AREAS OF COOPERATION IN THE CONTEXT OF DIGITAL TRANSFORMATION IN THE EUROPEAN UNION

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Abstract: *The European Union is a dynamic community of sovereign states that share and implement common strategies for the digital transformation of their industries. Germany, as the leader of digitalization in the EU and the author of the concept of Industry 4.0, is the first country to develop its national idea of a growing and innovative digital economy.*
Taking into account the common digital priorities, the European Union has formed a single concept - a model for digital transformation of the European economy.
In this context, based on the main documents with a view to establish a digitalized Europe, the main areas for digital transformation in the European Union are revealed. They are a promising vision for both the digital future of Europe and for mutually beneficial and copious digital cooperation.

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JEL Classification System*: F01, F15, F36, O14*

1. Artificial digital intelligence

Reliable artificial intelligence (abbr. AI) can bring many benefits, such as better health care, safer and cleaner transport, more efficient production and cheaper, more sustainable energy.

The digitization of artificial intelligence includes the following activities:

- creating a new public-private partnership in the field of artificial intelligence and robotics;
- strengthening and connecting research centers for excellence in the field of artificial intelligence;
- at least one digital innovation center specializing in artificial intelligence in each Member State;
- providing more funding for the development and use of artificial intelligence with the help of the European Investment Fund;
- use of artificial intelligence to increase the efficiency of public procurement procedures;
- assisting public authorities in procurement of artificial intelligence systems.

The European Commission's proposals include the following aspects:

- ✓ new risk-oriented artificial intelligence legislation without restricting innovation;
- ✓ requirements for transparency, traceability and human control regarding high-risk artificial intelligence systems;
- ✓ authorized inspection of artificial intelligence systems, such as cosmetic products, cars or toys;
- ✓ objective data sets;
- ✓ launching a pan-European debate on the use of remote biometric identification (e.g. facial recognition).

The figures for artificial intelligence clearly show the following parameters:

(i) 1.5 billion euro – EU funding for artificial intelligence research and innovation increased by 1.5 billion euro (up 70% from the previous period);

(ii) 20 billion euro. The aim is to attract over 20 billion euro in total annual artificial intelligence investment in the EU over the next ten years;

(iii) More than 25% of all robots used by industry and households are manufactured in Europe. [1]

2. Digital data

Data is at the heart of the digital transformation. It affects the way we produce, consume and live. Access to and ability to use ever-increasing data sets is essential for innovation and growth.

The EU will create a single data market in which:

- Data can move freely within the EU and across sectors for the benefit of all;
- European rules, in particular on privacy and data protection, as well as competition law, are fully respected;
- The rules for accessing and using data are fair, practical and clear.

The European Commission is proposing a new European way of managing data to facilitate the exchange of data between sectors and Member States.

The forecast data for 2025 show: [2]

(i) 530% – increase in global data volume, from 33 zettabytes in 2018 to 175 zettabytes;

(ii) 829 billion euro – value of the data-based economy in the EU-27. Of the € 301 billion (2.4% of EU GDP) in 2018;

(iii) 10.9 million data specialists in the EU-27 – from 5.7 million in 2018;

(iv) 65% of the EU population with basic digital skills – from 57% in 2018.

3. Industry - double ecological and digital transition

Europe's industry covers:

- 20% of the total European added value;
- 80% of European exports;
- 35 million jobs;
- 99% of European companies are small or medium-sized enterprises.

There are three driving forces with the goal to transform the industry, support small and medium-sized enterprises, whilst maintain Europe's sustainability and competitiveness:

First, a green transition, in the context of which the European Green Pact represents Europe's new growth strategy. It is based on the goal of becoming the world's first climate-neutral continent by 2050. [3]

Second, a digital transition that allows industry as well as small and medium-sized enterprises (SMEs) to be more proactive, provides new skills for workers and contributes to the decarbonization of the economy. Build a more circular economy by reducing its carbon and material footprint, and introducing circularity throughout the economy. The transition to a low-carbon economy is expected to create more than 1 million jobs by 2030. Europe already has 1 million job vacancies for digital experts.

Third, competitiveness on the world stage, for which Europe must use the impact of its single market to impose global standards. EU industry is highly integrated into global value chains, operating globally.

Ultimately, Europe's industrial industry needs to become greener, more circular as well as more digital.

4. Basic digital technologies

Cloud computing, quantum technology and high-performance computing technologies play a key role in building Europe's digital resilience, namely:

- Cloud computing is essential to ensure that data is processed efficiently and can contribute, inter alia, to the environmental transition in areas such as agriculture, mobility, buildings and manufacturing.
- High-speed computing, also known as supercomputer computing, allows data to be processed and analyzed at speeds thousands of times faster than other computers, which could lead to significant scientific advances.
- Quantum technology uses the properties of quantum mechanics to create practical applications that can lead to significant improvements in science, industry and society. [4]

5. Digital jurisprudence

Digital services legislation will introduce a number of new, harmonized EU-wide obligations for digital services, carefully graded based on the size and impact of these services, such as:

- rules for removing online illegal goods, services or content;
- safeguards for users whose content has been incorrectly deleted from platforms;
- new obligations for very large platforms to take risk-based actions to prevent abuse of their systems;
- comprehensive transparency measures, included with regard to online advertising and the algorithms used to recommend content to users;
- new powers to thoroughly review the operation of platforms, including facilitating researchers' access to key platform data;
- new rules for traceability of business users in online markets, supporting tracking of sellers of illegal goods or services;
- a new procedure for cooperation between public authorities to ensure effective implementation within the single market.

Legislation of digital markets combats the negative effects of certain types of behavior on platforms that act as "guardians of the digital entrance" within the single market.

Digital market legislation requires: [5]

(i) applying to large service providers on the main platform that are most vulnerable to unfair practices, such as search engines, social networks or online intermediary services;
(ii) setting quantitative thresholds as a basis for determining the alleged security guards of the information input;
(iii) prohibiting a number of manifestly unfair practices, such as blocking users from uninstalling any pre-installed software or applications;
(iv) requiring that the guards of the information entrance proactively take certain measures;
(v) imposing sanctions for non-compliance, which could include fines of up to 10% of the global turnover of the information entry guard, in order to ensure the effectiveness of the new rules;
(vi) targeting market investigations to assess whether the practices of a new entry gatekeeper should be added to the current market rules.

6. Digital cybersecurity

The digitalization of European cybersecurity must include:

First, Firewalls

A firewall is a key element in building any cybersecurity system. It is the first unit that receives incoming communication traffic directed to the inside of the local LAN of the exchange.

Second, Endpoint protection system.

It prevents all exploits, including those that exploit unknown Zero-Day vulnerabilities; provides protection against malware in executable files without the need for signature updates or Internet connection, protection against exploits, protection against malware as well as capabilities for unknown antivirus analysis.

Third, Data Protection System (DLP)

Today's IT environment is a difficult challenge for businesses that strive to comply with dozens of global data security regulations. For this reason, it is essential to use security solutions with an integrated system with a data leakage protection functionality.

Fourth, Data detection system.

Detection system of user identification data and investigation of security signals.

Fifth, Vulnerability management system. [6]

Monitors known and existing vulnerabilities and problems, issuing a warning when new vulnerabilities are detected. The system scans systems with public and private IP addresses for current security vulnerabilities and has the capacity to scan an unlimited number of IP addresses, without limiting the number of scans.

An example of digital jurisdiction is Digital Family Justice and the digitization in the context of the Covid-19 Pandemic. [7]

7. Digital education

„Digital education“ consists of two main areas: the development of digital competences for students and the pedagogical use of digital technology. Teacher competence is a major factor in the pedagogical use of digital technologies. [8]

The European Digital Competence Framework for Citizens, also known as Dig Comp [9, pp. 22-43] (Version, Carretero, Vuorikari and Punie, 2017), describes digital competence in detail.

There is a process of adapting education and training to the digital age, which should take place in the period 2021-2027. It proposes two strategic priorities, namely:

First, Promoting the development of a highly efficient ecosystem for digital education;

Second, Improving the digital skills and competencies needed for digital transformation.

In conclusion - strengthening cooperation and exchanges in digital education at EU level will require consumer-oriented innovation and engagement through digital education hackathons.

8. Digital health care and prevention

The purpose of the digital value chain is to transform health care and care in the digital single market by using the potential of data to empower citizens and build a healthier society.

Digital health care and prevention include:

(i) Secure access and exchange of health data;

(ii) Health data combined for research and personalized medicine;

(iii) Digital tools and data for citizen empowerment and person-centered health care.

It is recognized that Europe faces a major challenge with the sustainability and quality of health care delivery. Public spending on health and long-term care has been rising in recent decades in all EU Member States and is expected to rise further. In 2015, they are 8.5% of GDP in the European Union and could reach 12.5% of GDP in 2060. [10]

In the context under consideration, alarming statistics and recovery from the Covid-19 pandemic call for e-health, telemedicine and other digital technologies such as 4G/5G mobile communications, artificial intelligence and supercomputers to evolve, providing new opportunities for the transformation health systems.

9. Connectivity (programming)

In a digital environment connection or dependency refers to the degree to which one digital module relies on another digital module. The term connectivity is used in object-oriented design together with the concept of cohesion. Dependence is used more in traditional programming.

Connectivity is usually contrasted with cohesion (internal coherence). Low connectivity often means high cohesion and vice versa – high connectivity implies low cohesion. Object-oriented programming is a paradigm in computer programming.

The main directions of development include:

(i) Providing high speed mobile connectivity on key transport corridors;
(ii) Improving the coverage in the settlements with a focus on peripheral, underpopulated and rural areas;
(iii) Development of the state support network;
(iv) „Green" connectivity;
(v) Stimulating consumption.

10. Digital identification

Electronic identification in the European Union is carried out in accordance with Regulation (EU) № 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and certification services for electronic transactions in the internal market and repealing Directive 1999/93 / EC. EC (European Parliament, 2014).

E-identification as "the process of using data in electronic form to identify persons whose data uniquely constitutes a natural or legal person, or a natural person representing a legal person". [11, pp. 62-63]

The practical implementation of digital identification is implemented within the pilot project „Electronic Identity" (eID). Digital identification is one of the tools to ensure secure access to online services and to carry out electronic transactions. [12]

A clear example of digital cooperation is the concept of Factories of the future under the National Technological Initiative (Components of a factory of the future), which includes: [13, p. 14]

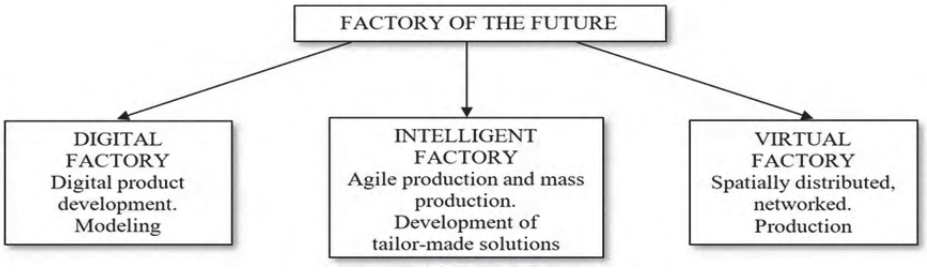

Figure 1. Components of a factory of the future

I. Digital factory, digital product development and modeling include:

a. Technologies: Digital development and Modeling; New materials and designs including certification; Additive and hybrid technologies; CNC technologies; and Smart Big Data.
b. Results: less development errors; little need for revision, less production waste; faster market entry for products.
c. Product: Digital model; Digital twin; and samples or small series.
d. Technological maturity: TRL1 - TRL 9; and MRL 1 - MRL 10.

II. Agile production and mass development of mass-cutting solutions at intelligent factories covers.

like a digital factory +

a. Technologies: Industrial robots; MES and ICS systems; Sensor technology; Industrial Internet; and big data.
b. Results: Less production waste, low energy consumption; Higher productivity;
c. Product: Series product.
d. Technological maturity: TRL 4 - TRL 9; and MRL 4 - MRL 10.

III. Virtual factory, spatially distributed, network production is presented as.

digital factory +

intelligent factory +

a. Technologies: Digital Operational Management Systems (ERP, CRM, SCM);
b. Results: More value creation; More employment; More transparent supply chains; and Protection of intellectual property;
c. Product: Supply chain; Model or small series; and Product Serial product;
d. Technological maturity: TRL 1 - TRL 9; and MRL 1 - MRL 10.

Symbols used: Computer Numerical Control, abbreviation (CNC); MES - Manufacturing Execution System; ICS - Incident Command System; ERP - Enterprise Resource Planning; CRM - Customer Relationship Management; SCM - Supply Chain Management (SCM); TRL - Technology Readiness Levels: TRL 1. Basic principles observed; TRL 9. Actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space); MRL - Manufacturing Readiness Levels: MRL 1. Basic manufacturing implications identified; MRL 10. Full rate production demonstrated and lean production practices in place.

Conclusions

First, the concept of Industry 4.0 requires a link between the digital world and the offline world. In the field of industrial production, this goes hand in hand with the maximum automation of all business processes, technological processes and production processes within a company.

Second, the Digital Transformation Transformation in the European Union is an irreversible process that requires political will, flexibility, sustainability and a broad financial resource.

Thirdly, the commented areas of cooperation are most developed in leading countries such as Germany and France, which suggests that they will be the „locomotives of digitalization“ in the European Union in the future.

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