based on successful cooperation with SAP as a Preferred Vendor since 2004.

LeverX Group: All-in-One Technology Partner
Designing cutting-edge solutions around the World

Team of highly qualified professionals

Customer-specific approach

Worldwide partner network

Seamless cooperation

Wide-ranging expertise

Competent to meet all your technological needs

LeverX Group works with customers as an SAP Contractor under a strict NDA. Our partners are SAP SE, SAP Global Marketing, SAP Labs, SAP Germany, SAP Nordic, SAP Switzerland, SAP America, SAP Canada, SAP Mexico, SAP CIS, SAP India, and SAP Japan. We have multiple projects all over the world.

leverx.com

Our SAP expertise includes:

- SAP S/4HANA Digital Core
- Digital Supply Chain Management
- Product Lifecycle Management
- Business Intelligence
- Asset Management
- Procurement

- SAP SuccessFactors and HCM
- Customer Experience
- Business Process Management
- Integration Technologies
- Governance, Risk, Compliance, and Security

Why LeverX Group?

Broad experience and profound competence in numerous solutions and technologies

Comprehensive understanding of business processes and industry-specific requirements

Continuous investment in innovation and early adoption of cutting-edge technologies

Full-cycle software development and support for enterprise solutions and consumer applications

Team scalability based on an established hiring/mentoring program and access to a broad pool of experts

Offshore/Nearshore/Onsite delivery model for customers worldwide

We are always happy to answer all your questions and find the best approach to enhance your business processes.

Contact us