

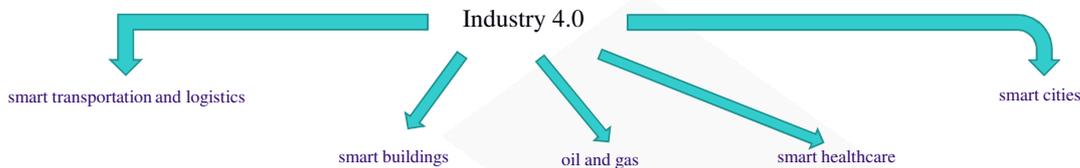
# FEATURES OF INDUSTRY 4.0 AND MECHANISMS OF STATE MANAGEMENT OF MANUFACTURING IN CURRENT GLOBAL ECONOMIC SITUATION

Dmytro Khlaponin

Kyiv National University of Construction and Architecture

## 1. The meaning and advantages of Industry 4.0

Smart industry or “INDUSTRIE 4.0” refers to the technological evolution from embedded systems to cyber-physical systems.



Digital transformation, interconnectedness and new manufacturing technologies related to Industry 4.0 offer such opportunities: new business models, sustainable and efficient use of limited resources, the cost-effective production of highly customizable products, reduction of costs, acceleration of production times, exceptional customer support.

### 1.1. Internet of Things technology as an integral component of Industry 4.0

According to a study from the MPI Group in 2021:

31%  
of production  
processes now  
incorporate smart  
devices and  
embedded  
intelligence

34%  
of manufacturers have  
plans to incorporate  
IoT technology into  
their processes

32%  
of manufacturers  
plan to embed IoT  
technology into their  
products

### 1.2. Technology convergence becomes technology fusion

The convergence of information technology and operations technology (IT/OT convergence) includes cybersecurity, which helps fill existing security gaps and ensures consistent security levels across the entire organization. The convergence also includes the integration of power and automation, which involves converging information about electrical assets and the production process to help improve sustainability across the entire lifecycle of a manufacturing plant. Convergence between power and automation also provides an integrated, digitalized approach that increases interoperability and flexibility, reduces capex and opex expenditures, increases production efficiencies, decreases unscheduled downtime and improves overall profitability.

### 1.3. Operational resilience becomes a key company objective

The current COVID-19 pandemic leads manufacturers to focus on operational resilience as a key corporate objective. Operational resilience means that companies are breaking physical and organizational boundaries to engage a real-time workforce, connecting teams and enhancing collaboration. Operational resilience means that new methodologies are being deployed for companies to protect against unscheduled downtime and asset failures, ensure product fulfillment, protect personnel and enhance security architectures. In 2021, manufacturers will look to increase their operational resilience, to reduce their supply chain vulnerability, lower safety risks, improve remote operational performance and optimize production throughout the plant lifecycle.

A conclusion can be made that one of the key objectives of any manufacturing company is operational resilience and all management decisions concerning supplies, negotiations with partners, response to customer needs, operational resilience, cyber security measures, personnel management and safety are made in real time with close collaboration of all members of a team from the lowest level to the top management. Such approach in management of a company (for example a plant) is required also because of the current COVID-19 pandemic.

Industry 4.0 is a part of national economy of a developed state and it will develop rapidly and will transform into more innovative concepts in order to satisfy manufacturer and customer requirements. For this reason such state should take appropriate measures to support certain enterprises by means of tax optimization, licencing of certain types of economic activity, issue of standards in Industry 4.0, certification of products and services, training of public officials etc.

Also in order to optimize production throughout the plant lifecycle cyber physical systems should be created. Cyber-physical systems integrate computation, communication, sensing, and actuation with physical systems to fulfill time-sensitive functions with varying degrees of interaction with the environment, including human interaction.

### 1.4. Automated operations become autonomous operations

One more issue that needs to be considered is that automated operations become autonomous operations.

Accelerated by the COVID-19 pandemic, industry urgently requires new modes of operation.

Thanks to advances in digitalization and new open process automation standards, IT/OT convergence and digital transformation, manufacturers have an opportunity to move from “automated” to “autonomous” operations where appropriate.

Today, human operators decide what to do when something unpredictable happens. Tomorrow, the autonomous systems may be making those decisions, with the humans serving as observers and overseers. One concern often expressed is the aging workforce and how to pass on the knowledge gained over years of making decisions. This is often based on intuition and experience. While these human characteristics can be hard to replicate in systems, when trained with appropriate historical data and combined with adequate real-time data, artificial intelligence (AI)-based applications can enhance the human’s understanding of what is normal and abnormal in plant operations.

In 2021, manufacturers will continue to make inroads toward moving operations from automated to autonomous.

### 1.5. The state policy of Industry 4.0 implementation and regulation in Ukraine

Ukraine like other developed countries also implements Industry 4.0 in its economy.

In order to define the peculiarities of Industry 4.0 implementation and regulation in Ukraine it is necessary to outline the mechanisms of state management of Industry 4.0 in the Ukrainian economy.

For the purpose of the Industry 4.0 regulation in Ukraine the Cabinet of ministers of Ukraine issued an Order dated 17 January 2018 “On the approval of the concept of digital economy and society development in 2018-2020 years and the plan for its realization”. Actually it is still valid.

This order provides that Industry 4.0 is an updated concept of “smart manufacturing”, which is identified with the “fourth industrial revolution” and the emergence of cyberphysical systems. Industry 4.0 is the next stage of digitalization of industry, in which the main role is played by technologies and concepts such as the Internet of Things, “big data”, “predictive analytics”, cloud computing, “machine learning”, machine interaction, artificial intelligence, robotics, 3D printing, augmented reality.

To use the potential of Industry 4.0 in Ukraine, it is important to implement the following initiatives:

**targeting**, i.e. analysis and research of industrial sectors in order to assess competitiveness and development prospects;

**introduction of modern information technologies** in industry, or a program of education and transfer of best practices from the IT sector and digital industries to industrial sectors.

**engineering clusters**. Powerful developers in industrial engineering have the opportunity to radically influence industrial innovations, scientific research and development, export marketing.

**sectoral “road maps” of digital transformation**.

Other important tasks are the official **recognition of international standards**, which are the generally accepted basis of Industry 4.0 (about 100 standards), **state support for technical committees** involved in working on standards related to Industry 4.0; **creation of mechanisms of technology transfer**.