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Anna Abramova
Anastasia Ryzhkova
Iuliia Tserekh

AI development in the context of digital inequality

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Anna Abramova, Anastasia Ryzhkova, Iulia Tserekh

"AI Development in the Context of Digital Inequality"

Research paper

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Authors:

Anna Abramova, PhD, Director MGIMO Centre for AI, Head of the Department of Digital Economy and Artificial Intelligence of the ADV group at MGIMO-University

Anastasia Ryzhkova, PhD, researcher MGIMO Centre for AI

Iulia Tserekh, junior researcher MGIMO Centre for AI

Abstract

Digital inequality is one of the most challenging issue for massive AI implementation. For decades digital divide was broadly discussed with the emphasis on developing countries. But current developments in AI highlight the challenging issues for both developed and developing world. Key pillars of inequality are inherited from the priviest decades – poor ICT infrastructure, ICT literacy, strategic vision of digitalisation and regulations. This matrix could be applied to AI era generating new groups of risks.

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List of abbreviations

AI	Artificial intelligence
ICT	Information-communication technology
OECD	Organisation for Economic Co-operation and Development
SDGs	Sustainable Development Goals
UNCTAD	United Nations Conference on Trade and Development
UNESCO	United Nations Educational, Scientific and Cultural Organization
R&D	Research and development
WEF	World Economic Forum

Digital inequality origins in digital divide: key challenges

In the era of dynamic implementation of Artificial intelligence (AI) it is important to understand if it is becoming a common-used technology. Since the spread of digital technologies and digital economy growth the world faced sharp issues of uneven access to Internet, ICTs and digital assets.

In 1999 OECD emphasized: "visions of a global knowledge-based economy and universal electronic commerce, characterised by the 'death of distance' must be tempered by the reality that half the world's population has never made a telephone call, much less accessed the Internet"(OECD,2001)[1].

The term "digital divide" became popular in mid-1990s. According to Britannica it means **"**the uneven distribution of information and communication technologies (ICTs) in society. The digital divide encompasses differences in both access (first-level digital divide) and usage (second-level digital divide) of computers and the Internet between (1) industrialized and developing countries (global divide), (2) various socioeconomic groups within single nation-states (social divide), and (3) different kinds of users with regard to their political engagement on the Internet (democratic divide). In general, those differences are believed to reinforce social inequalities and to cause a persisting information or knowledge gap amid those people with access to and using the new media ("haves") and those people without ("have-nots")[2]".

Digital divide was widely discussed by the experts in international organisations (UN, OECD, WBG, ADB) and academics.

In attempt to measure digital divide, OECD enumerated important indicators(OECD, 2001)[3]:

- "readiness indicators" (computer, mobile, Internet and etc availability)
- income and education (primarily between households)

[1] UNDERSTANDING THE DIGITAL DIVIDE, https://www.oecd.org/sti/1888451.pdf

[2] https://www.britannica.com/topic/digital-divide

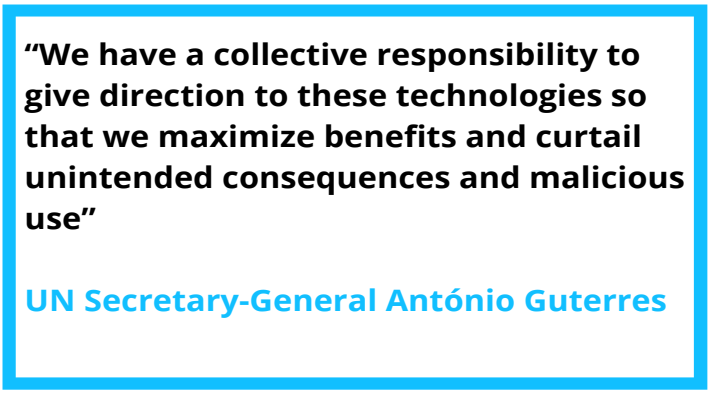
- profiles of countries, individuals and businesses

The term “digital divide” was commonly used until 2011, when in case of social-economy reasons “digital inequality” one became more widespread.

Inequality in access to the Internet and ICT is still a great concern. In 2021 UNDP[4] stated that about 60% of the population is “online” in developed countries nowadays, while in less-developed ones there only 1 in 5 people are “online”[5]. According to IBERDOLA, digital divide assumes 52 % of women and 42 % of men in the world[6]. According to the UN Report “Roadmap for Digital Cooperation” of the Secretary General, 8 key areas for action in this sphere are listed (UN, 2020)[7]:

1)achieving universal connectivity by 2030
2)promoting digital public goods to create a more equitable world
3)ensuring digital inclusion for all, including the most vulnerable
4)strengthening digital capacity-building
5)ensuring the protection of human rights in the digital era
6)supporting global cooperation on AI
7)promoting trust and security in the digital environment
8)building a more effective architecture for digital cooperation

[4] The evolving digital divide, https://www.undp.org/blog/evolving-digital-divide
[5] The evolving digital divide, https://www.undp.org/blog/evolving-digital-divide
[6] h Digital divide throughout the world and why it causes inequality, https://www.iberdrola.com/social-commitment/what-is-digital-divide
[7] Report of the Secretary-General Roadmap for Digital Cooperation, https://www.un.org/en/content/digital-cooperation-roadmap/



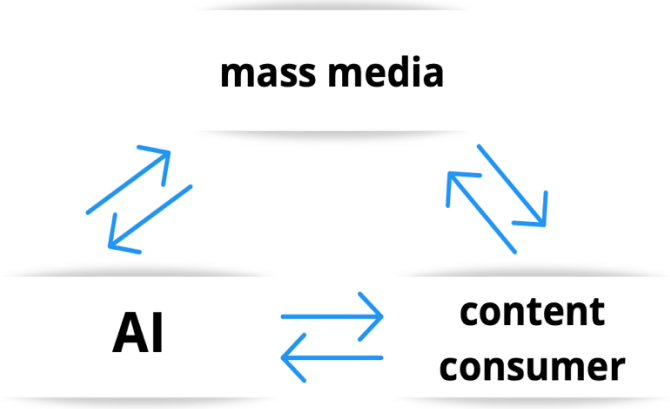
Picture 1. Quote of Antonio Guterres from UN Report “Roadmap for Digital Cooperation”

“Half of the world’s population currently does not have access to the Internet. “By 2030, every person should have safe and affordable access to the Internet, including meaningful use of digitally enabled services in line with the Sustainable Development Goals”, emphasizes the Report.

Media communications and social media play a vital role in a process of digital equality achievement and related problems coverage. The modern media market at the current stage involves the active use of AI technologies. At the same time, the features of the forms and directions of using AI in journalism actually allow us to talk about the formation of a fundamentally new structure of the media space which can allow the world reduce the digital divide.

The presence of the mobile Internet and platforms for horizontal mass communication in the form of social networks has led to the transformation of the entire information space, the analysis of which has become extremely difficult for the traditional journalistic staff to cope with. The traditional format for submitting materials has become not very convenient and a large number of people continued to consume content in their usual "old" forms. In order to reach the maximum audience, the media are forced to duplicate the same materials in different formats for different categories of users.

In addition to traditional subjects (mass media and consumers of information), new participants appear in the face of systems (units) of AI. Nowadays mass communication is carried out not only between the media and consumers, but also between the media and AI, as well as between consumers and AI.



Picture 2. AI and the cycle of production & consumption of information

The interaction of AI technologies with mass media consumers is carried out in order to form their personalized digital profile, on the basis of which the information materials offered to them are further structured.

Thus, the consumer is surrounded by the most relevant, from the point of view of his activity on the Internet, mass information, which is most likely to be of interest to him. In many ways, such processes can be linked to the modern interpretation of the "echo chamber"[8] effect.

In its most general form, **this effect can be described as a universal pattern of social behavior, according to which communication between people takes place in relatively closed communities, all members of which adhere to similar beliefs and views.** At the same time, such communities are closed from the penetration of

[8] Sunstein C.R. Echo chambers. Princeton: Princeton University Press. 2001; Sunstein C.R. Democracy and filtering // Communications of the ACM. 2004. № 47(12). P. 57–59.

alternative information from the outside, since all different points of view and ideas are rejected by members of these groups, and all internal beliefs are greatly strengthened due to repeated uncritical reproduction in intragroup communication[9].

In the context of the ubiquitous distribution of social networks, the concept of echo chambers was somewhat revised and received the form of the theory of **"information capsules",** which is intended to describe the features of the operation of the mechanism of echo chambers in the conditions of the modern information environment and the corresponding mass communications.

Information capsules are understood as a special information and communication structure, within which symbols, ideas and beliefs are not subjected to critical reflection and are not compared with external alternative points of view, but, on the contrary, are permanently strengthened due to self-reference between the participants of this structure. At the same time, the overwhelming majority of groups in social networks, online communities and other online platforms currently have the properties of such information capsules.

Therefore, wide implementation of digital technologies also makes it possible to automate certain processes and operations that are currently carried out by people, but can also be implemented by specialized programs based on certain algorithms. For example, researchers see the future in **software crawlers, which, having access to unlimited amounts of information constantly updated on the Internet, can identify, select and extract the necessary information for its subsequent submission in the form of news and press releases.**

Nowadays, there are, for example, such robotic platforms as Wordsmith, Narrative Science and Yseop, which allow you to search for the necessary materials among a large amount of information, followed by their analysis and processing. Modern technologies using semantic algorithms make it possible not only to select

[9] Hall J.K. Echo Chamber: Rush Limbaugh and the Conservative Media Establishment / J.K. Hall, J.N. Cappella. New York : Oxford Univ. Press, 2008. P. 35.

information, but also to rewrite it in the required format and style, creating full-fledged news notes. AI technologies are able to implement all stages of the process of preparing and presenting news from collecting information to posting on platforms.

Such technologies are already in use today. Although their use is not yet widespread, progress in this direction is already quite significant. Most often, such technologies are used by large medical companies. Automatic news creation technologies are used in the Associated Press, The New York Times, The Guardian, Forbes, Los Angeles Times, BBC, etc.

The other bulk of research investigated cultural, territorial, conceptual origin of digital divide. Moreover, due to the recent COVID 19 pandemia scientists claim that it also had a significant impact on the problem.

In the bulk of research cultural, territorial, conceptual origin of digital divide were investigated. The most challenging areas are access to education and labour market equality. Digital divide influences the skills and labour market developments "differential access of skills and usage is likely to increase" (Dijk & Hacker 2003).

For some regions social and territorial developments are closely interconnected with digital divide (Kartiasih et al. 2022), also raising the challenges for labour market considering relationship between regional digital development and labour market resilience (Reveiu et al.2022). Moreover, COVID 19 pandemia pushed the discussions on already challenging issues highlighting the challenges of rapid digital transformation: The interconnections of digital divide and social inclusion in access to primary and secondary education (Cheshmehzangi et al.2022); impacts of the digital divide on children in five majority world countries during the COVID-19 pandemic (Law et al.2022), contribution of COVID-19 pandemic digital divide in universities in Sub-Saharan Africa and African Identities, (Vurayai,2022).

So, young adults who assisted their older family members considered the learning experience to be successful and were rewarded with reciprocal benefits (Flynn

2022). This study contributes to the field of intergenerational research by exploring the perspectives of young adults involved in an intergenerational exchange to support the digital skills of their older adult family members.

Digital divide assessment raises the question of responsibility and measurements (Epstein et al. 2011), methodological issues of digital divide measurements (Vehovar et al.2006) and options for discussion of digital divide from different perspectives depending on data sets (Sicherl 2019).

From digital inequality to AI inequality

Digital divide assessment became the ground for further analysis of digital inequality from different perspectives – social, regional and sectoral. Digital inequality term was introduced in the first decade of the new century but still unique definition is not elaborated. According to DiMaggio, P., Hargittai, E. (2001) "five specific dimensions along which differences within the online population might generate inequality:

1. Differences in the technical means by which people connect to the Internet. This includes both connection means (broadband versus dialup, etc.) and the quality of computer and other hardware.

2. User autonomy in using the Web. Can individual connect solely at work. Are their Internet sessions monitored? Are the sites they can visit limited by filtering software, as if often the case in public facilities?

3. Skill levels of users. Four different kinds of knowledge make up what they call 'Internet competence', 1) How to log on, 2) How to search the Web, 3) Basic knowledge about how the Web works and 4) Knowledge of computers and software that will allow users to solve equipment problems that occur.

4. User's levels of social support. Where can users turn when they have problems that they cannot solve on their own?

5. The purposes for which users use the Internet. There are numerous ends towards which the power of the Internet can be directed, some with greater long-term benefits than others."

It worth stressing out that the issues indicated above could be applied for the assessment disparities in digital technologies usage. They are elaborated raising research questions on territorial and sectoral aspects of digital inequality. In terms of regional level research, the case of Europe was discussed more often indicating intraregional challenges (Stiakakis et al.2010; Zilian 2020) . The sectoral challenges are less discussed. The assessment of digital communications during COVID 19 pandemic "illustrate how digital inequalities can put already disadvantaged groups at greater risk of diminished social contact during a public health crisis" (Nguen 2021). Digital inequality role in consumption of transport services and level of engagement were discussed (Durand et al. 2022), for education in universities highlighting social inequalities (Oyedemi 2012).

AI development in the past decade push the new era in digital economy development becoming more dependent on wide spread of AI applications. AI market developments raise the question of inequality in AI adoption and usage and make it possible to discuss "AI inequalities". As the discussions on AI role in social and economic development are increasing raising different aspects of its estimation the overcoming the gap in research on AI inequality is becoming important.

Key pillars of digital inequality in AI era

AI systems enlarging usage is challenging the global economic development and raise new questions in discussion of inequality. On one hand AI technology promises improvements in effectiveness both in production and services, makes it possible to create new sectors and products. On the other hand, in case of lack of development of ICT infrastructure, limitations in digital literacy and especially AI and data skills, accompanied with poor of vision of long-term development priorities and essential tracks for AI implementation technological advances grounded on AI bring

significant challenges to the society and economy. Application of SDGs for estimations of AI influence on inequality make it possible to make the following conclusions in case of health care sector. AI may increase accessibility of services and reduce inequality (SDG 10 “Reduced Inequalities”, SDG 4 “Quality Education”), but costs for AI may aggravate inequalities, AI bias reinforce inequalities (SDG 10) and discrimination (SDG 5), and in addition AI violate principles of security, privacy and confidentiality of personal information (SDG 16) (Ducret et al., 2022).

So, AI could be one of the issues challenging equality in society. But we could Also pose the question on AI inequality, taking narrow scope from digital inequality, putting in the center ability for AI systems creation and usage.

The key pillars in case of AI inequality measurement and coping with it could be the following: *national strategies and priorities for AI* with indication of midterm and long-term targets in education, economy developments, emphasizing the key sectors for AI adoption, regulation; *ICT infrastructure development* with emphasis for AI needs, big data, data additional value creation; *AI literacy*.

Risks of AI inequality

There are several key risks of inequality in the era of artificial intelligence, which leads to the stratification of society and the strengthening of trends in social inequality and discord.

1. **The stratification of society into several groups:**

- having an IT infrastructure capable of quickly processing big data,
- having an IT infrastructure capable of processing big data,
- do not have an IT infrastructure

The accelerating pace of digital transformation may exacerbate social divisions in terms of access to and benefits from the digital economy.

Access to a modern and efficient IT infrastructure may provoke pressure from certain sections of society on others, while it is possible, in the near future, that the situation of social stratification may be clearly presented.

2. **The need for rapid retraining of citizens whose professions are replacing artificial intelligence technologies**

The explosion of AI exacerbates the potential negative impacts by putting jobs that are most at risk for tasks that can be easily automated. While these jobs initially tended to be middle-income jobs, the advent of robotics and artificial intelligence is beginning to displace manual tasks focused on low-income jobs such as retail and warehousing, which can lead to social instability.

3. **Productivity gains from new technologies should serve more to reduce inequality than to increase efficiency**

As with social stratification, it is critical that the productivity gains from digital adoption become less divisive and more inclusive. Productivity increases the return on digital investment and can free up firms' resources to scale up and support new innovations. To kick-start this virtuous cycle of investment and productivity, a more inclusive approach to productivity is needed.

4. **Humanity is experiencing a "rollback" in personal development.**

The WEF predicts that inflationary pressures may remain steady for the next few years as the war continues, the pandemic continues, and the economic war continues to tear supply chains apart.

“Continued inflation could lead to stagflation, the socio-economic consequences of which could be severe given the unprecedented interaction with historically high levels of public debt,” the report says.

5. **Differences in basic access to knowledge**

Access to the Internet should be seen as a basic need, like water and electricity. The digital divide affects children's ability to learn and develop. Many schoolchildren

are deprived of access to modern technologies and the development of digital skills. The COVID-19 pandemic showed that children who had the right resources learned new skills and had an advantage in learning from home.

6. **Differences in access to employment**

The digital divide is a major barrier to finding quality jobs. This reduces the chances of getting a suitable job and thus affects a person's income. Lack of ICT skills, social media experience and poor quality of infrastructure are major barriers to getting a job in today's environment.

7. **Infringement of the rights of women in the age of AI**

Research shows that women are more likely to experience the digital divide. A study published in 2020 found that there are 300 million fewer women in low- and middle-income countries than men who use the Internet on their mobile phones. In addition, women in these countries are 20% less likely than men to own smartphones. Accordingly, women were less able to make decisions about these purchases.

A range of factors influence the development of this risk. For example, cultural norms in many countries require women to stay at home and take care of household chores, while men become the main breadwinners. This same trend often hinders women's education. Some countries also require women to exhibit consistent submissive behavior towards male peers, which can also restrict access to and use of the Internet.

8. **Restriction of access of different segments of society to health care services**

The digital divide also minimizes people's access to health care and health information. The digitalization of the medical services sector is forcing a transition to new approaches to working with consumers of these services, but only the opinion of the “majority” is taken into account, infringing on those who do not have the necessary skills or the necessary infrastructure to make the necessary transition.

For example, the Indian government has made it mandatory for residents to sign up for COVID-19 vaccines through an online platform. In other countries, public health officials have posted social media alerts about high-risk areas and how to stay safe. At the same time, enhanced measures were not taken to contain disinformation on Twitter and other social networks.

9. **Difficulties in the development of new approaches to of the labor processes**

The digital divide creates barriers to remote work. As of June 2020, nearly twice as many people were working from home as in traditional offices. However, 35% of these people had poor or no internet access, making remote work impossible. Working from home gives people more flexibility, but not without the necessary infrastructure.

10. **Restriction on access to assistance and support services**

The digital divide limits a person's access to support services, for example, for victims of domestic violence. Most of the organizations that help such groups have websites that let people know about the services and also have quick exit buttons that allow visitors to quickly leave the site in compromising situations. However, without the Internet, people may not even be aware of the existence of such organizations.

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MGIMO Centre for AI was established to enhance international cooperation and support collaboration with all the actors of digital economy both at national and international levels. Our multidisciplinary research is focused on international cooperation agenda, national policies for AI and business opportunities. International trade and trade policy (prioritising digital trade), sustainable development, AI ethics are the key areas of our activities.

On the basis of MGIMO-University we promote an international AI expert platform with regular conferences and round tables, peer-revied articles and research papers. Our enlarging network of strategic partneships makes it possible to provide AI consulting and policy solutions both for business and goverment agencies.

The Centre was founded in October, 2021

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Our contacts

143007, Moscow Region, Odintsovo,
Novo-Sportivnaya street, 3
https://aicentre.mgimo.ru
E: aicentre@inno.mgimo.ru
P: +7 903 623-95-15
https://t.me/aicentremgimo

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