

# Digital Economy: Development Prospects in the European Union and the Republic of Moldova

Alexandru LEAHOVCENCO<sup>6</sup>

## Abstract

*This article focuses on issues related to digital economy. The European Union adopted and implements „Digital Agenda for Europe” constantly adjusting its priorities to the new circumstances. The government of the Republic of Moldova approved the National Strategy for Information Society Development “Digital Moldova 2020” which aim is to create conditions through minimum state intervention but with maximum effect for information society development. National Strategy for Information Society Development will lead to the following measurable results: ranking the Republic of Moldova among top 50 countries in the international rankings in digital technologies.*

*Keywords: digital economy, National Strategy for Information Society Development “Digital Moldova 2020”, cyber security.*

The Organisation for Economic Co-operation and Development (OECD) in its Digital Economy Outlook 2015 gave the following definition of digital economy as a *result of transformational effects of new technologies in the field of information and communication.*(OECD,2015)

In accordance with definition, which was presented in Wikipedia *digital economy refers to an economy that is based on digital computing technologies. The digital economy is also sometimes called the Internet Economy, the New Economy, or Web Economy.*..(OECD,2015)

However, it should be noted that this definition is not unambiguous, for example in specialized literature there is also such a definition as: digital economy is the worldwide network of economic activities enabled by information and communications technologies . It can also be defined more simply as an economy based on digital technologies. Several definitions for this term exist in different variations, therefore the study of the digital economy, analysis of its elements must contribute to the economic paradigm in this matter.

For the first time the term digital economy was invented by Don Tapscott and presented in the book *The Digital Economy: Promise and Peril in the Age of Networked Intelligence*, published in 1995.(Tapscott , Don 1997)

The ideology emerged in the last decade of the twentieth century concept digital/electronic economy as no one is better outlined in 1995 Nicholas Negroponte – American scientist-computer scientist. He used a metaphor of shifting from processing atoms to processing bits.

In 2014 *Digital Economy* has been defined as the branch of economics studying zero marginal cost intangible goods over the Net. (Fournier Laurent, 2014)

---

<sup>6</sup> Alexandru LEAHOVCENCO, Academy of Economic Studies of Moldova, e-mail: alexandru.leahovcenco@yandex.com

In the USA, often talking about the digital economy, use the term API Economy. (Application Programming Interface economy). It should be emphasized that API economy is a general term that describes the application programming interfaces (APIs) which can positively affect an organization's profitability. An API is a customer interface for technology products that allows software components to communicate. Major companies that have gained revenue from APIs include Twitter, Google Salesforce.com, Amazon, Facebook.

Here was a time when only software professionals knew about APIs. APIs take three basic forms: local, web-like and program-like.

Local APIs offer operating systems or middleware services to application programs (such as Microsoft's .NET APIs, the TAPI (Telephony API) for voice applications, and database access APIs).

Web APIs are designed to represent widely used resources like HTML pages and are accessed using a simple HTTP protocol. Any web URL activates a web API.

Program APIs are based on remote procedure call (RPC) technology that makes a remote program component appear to be local to the rest of the software. Examples of program APIs are: Service oriented architecture (SOA) APIs, Microsoft's WS-series of APIs.

Digital economy influences all sectors economy and social activities, for example, retail trade, transports, financial services, manufacturing, education, health, funds media and so on. It has implications far beyond information and communication technology. In addition, the Internet empowers people in new directions, giving the opportunity to create and share their ideas, creating new content, new businesses and markets.

In his article, published in 2001 Thomas Mesenbourg noted three main components of the digital economy concept, which can be identified as:

- *e-business infrastructure (hardware, software, telecoms, networks, human capital, etc.),*
- *e-business (how business is conducted, any process that an organization conducts over computer-mediated networks),*
- *e-commerce (transfer of goods, for example when a book is sold online).*

The author also proposes to supplement this classification with another component, such as cyber security of digital economy.

The Digital Economy is worth three trillion dollars today. This is six times the U.S.' annual trade deficit or more than the GDP of the United Kingdom. What is impressive is the fact that this entire value has been generated in the past 20 years since the launch of the Internet.

Consider the first component of the business structure will analyze the availability of the Internet in various continents of the world.

World Bank data on Internet activity are shown in table 1.

**Table 1. Global internet activity and internet statistics the population on 31 March 2017**

<b>World Regions</b>	<b>Population (2017 Est.)</b>	<b>Population % of World</b>	<b>Internet Users 31 March 2017</b>	<b>Penetration Rate (% Pop.)</b>	<b>Growth% 2000-2017</b>	<b>Internet Users %</b>
<b>Africa</b>	1,246,504,865	16.6 %	<b>353,121,578</b>	28.3 %	7,722.1%	9.4 %
<b>Asia</b>	4,148,177,672	55.2 %	<b>1,874,136,654</b>	45.2 %	1,539.6%	50.1 %
<b>Europe</b>	822,710,362	10.9 %	<b>636,971,824</b>	77.4 %	506.1%	17.0 %
<b>Latin</b>	647,604,645	8.6 %	<b>385,919,382</b>	59.6 %	2,035.8%	10.3 %

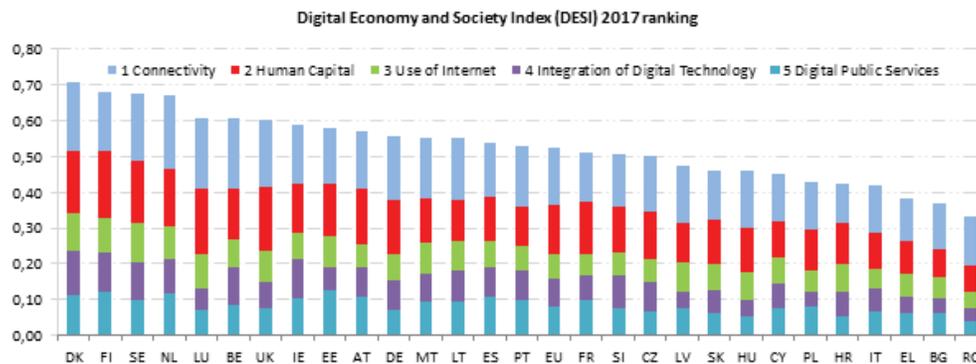
<b>America / Caribbean</b>						
<b>Middle East</b>	250,327,574	3.3 %	<b>141,931,765</b>	56.7 %	4,220.9%	3.8 %
<b>North America</b>	363,224,006	4.8 %	<b>320,068,243</b>	88.1 %	196.1%	8.6 %
<b>Oceania / Australia</b>	40,479,846	0.5 %	<b>27,549,054</b>	68.1 %	261.5%	0.7 %
<b>WORLD TOTAL</b>	<b>7,519,028,970</b>	<b>100.0 %</b>	<b>3,739,698,500</b>	<b>49.7 %</b>	<b>936.0%</b>	<b>100.0 %</b>

Source: <http://www.internetworldstats.com/stats.htm>

Analyzing the data of Table 1, we can draw the following conclusion that, with a share of Europe's population of 10.9%, seventeen percent of Europeans use the Internet. That is quite a high level considering the fact that 77.4% of the population of Europe is Internet users.

However, the digital economy should be viewed in the context of the Society Index. In accordance with data presented by European HYPERLINK "<https://ec.europa.eu/info/indexed>" Commission, index DESI represents indicators in the following countries of the European Union, which are presented in figure 1.

**Figure 1. Digital Economy and Society Index (DESI) 2017 ranking**



Source: <https://ec.europa.eu/digital-single-market/digital-economy-and-society-index-desi>

The Digital Economy and Society Index (DESI) is a composite index that unites relevant indicators on Europe's digital performance and traces the evolution of EU member states in digital competitiveness. The Digital Economy and Society Index (DESI) consists of 5 components (indexes):

- **Connectivity,**
- **Human Capital/Digital skills.**
- **Use of Internet by citizens,**
- **Integration of Digital Technology by businesses,**
- **Digital Public Services.**

The *Connectivity* index measures the deployment of broadband infrastructure and its quality. One of the main and necessary condition for competitiveness is a access to fast broadband-enabled services. In 2016 the highest score on connectivity was registered by the Netherlands. Romania was the weakest for this indicator followed by Croatia, Bulgaria and

Poland. It is important to note that such an indicator as fixed broadband is available to 98% of Europeans, and 76% of European homes can access high-speed broadband.

The skills needed to take advantage of the possibilities offered by a digital society must be measured and represent the *Human Capital* index. These skills represent the ability of the individuals to interact online and consume digital goods and services, to advanced skills that empower the workforce to take advantage of technology for enhanced productivity and economic growth. In 2016 highest score of this index obtained Denmark, Luxembourg, Finland and Romania, Bulgaria, Greece got the lowest ones. However, it is necessary to state that 44% of Europeans still do not have basic digital skills. The European Union is taking steps in the growth of Science, Technology, Engineering and Mathematics (STEM) graduates (19 graduates per 1000 people aged 20 to 29 years old in 2014, compared to 17 in 2012) and in the share of ICT specialists in the workforce (3.6 % in 2015 as opposed to 3.2 % in 2013).

Such indicator as *Use of Internet by citizens* refers to the variety of activities performed by citizens already online. Such activities range from consumption of online content (videos, music, games, etc.) to modern communication activities or online shopping and banking. It is necessary to state that in 2016, internet users are the most active in Denmark, Sweden and Luxembourg. On this dimension, Romania, Bulgaria and Italy are at the bottom of the list. The European Commission analyzed the areas where citizens are most active, such as reading news online (70%), shopping online (66%) or using online banking (59%). Businesses can strengthen efficiency, reduce costs and engage more better customers, collaborators and business partners through adopting digital technology.

Such index as *Integration of technology* in 2016 was highest in in Denmark, Ireland and Finland, and the least developed in Romania, Poland and Bulgaria. In European Union using of digital technologies is significantly increased, such as the use of a business software for electronic information sharing (from 26% in 2013 to 36% of enterprises in 2015), sending electronic invoices (from 11% in 2014 to 18% of enterprises in 2016) or using social media to engage with customers and partners (from 14% in 2013 to 20% of enterprises in 2016). However, it must be emphasized that, e-commerce by SMEs grew slightly (from 15% in 2014 to 17% of SMEs in 2016).

*Digital Public Services* represent level of the digitisation of public services, focusing on e-Government. European leaders in Digital Public Services in 2016 are Estonia, Finland and the Netherlands. For two years there has been a slight improvement of quality of European online public services through growth in the number of public services available online (online service completion score increased from 75 in 2014 to 82 in 2016).

Analyzing the indicators of the digital economy in the Republic of Moldova, we can state the following: more than a 50% of population are using the Internet, more than a half of households have at least one computer connected to Internet, 50% of the population read newspapers online, but only one out of 10 users accesses the government web site and only one out of 20 users has accessed at least one electronic public service in the past 12 months.

According to a number of indicators, Moldova has achieved certain successes, such as the penetration of Mobile telephony exceeded 119% (*covering – 99% of the territory*, EU average – 128%), broadband Internet at fixed locations reached a penetration level of 11.72% (EU average – 27.2%), broadband mobile Internet – modems/cards – 4.7% (EU average – 7.5%), households broadband Internet connection – 35%.

It should also be noted the following information, which is presented in annual national survey conducted in November 2012 by the Institute for Public Policy and Magenta, that: 16% of users practice electronic commerce, 8% use Internet banking services, about 63% of the users download digital content, 33% use Internet for education and training, 16%

command of some services provided by private institutions and of the central public institutions, while only 1 out of 20 uses Internet for accessing electronic public services.

The government of the Republic of Moldova provides more than 570 services and only 5 out of 12 online basic public services for citizens, and 6 out of 8 – for economic agents. Within the framework of the e-Government Transformation Project starting from September 2012 to present, were launched:

- *e-Application for criminal record,*
- *e-Licensing (connected to the mobile signature),*
- *electronic reporting to e-CNAM and e-CNAS (connected to mobile signature),*
- *e-DNC (Normative Documents in Constructions),*
- *SIA “the state register of public acquisitions” services,*
- *M-Cloud - common government technology platform.*

Moldova has moved to the top seven countries in the world that also implement such innovative as mobile electronic signature and the use of this tool shall safely boost access to the available electronic services. Such tool, which shall be implemented, as the electronic identity cards, shall facilitate the access to electronic services. The digital identity management becomes an important factor for the functionality of infrastructure and access to digital services.

E-commerce in the Republic of Moldova is still undeveloped because of the low number of services that accept online payments, that’s why 37,7% of the country's Internet user’s make on-line purchases, these procurements are mainly from abroad.

Bank’s cards in Moldova are issued mostly for cash withdrawals – 87 percent of card holders’ cash and 97,7 percent out of the total value of operations realized in the Republic of Moldova).

In the Republic of Moldova the necessary regulatory framework in the field of digital technologies was created, which currently includes about 20 laws, 80 Government decisions, about 70 approved conceptual documents regarding the informational systems of public authorities, more than 20 general purpose regulatory acts and 75 with a specific purpose issued by the National Regulatory Agency for Electronic Communications and Information Technology.

For the purpose of improving the regulatory framework was created the Ministry of Information Technology and Communications and the specialized institutions such as the Centre for Electronic Governance and National Center for Personal Data Protection. In 2011 World Bank adopted the Technological Transformation Strategic Program of governance “e-Transformation”.

In Moldova were implemented such systems as: online fiscal declarations systems, mobile digital signature and online services as: e-Police Clearance Certificate, e-Licensing, biometric passport, automated biometric border crossing systems based on electronic passports. Currently will be implemented cloud computing based services and the interoperability framework based on the open standards.

In the international graduation Moldova occupies the following places on:

- *62nd out of 155 countries according to the level of ICT development (IDI),*
- *69th out of 159 countries, at the e-Governance Development Index (e-GRI) ranks*
- *61st position out of 144 countries according to the Index of Internet penetration in schools (KEI),*
- *78th position out of 142 countries in Training Network Index (NRI)*

The European Commission adopted new priorities for digital economy and society on December 18, 2012. It’s necessary to note that the growth rate registered by the digital

economy is seven times higher than the rest of the economy. Implementation of the updated Digital Agenda will lead to the European GDP growth of 5% or 1500 Euro per capita over the next eight years, by improving the computer skills levels of the workforce, by increasing the ICT investments, facilitating public sector innovation and reforming the framework conditions for the Internet-based economy.

In accordance with the strategy adopted by the European Commission the new priorities of the Digital Agenda for Europe are to:

- *elaborate a new legislative framework in the field of broadband services;*
- *create new infrastructures of digital public services through the Connecting Europe facility;*
- *launch the grand coalition for promoting competences and create jobs in the digital domain;*
- *draw up proposals on a strategy and a cyber-security directive at the EU level;*
- *update the EU framework on copyrights;*
- *boost the "cloud computing" system based on the public sector purchasing power;*
- *launch a new industrial strategy in the electronic field.*

However, it is necessary to mention some problems that arise in the process of development of the information society in Republic of Moldova.

First problem is connected to non-optimized infrastructure and irregular access to internet in Moldova, so as about 30% of rural areas still do not have broadband access, the broadband connectivity required to meet present and future needs of the country isn't available throughout the entire territory of the country. But however the Republic of Moldova is among the top 20 countries in the world by Internet access speed.

The next problem is the low availability of electronic services and underdeveloped local digital content. In terms of online promotion the Republic of Moldova's position is quite weak. The number of web top-level domains per 1000 people in the Republic of Moldova is only 2.0 units compared to 22.3/1,000 in Central and East Europe (CEE). This is due to low presence of local enterprises on the Internet, which is a gap for promoting local digital content and domestic products.

Another problem is low level of digital literacy of population, this is most clearly demonstrated in the Global IT Report 2012, in terms of people's skills, the Republic of Moldova was ranked in 65<sup>th</sup> place out of 142 countries, assessed with 5 points out of 7 possible.

If in terms of the digital literacy Moldova was assessed with 4 points out of 7 possible and ranked on 44<sup>th</sup> place, in terms of education in mathematics and science is ranked on 69<sup>th</sup> place. On the quality of education, Moldova is located at 102nd place with 3.2 points out of 7 possible, which is among the last 40 countries included in the report. With regret we have to state that only 10% of the population aged between 45 and 54 years and 14% of population aged between 35-44 years and are Internet users in Moldova.

In modern conditions there is a risk of increasing the danger of cybercrime and risk of low trust in networks and online services.

Cyber security implies application of a set of proactive and reactive measures that ensure authenticity, confidentiality, integrity, availability and trustworthiness of e-information, public and private resources and services in cyberspace.

Global character of cyberspace is able to increase the risks both for private and public sectors.

The most cyber threats that are appeared through the exploitation of human, technical and procedural nature weaknesses, often materialize in:

- *cyber-attacks against the infrastructure of public or state organization which damage could be a threat to national security;*
- *unauthorized access to cyber infrastructure of public or and private sectors;*
- *deletion or damage of information data or illegal access restriction to these data;*
- *cyber espionage, causing a loss of property, blackmail of individuals and legal entities, in the public and private sectors.*

On November 23<sup>rd</sup> in 2001 was adopted Europe Convention on Cybercrime by the European Council in Budapest, which has ratified by the Republic of Moldova.

The provisions of the Convention are aimed at preventing and fighting cybercrime, stipulate the protection and aid delivery to service providers and information systems users; establish the rules of cooperation with other states, international and regional organizations.

There is no unique public authority directly responsible and empowered with rights and duties on cyber security in Moldova. At this moment, there are several institutions involved in this process, each of them providing coverage for this issue on their business segment.

However, the Government of Moldova established the operational e-Governance Center that implements the “e-Government Transformation” project – Strategic program of technological modernization of the governance including:

- *Common M-Cloud Government Technological Platform;*
- *Government Electronic Payment Service;*
- *Government Interoperability Platform;*
- *Paperless Government initiative - SIGEDIA;*
- *Government Platform for e-Business Reporting;*
- *Government platform for business permissive licenses;*
- *e-Acquisitions;*
- *e-Constructions;*
- *e-Justice;*
- *Digitization of Operational Support Systems for the Government;*
- *Government data storage infrastructure.*

The government of the republic approved the National Strategy for Information Society Development “Digital Moldova 2020” which aim is to create conditions through minimum state intervention but with maximum effect for information society development, focusing efforts at three directions:

- 1) Access and infrastructure** – *improvement of connectivity and network access;*
- 2) Digital content and electronic services** - *promoting digital content and generating services;*
- 3) Capacities and utilization-** *strengthening literacy and digital skills to enable innovation and stimulate usage.*

These three directions have a major impact on the following three components of society:

- a) *population, that shall enjoy more comfortable life;*
- b) *businesses, which shall increase the level of competitiveness;*

*c) governance, which shall improve their performances and provide services to the citizens and companies anytime, anywhere and on any terminal equipment.*

National Strategy for Information Society Development “Digital Moldova 2020” will lead to the following measurable results:

- *ranking the Republic of Moldova among top 50 countries in the international rankings);*
- *at least 60% of households and 75% of citizens shall be connected to broadband Internet;*
- *100% of public services which may be provided electronically shall be available online;*
- *public services shall be provided under the ID card, including electronic or through electronic or mobile identification;*
- *at least 60% of the population shall use digital signature;*
- *20% of the population shall shop online.*

### **Conclusion**

It is unthinkable to build a country’s future without a digital strategy that must create opportunities to innovate and develop based on ICT technologies, to maximize the usage of government data services for the citizens’ benefit.

The European Union adopted and implements „Digital Agenda for Europe” Strategy, adjusting its priorities to the new circumstances.

In addition, countries such as USA, UK, Qatar, which occupy first places in international rankings also approved digital strategies aiming to ensure an accelerated development.

It should be noted that the Republic of Moldova has also approved a similar strategy that must be implemented before 2020.

### **References:**

Tapscott, Don (1997). The digital economy : promise and peril in the age of networked intelligence. New York: McGraw-Hill. ISBN 0-07-063342-8. Nicholas Negroponte (1995-01-01). "Bits and Atoms". Wired magazine. (MIT link). Retrieved 20 February 2017.

The New Digital Economy - How it will transform business, Oxford Economics.

Internet matters: Essays in digital transformation. Available at:

[http://www.mckinsey.com/insights/mgi/research/technology\\_and\\_innovation/essays\\_in\\_digital\\_transformation](http://www.mckinsey.com/insights/mgi/research/technology_and_innovation/essays_in_digital_transformation). Mckinsey.com (2013-03-13). Retrieved on 2013-07-23.

Hotărîre Guvernului RM nr. 857 din 31.10.2013 ”Cu privire la Strategia națională de

dezvoltare a societății informaționale “Moldova Digitală 2020”

OECD Digital Economy Outlook 2015, (July 15, 2015) – Available at:

<http://www.oecd.org/internet/oecd-digital-economy-outlook-2015-9789264232440-en.htm>