

Digital Transformation For E-Governance in Ukraine: International Curriculum and Best Practices

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ABSTRACT

The study tackles the limits of understanding of EU e-governance principles and practices in Ukraine, since strong EU aspirations of the country are challenged by the warfare threatening the nation existence. The struggle of Ukraine against Russian invasion revealed the benefits of previous digitalization efforts in the public sector. However, civil servants and citizens in the country still feel the urgent need of enhancing digital competence. The public sector developed a clear understanding that further reforms must be aligned with EU experiences and expectations, and a proper expertise is called for. Thus, the research objective is to highlight and disseminate EU experience and best practices of the transition to e-governance. The research project e-DEBUT helps promote EU values of transparency, participatory democracy, and inclusiveness through strengthening the digital community in Ukraine. The study aims to develop an innovative curriculum to enhance skills and competencies of civil servants, enrolled in master's programs, needed for effective rendering of public e-services in war-time, and transferring knowledge of the tech trends and best e-governance practices of EU countries. The project's meaningful results are: a course syllabus, summer schools' curricula, and a workshop on the facets of development of e-governance in EU countries and in Ukraine; open digital educational resources and analytical materials; a manual for civil servants on the use of e-governance tools under martial law and through post-war reconstruction of Ukraine. The centerpiece of the study is the development of the study module, covering EU lens on concepts of e-governance and digital state, EU technological trends for e-governance, EU best practices in rendering e-governance for business and citizens, as well as the investigation of the adaptation of EU experience in the use of artificial intelligence and smart city infrastructures to the managerial needs of the

country at war.

Keywords: E-Governance, Digital Curriculum Development, Digital Education, Digital literacy, Digital communication, Interdisciplinarity, Internationalization.

1. INTRODUCTION

The development of e-governance is one of the main factors competitiveness for any country. The latest UN study [13] on the development of electronic government (E-Government Development Index) rates Ukraine 46th out of 193 countries surveyed, breaking into the ranks of countries with a high level of public administration digitization. Thus, Ukraine is in the mainstream of digital transformations of the European Union member states. However, there is still a significant lag behind the global and even regional leaders (Estonia and Poland) in the pace of digitization.

The field of electronic services calls for special attention, along with the need to develop the telecommunications infrastructure. The main problems of the industry are:

- insufficient coordination of state bodies responsible for the development of e-governance;
- digital inequality both on decision making level (between central and local authorities) and grassroots level (citizens);
- insufficient citizen participation and control in the specified area;
- low information security and information protection in the systems of government bodies; low level of digital competence of civil servants.

The invasion of the Russian Federation posed new challenges to the system of public electronic services. There was a need to expedite and expand the processes of digitization of state service

functions. New opportunities arose for registering recipients of social aid, for data collection on infrastructure damage, for grant and funding opportunities for the development of small and medium businesses, etc. Ukraine is accumulating a unique experience in the development of e-governance through the active warfare. But the general issues of the industry development persisted, some of them got intensified (issues of coordination, security challenges, etc.).

Based on Ukrainian experiences, such economic effects of digital solutions implementation in the public sector were significant:

- saving time and material resources;
- releasing employees from routine and menial tasks;
- supporting business activity across the board through round-the-clock receipt of administrative services;
- corruption prevention through depersonalized interaction of citizens and businesses with state officials;
- reducing the number of state officials and cutting the red tape.

During martial law digital solutions reduced the cost of coordinating the joint efforts of authorities, businesses, citizens, and international partners to resist occupation. Digital platforms have proven their effectiveness for such goals as detecting enemy equipment and troops; raising funds for military and humanitarian purposes; increasing the transparency of volunteer and humanitarian activities; identifying internally and externally displaced persons and organizing targeted humanitarian aid. For instance, in 2022, the digital state fundraising platform UNITED24 was initiated [12]. By the end of the year, it accumulated more than \$237 million in donations from 110 countries.

In the future, during the post-war reconstruction of Ukraine, e-governance should become a basic prerequisite for building an effective digital economy and digital market, as well as its further integration into the EU Digital Single Market (according to the EUDSM Strategy).

It is essential to develop the e-governance sector of Ukraine in full compliance with the EU policies and practices [1; 2; 3; 7; 8; 11; 14; 15]. The EU has made great strides in the development of e-government over the past few decades [13]. By 2020, the EU has set a goal of having all of its member states 100% e-enabled, meaning that they will be able to provide all of their public services electronically, reducing paperwork and bureaucracy. To reach this goal, the EU has been encouraging all of its member states to develop and implement e-government initiatives. Currently, the majority of EU countries have e-government services available, with over 70% offering online tax filing, over 60% with online services for public administration and over 50% with online voting. This is an impressive improvement from the early 2000s, when only a handful of countries had any e-government services available at all.

However, there are still major challenges and shortcomings being currently addressed by European countries, such as:

- insufficient security of many services, their vulnerability to cyberattacks;
- lack of standardization across different e-governance systems, challenging accessibility and use of services across different countries;
- a digital gap between different countries, with some countries having much more advanced e-governance systems than the others.

These challenges are quite common to those in Ukraine. So, the knowledge about the European practices is highly valuable to Ukraine in terms of overcoming security and coordination issues. Meanwhile, the Ukrainian experience could contribute to the European e-governance knowledge pool in terms of crisis and resilience management in the time of war.

In the EU there is a growing need for academic research on how to use technology to improve public services. One of the main research studies conducted by the European Commission is the Annual Digital Scoreboard, which provides an overview of the adoption and usage of digital services in the EU. This research has identified several areas of success, such as the increasing use of digital services for public welfare, healthcare, and education. This and other studies from the European Commission will serve as a solid background for the project implementation. The research efforts of European universities are mainly dedicated to digital innovations in the e-gov sector. For instance, the e-Government Knowledge Centre at the University of Twente in the Netherlands has produced a range of studies on topics of digital identity management, public service delivery through open data, and the use of artificial intelligence in public services. Another example is the Digital Government Research Group at the Free University of Berlin in Germany that focuses on the specifics of the use of blockchain technology to improve public service delivery. Ukrainian universities have also been conducting a variety of research and studies to keep up with the changing landscape of public policy and digital solutions. For example, the National Technical University of Ukraine in Kyiv has conducted research into the use of digital technologies for the collection and processing of data from public services. The research also looks into the effectiveness of existing e-governance services in terms of cost-effectiveness and user satisfaction. Despite the scope and the research diversity in the realm of e-governance in the EU and Ukraine, there are still some research deficits that need to be addressed. There is a need to further explore the potential of digital technologies to improve public service delivery across different countries (cross-country-comparison). More research efforts are expected into the topic of the access to services for vulnerable groups. Also, there is a lack of research on the role of civil society in the adoption and implementation of e-governance initiatives. Finally, the present knowledge on the use of e-government tools in crisis management are mostly limited to cases triggered by COVID-19 pandemic only. All these issues remain relevant to the public sector itself as a service deliverer, as well as to citizens and business as stakeholders. Of course, the development of e-government is impossible without appropriate training of relevant qualified professionals. The educational efforts must be carefully aligned with the challenges posed to the e-gov sector. Such alignment is a mission of the international project e-DEBUT, funded by the European Commission (Project Number: 101127007 — e-DEBUT — ERASMUS-JMO-2023-HEI-TCH-RSCH).

Therefore, the **objectives** of the study within the project e-DEBUT cover the following scope: to reveal and disseminate EU experiences of the transition to e-governance, its management and its challenges. The project helps promote the European values of policy transparency, participatory democracy and inclusiveness through building and strengthening the digital community in Ukraine. **The project outputs** are: a learning course (40 hours), three summer schools (32, 30 and 30 hours accordingly), a workshop on the development of e-governance in EU countries and in Ukraine; open educational resources (electronic course), analytical materials, a website, and a YouTube channel; a workshop for academic, professional, and

general public audiences on e-governance issues; a manual, guidelines for civil servants on the use of e-governance tools under martial law and through post-war economic reconstruction. The **project outcomes** include: increase in the capacity of the public sector to implement a transparent regulatory policy and effective communication with business to improve the business climate; increase in the capacity of the public sector to deliver accessible and transparent electronic services to citizens to improve the quality of life.

2. FINDINGS

Interdisciplinary Needs and International Best Practices for E-governance Curriculum development

The doctrine of electronic governance implementation was adopted in Ukraine [9]. Its objectives include the modernization of public services and the development of interaction between authorities, citizens, and businesses via digital technologies. Besides, within the framework of the Association Agreement between the EU and Ukraine, Ukraine must ensure the comprehensive development of the information society according to European requirements for the benefit of individuals and businesses through the provision of universal access to digital technologies and through improved quality of services (Article 389) [6].

To fulfill the commitments and resolve the current issues, it is necessary to intensify educational efforts in Ukraine. The root cause for the country to lag in the field of e-governance is the imperfect system of developing the digital competencies of civil servants, which does not provide the necessary range of knowledge. National studies in 2021 assessed the functional digital literacy of civil servants in Ukraine as below satisfactory. Only a quarter of employees surveyed dared to take a government-approved digital literacy test to prove their level of digital skills. Every fifth employee is completely unaware of the existence of digital tools for civil society interaction. More than a third of the sample still lacks basic digital literacy. More than a half of the surveyed officials indicate a need for cybersecurity knowledge.

Typical is a limited perception of the social role of electronic services in Ukraine by the state employees. As a rule, they single out only three areas for the development of e-governance: communal, educational, and medical services. On the other hand, e-services aimed at the comprehensive development of human capital are insufficiently updated: e-employment, e-business, and e-democracy. The potential benefits of the wall to wall digitization are not fully understood. Most do not understand the concept of Big Data, machine learning, artificial intelligence as well as their role in the development of e-governance and management decision-making. This shows that the civil service remains focused on old management models, although the demand for new knowledge is forming gradually.

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Ukrainian universities are also engaged in various research and studies to adapt to constantly changing public policy conditions and innovative digital solutions. One such example can be research conducted by the National Technical University in Kyiv concerning digital technologies' implications for data collection and processing data from public services. The study also included analyzing the cost-effectiveness and user satisfaction from current e-governance services.

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All these issues remain relevant to the public sector itself as a service deliverer, as well as to citizens and business as stakeholders. Of course, the development of e-government is impossible without appropriate training of relevant qualified professionals. The educational efforts must be carefully aligned with the challenges posed to the e-gov sector. Studying and teaching the European experience of implementing e-governance principles is a necessary element of the further formation of a service digital state compound in Ukraine as a democratic social legal state that has officially declared its intentions to become a member of the EU. The European experience and ideology of digital transformations in public administration are valuable for their focus not only on the efficiency of state management but also on improving the quality of everyday life and education.

The study, thus, tackles limits of understanding of EU e-governance principles and practices in Ukraine, since strong EU aspirations of the country are challenged by the warfare threatening the nation existence. The struggle of Ukraine against Russian invasion revealed the benefits of previous digitalization efforts in the public sector. However, civil servants and citizens in the country still feel the urgent need of enhancing digital competence. The public sector developed a clear understanding that further reforms must be aligned with EU experiences and expectations, and a proper expertise is called for.

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The project activities provide a foundation for students to evaluate the implications of the EU digital policies and initiatives for Europe and beyond. They explore the EU initiatives in the digital economy, such as the Digital Agenda for Europe, the European Digital Single Market, and the European Cloud Initiative. These initiatives are designed to make the EU more digitally competitive and foster innovation and growth. Finally, the modules provide an opportunity to analyze the impact of EU policies and initiatives on the people, organizations, and governments of Europe. This includes examining the implications of the EU digital policies on privacy, data protection, and competition. The project thematic scope is consistent with the European priorities of digital development, postulated in the following documents: European Declaration on Digital Rights and Principles for the Digital Decade [3] (the human-centric lens of digital transformation); Digital Agenda for Europe [4] (digital competence development); 2030 Digital Compass: The European way for the Digital Decade [5] (seamless digital interaction on all levels of public governance). The project is consistent with the national priorities of public governance digitization, based on: The Doctrine of digital economy and society development [12], that declares digitization as priority avenue of development of Ukraine; The national policy of digital development of Ukraine as implemented by executive organs. This project is an interdisciplinary synergy of specialists - experts in computer science, management, communications, and economics, the result of their lifelong training in the field of electronic governance and human resources development. The international curriculum developed within the study is in compliance with e-governance program at Tallinn University of Technology, E-Government Academy of Estonia. The university was also involved in the implementation of the project "Consulting Ukrainian universities on the development of curricula for master's work in electronic government" (2019-2022, US-282/20) [9; 10], funded by the Ministry of Foreign Affairs of Estonia.

E-governance Curriculum Design for E-Debut Project

The study aims to develop and assess an innovative curriculum to enhance skills and competencies of civil servants, enrolled in master's programs, needed for effective rendering of public e-services in war-time, and transferring knowledge of the tech trends and best e-governance practices of EU countries.

The demand for e-governance professionals in Ukraine is growing. According to the Ukrainian Ministry of Digital Transformation, there is a shortage of over 16,000 e-governance professionals in the country. The volume of the state funded demand for higher education responds weakly to this need. Thus, according to the results of 2021, the state funded demand increased by less than 6% in the field of information and communication. And at the same time, the volume of demand from the state for the training of management specialists was reduced by 28%. To meet this demand, universities in Ukraine are offering specialized courses. As of 2021, there are over 20 universities in Ukraine offering courses in e-governance. Yet, the

higher education system in this field is facing major challenges. Firstly, there is a lack of educational resources and training materials for students and professionals in e-governance. The universities that do offer courses in this field often lack the necessary expertise and technology to provide up-to-date instruction.

The knowledge on EU experience of digital reforms are also insufficiently covered in the curricula of Ukrainian universities and other educational institutions. Secondly, the infrastructure of higher education institutions in Ukraine is inadequate and outdated. This leads to limited access to online resources, and a lack of secure networks for data storage. In addition, many universities are still relying on outdated computer systems and software, which can lead to security vulnerabilities. Thirdly, there is a lack of qualified personnel and staff members who can help implement e-governance study programs. Most universities are unable to hire people with the necessary technical skills and experience. Fourthmost, there is a lack of coordination between universities rendering courses on e-governance. They often act as competitors and the efforts do not add to the national system of e-gov knowledge. There is also lack of communication between universities and the government when it comes to transferring of knowledge and awareness of expertise shortage. The aforementioned resulted in: a fragmentary nature of the development of digital competencies of civil servants capable of maintaining dialogue and interaction with citizens; a superficial understanding of the social goals of e-governance implementation.

There has still been no expert center founded in Ukraine, which would systematically and cohesively provide the field of e-governance with knowledge about cutting-edge trends as well as about European practices of ensuring the sustainability of the structure and functioning of public e-services. Thus, the objectives of the project are: new innovative curriculum to develop a set of skills and competencies of civil servants, enrolled in public administration master's studies, needed for effective rendering public e-services in war-time for development and management of e-government; transferring the knowledge of the predominant technological trends and best practices of EU countries in the field of e-governance; to implement innovative teaching and training approaches for disseminating the EU experiences in e-government and building relevant skills of the involved students; setting up a multidimensional (scientific and educational) discussion platform to instigate a wide-range academic and educational discussion on the priorities of digital transformation in public sector of Ukraine.

The centerpiece of the investigative activities is the development of the study module, covering EU lens on concepts of e-governance and digital state, EU technological trends for e-governance, EU best practices in rendering e-governance for business and citizens, which comprises of the following structural units (Fig. 1):

1. Concept of e-governance VS concept of digital state: European angle;
2. European technological trends for e-governance;
3. G2B (e-governance for business) - European best practices, starting a business;
4. G2C (e-governance for citizens) - European best practices [11].

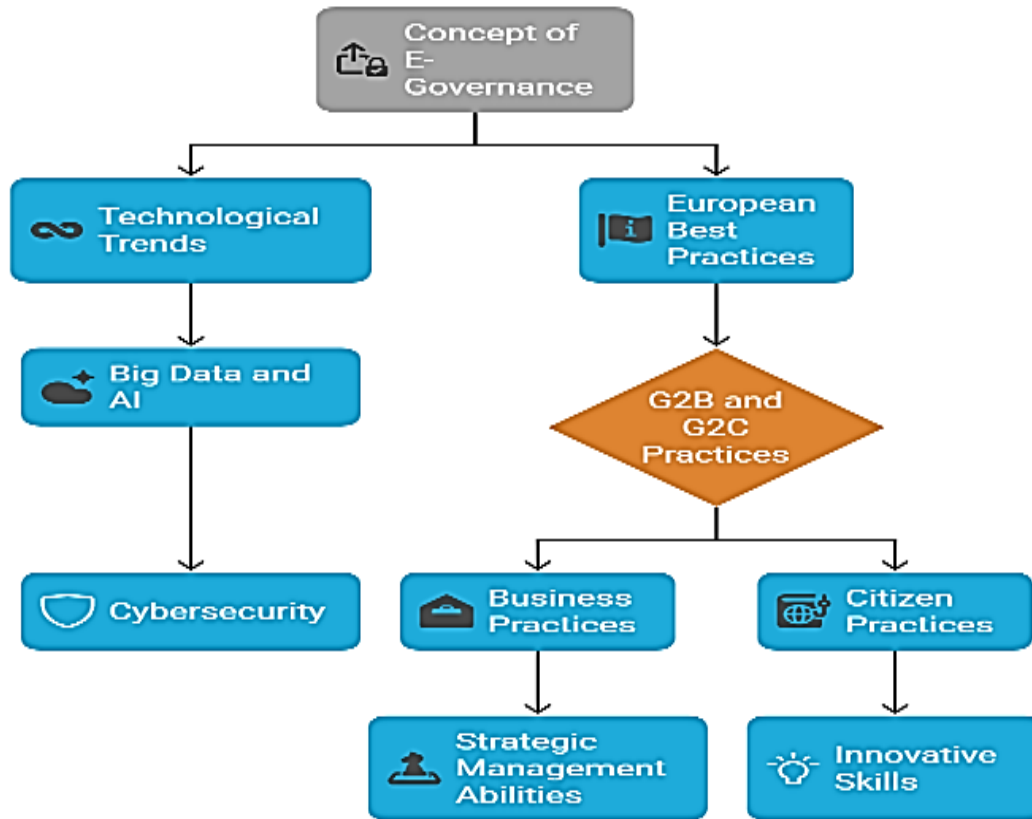


Figure 1. E-debut Curriculum

The curricula of Summer schools within the project are planned to be held in 2024, 2025, and in 2026 on the following topics:

The imminent study results pertain to the focus group of Summer School 1: Digital Competence for e-governance (32 hours).

Target groups that comprise the survey sample: students, educators, the community of cities, employees and citizens, who use e-governance.

The focus of the study is the content and implementation of of the summer school 1. The syllabus structure is:

1) Concept of digital transformation of society and economy.

Digital transformation projects in the EU (8 hours);

2) EU digital labor market: main trends and prospects for development (8 hours);

3) European Competence Frameworks for the Needs of the Digital Society:

- European Digital Competence Framework for Citizens (DigComp 2.2),

- Key Competence for Entrepreneurship (EntreComp),

- Competence Framework for Personal, Social, and Key Learning-related competencies (LifeComp),

- GreenComp – a reference framework of competences for sustainable development (8 hours);

4) Competencies required for eGovernment services (8 hours).

The content structure of the Summer School 2 E-Governance For Digital Economy (30 Hours):

1) Digital economy and types of e-business, e-social activities (social entrepreneurship) (6 hours);

2) Digital technologies of public administration in the digital economy (6 hours);

3) Internet of things in the digital economy (6 hours);

4) Artificial intelligence in the digital economy (6 hours);

5) E-business management (6 hours)

The syllabi are streamlined to foster investigation of the adaptation of the EU experience in the use of artificial intelligence and smart city infrastructures to the managerial needs of the country at war.

The study aims to develop and assess an innovative curriculum to enhance skills and competencies of civil servants, enrolled in master's programs, needed for effective rendering of public e-services in war-time, and transferring knowledge of the tech trends and best e-governance practices of EU countries.

The survey of digital transformation interpretation was conducted among the Summer School 1, Module and Summer School 2 participants (168 total) and yielded the following meaningful clusters (Voyant tools, AI-cluster analysis):

- TECHNOLOGIES;
- INNOVATION;
- NEW OPPORTUNITIES;
- AI;
- EDUCATION (Fig. 2).

As well as such key connectors:

- OPTIMIZATION;
- SIMPLIFICATION;
- DIGITAL;
- SPEED
- E-SERVICES.

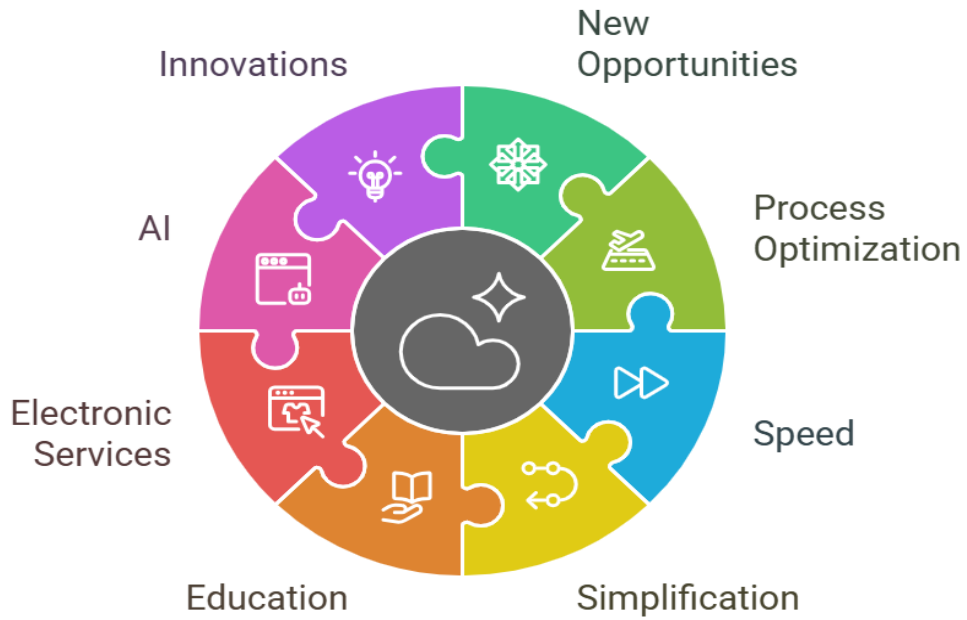


Figure 2. Components of Digital Transformation in E-governance.

Subsequently, the content analysis of the survey results revealed a predomination of **AI-powered digital tools** and services as equivalent or a driving force behind **digital innovation in society**

(Fig. 3). E-governance tools are, thus, perceived as not an innovation but a new normal as of 2025.

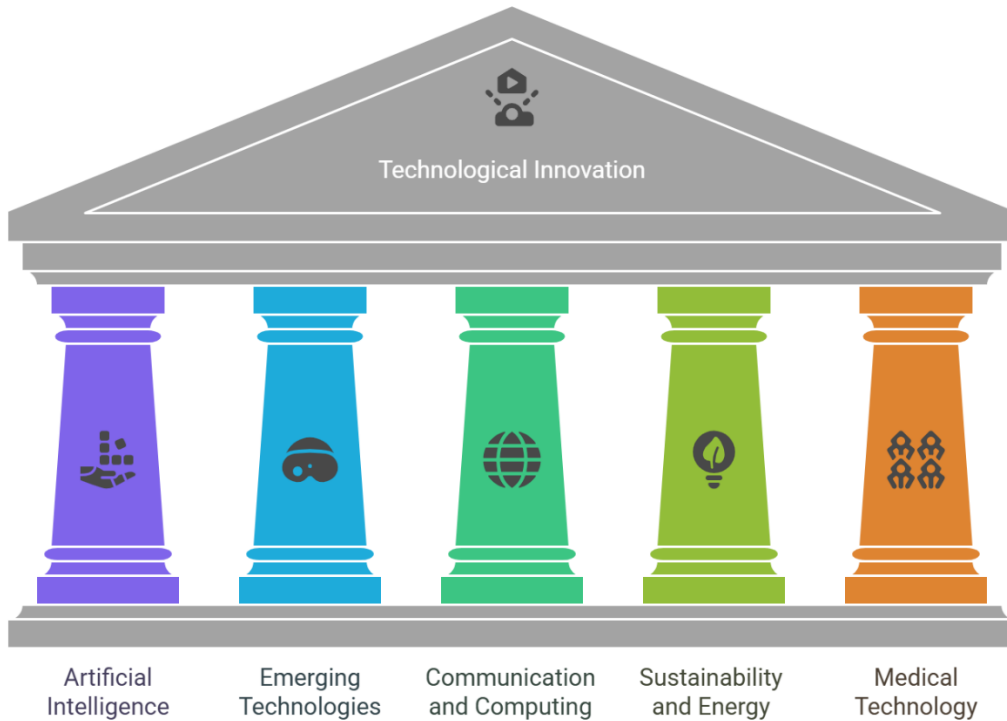


Figure 3. Components of Technological Innovations in Society

The syllabi are streamlined to foster investigation of the adaptation of the EU experience in the use of artificial intelligence and smart city infrastructures to the managerial needs of the country at war. The syllabi are streamlined to foster investigation of the adaptation of the EU experience in the use of artificial intelligence and smart city infrastructures to the managerial needs of the country at war. The eDEBUT project outcomes, as corroborated by the Summer School 1 survey results: increase in the capacity of the public sector to implement a transparent regulatory policy and effective communication with business to improve the business climate; increase in the capacity of the public sector to deliver accessible and transparent electronic services to citizens to improve the quality of life.

3. CONCLUSIONS

In conclusion, Ukraine is at a critical crossroads to develop its e-governance efficiency. The nation's unique war-related experience aligned with the lessons of the EU nations' growth and the experience of shared difficulties may lead to significant advancements. While some issues, including problems of digital inequality and the lack of digital expertise among the public servants, are still present, Ukraine has already enjoyed positive economic outcomes of its ventures. With imperative focus on educational strategies, solid research background, and experience sharing initiatives, Ukraine will not only ensure strengthened public administration during post-war recovery but ensure fully-fledged integration into the EU Digital Single Market to remain competitive and prosperous in the years to come.

The inquiry results inform the derivation of the following recommendations for UNIVERSAL AND LOCALLY CUSTOMIZED SOLUTIONS for e-governance digital education going forward: 1) To critically review of the curriculum content to accommodate the dynamics of digital society input; 2) To update the curriculum content interconnectivity and learning outcomes to accommodate the interoperable interface of skills, customized to facilitate professional activity and communicative application in the intensely digitized world; 3) To devise a flexible model of educational content upgrade to meet the dynamic transdisciplinary requirements of the job market in the digital economy of the post-pandemic timespan; 4) To enhance the universality of professional application for university graduates in the digital age.

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