MINISTRY OF EDUCATION OF THE REPUBLIC OF BELARUS
Belarusian National Technical University

Faculty of Management Technologies and Humanitarization
Department of "Philosophical Teachings"

A.I. Loiko

PHILOSOPHY OF ARTIFICIAL INTELLIGENCE

Textbook on general education discipline
"Philosophy" for students of all forms of study

Electronic learning material

Minsk
BNTU
2024

Author:

A. I. Loiko, Head of the Department of Philosophical Teachings, BNTU, Doctor of Philosophy, Professor

Reviewers:

Kandrichina I.N., Associate Professor, Department of Management, Belarusian National Technical University, Candidate of Sociological Sciences

Nekrashevich F.A., Associate Professor of the Department of Philosophy and Ideological Work of the Educational Institution "Academy of the Ministry of Internal Affairs of the Republic of Belarus" Candidate of Historical Sciences

The textbook will allow students to study in depth topics related to the philosophy of consciousness, philosophy of artificial intelligence, philosophy of technology, social philosophy, ethics and philosophy of digital law.

INTRODUCTION

The philosophy of artificial intelligence technologies is included in the subject field of philosophy of technology. Technology is understood as a process within a certain activity that provides an effective result through the organization of labor of the subject of the activity and the use of mechanical and machine devices. In the early stages of history, man used technological processes in combination with mechanical tools. Areas of application were hunting, fishing, animal husbandry, agriculture, construction, and military affairs. Craftsmen were engaged in the manufacture of tools. At first these were stone and bronze tools. Then iron became the main material for making tools.

A limited set of tools did not prevent ancient builders from implementing unique projects for the construction of pyramids, stone idols on Easter Island, Stonehenge, canals, lighthouses, walls and cities with water supply and sewerage infrastructure, and shipbuilding. The main emphasis was on the use of cheap labor and labor organization. The more active use of technical devices was hampered by the slave and captive labor system. Therefore, some technical solutions were not used.

Aristotle, comparing the main components of human activity, noted the lower value status of technical skill compared to knowledge. The reason for its assessment is that the master, when making mechanical tools, copies samples from nature. This means that he does not bring anything new to intellectual culture. As a result, technology has a neutral status in culture. This means that it cannot influence the content of social processes.

During the Renaissance, equipment and technology became part of the information space of society. With their help, books were published and distributed at universities. These were editions of the Bible and poetic literature.

In modern times, technology and technology were considered in close connection with mechanics. The opinion has become established that engineering and technology are based on scientific knowledge from the field of mechan-

ics. The fascination with mechanics was so significant that at the level of philosophy, mechanism became one of the key ontologies through which not only objects of technology, but also living nature were described. Technology was associated with a well-organized device with signs of high precision and rationality. A clock mechanism was taken as a sample. This approach to culture was cultivated during the Enlightenment.

Technical devices have become part of scientific research (microscope, telescope). The development of observation instruments was carried out by G. Galileo and I. Newton. The methodological strategies of sensationalism and empiricism played an important role in supporting such developments. K. Semyanovych applied the philosophy of mechanism to systematically describe artillery and related technologies and professional skills. As a result, technical sciences emerged, represented by ballistics, pyrotechnics and space technology.

Interest in the phenomenon of technology was formed in the context of the market industrial economy's search for more efficient forms of organizing production activities compared to medieval workshops. A detailed analysis of the causes and forms of technological activity in industry was carried out by K. Marx. Industrial technology became a subject of study in polytechnic schools and institutes as early as the 18th century. Philosophical engineers Ernst Hartig, Johann Beckmann, Franz Relo and Alois Riedler played an important role.

K. Marx showed that at first production owners emphasized the technological organization of production through cooperation and the division of professional labor into separate operations. Manufactory corresponded to this approach. But when the possibilities for increasing worker productivity were exhausted by the technological organization, managers turned to the resource for increasing production productivity contained in industrial equipment, in particular, machine tools. This strategy has proven to be effective. But it turned out to be unacceptable to the workers. This showed the Luddite movement.

But the workers could not prevent the introduction of equipment into technological processes. The role of technology grew, and this role created a

special status in industrial society for engineers and technical specialists. In 1856, the Union of German Engineers arose in Germany, the purpose of which was to understand the phenomenon of technology and the role of engineers in an industrial society.

The term “philosophy of technology” was introduced into German by E. Kapp in the second half of the 19th century. In English, the term “philosophy of technology” is used to refer to problems related to engineering and technology. In Russian, the term “philosophy of technology” is used to denote the subject field of technology and technology.

E. Kapp understood philosophy of technology as a field of research oriented toward philosophical anthropology. The main object of this anthropology was the extended man. E. Kapp believed that technical devices (mechanical and machine) are a continuation of human organs. In his opinion, a person designs technical devices in order to increase the physical capabilities of his own body in the processes of activity.

At the beginning of the twentieth century, T. Veblen developed topics related to the role of engineers in industrial society. Based on the methodology of technological determinism, he proposed the concept of technocracy. It involves the transfer of production management from the leisure class to engineers. This is argued by the fact that engineers are involved in production processes and are well aware of their features and needs. In this context of consideration, engineers had to become managers, which they took advantage of in the USA. In this management, the key was attention to the creation of efficient industrial technological processes and work with banks and investors. An example was given by G. Ford, who generated a technological project for a conveyor in order to convince creditors of the efficiency of production.

Against the background of attention to technology and technology, an important role was given to increasing the productivity of workers. Such studies became the main ones for F. Taylor. Their results were published in the books “Factory Management” (1903), “Principles of Scientific Management” (1911),

“Testimony before a Special Congressional Commission” (1912). It was proposed to maintain strict regulations on the use of materials and tools; standardization of tools, work operations; accurate recording of working hours; study of labor operations by decomposing them into their component elements and timing, establishing control over each operation. F. Taylor linked the task of introducing advanced work methods with the standardization of tools, taking into account the characteristics of specific types of work. His followers were engineer G.L. Gant, F.B. Gilbert and L. Gilbert.

G.L. Gantt applied analytical methods to study manufacturing operations. He developed methods for planning the sequence of manufacturing operations. The subject of the research was human-machine production systems. F.B. Gilbert and L. Gilbert showed that the basic elements of manufacturing operations do not depend on the content of the work. They developed a technique for microanalysis of movements, which marked the beginning of the scientific organization of workplaces.

The emphasis on streamlining workplaces and processes became evident. The detailing of all aspects of the work process at the level of the manufacturing operation created an image of society resembling a mechanical device. This meant that mechanism had returned to culture. His product was a one-dimensional man (G. Marcuse).

Along with the applied approach to engineering and technology, which corresponded to the concept of the determining role of technological and economic determinism in the development of society, a critical attitude towards humanity’s commitment to the values of engineering and technology grew. This was due to the fact that technology was recognized as a special ontological essence, according to F. Dessauer, given from God. But this argument of the technocrats was not convincing for philosophers of the classical humanitarian orientation. The signs of the First World War did not help technological optimism. In this war, technology showed itself as a means of mass destruction of people.

Humanitarian philosophers have discovered a wide range of negative influences of technology and technology on culture. This gave grounds for O. Spengler and N. Berdyaev to write about technology as a key feature of civilization. This sign means the end of the cultural stage in the history of mankind. It is characterized by dehumanization.

F. Nietzsche adhered to a similar position when he wrote that people themselves ended the historical era of cultural values. According to him, God is dead and we killed him. With this action, humanity entered the era of nihilism. H. Orhega i Gasset, C. Jaspers, C.G. Jung and S. Freud wrote about the unfavorable combination for humanity of crowd psychology and technological determinism with its characteristic subjectivism in decision making. The crowd has become the main instrument for the implementation of inhumane social projects.

At the level of individual consciousness, S. Freud discovered the level structure of the human psyche in the form of not always peaceful coexistence of the unconscious, subconscious and conscious components of worldview. In such a situation, the individual consciousness needs psychological support and therapy. Another factor in the internal instability of a person's individual consciousness is borderline situations. Their source is social reality, saturated with industrial technologies, including military ones. In these situations, the individual is faced with a choice between life and death. This is one of the main plots of fiction of the 19th and 20th centuries.

A. Schopenhauer emphasized will. A. Bergson gave preference to intuitionism. Neo-Thomism, personalism and Russian religious philosophy assigned a stabilizing role to God.

From the position of fundamental ontology, M. Heidegger examined technology in the categories of being and time. He discovered that technology produces superficial instrumental thinking in people. They have lost the culture of meaningful reflection. And this creates high risks for the people themselves.

Against the backdrop of articulated concerns about the consequences of technological progress for humanity, technological and economic determinism,

in mutual interest, continued to dominate human practices. The dominance of technological determinism in social philosophy and sociology was evidenced by the concept of industrial, post-industrial and information societies, which became popular.

Industrial society was defined by the criterion of the dominance of industrial, transport and energy technologies in society. Industrial technologies were localized in factories and factories. They formed the basis of the economic structures of transnational and state corporations. Energy technologies are localized by national energy systems, power plants, oil, gas and coal companies. Oil and natural gas have become the main energy resources. And the consumption of electrical energy has become not only industrial, but also domestic.

Transport technologies ensured the functioning of logistics. This function was performed by land, air and water transport, localized in large transport companies. Information technologies of telegraph, radio, mail, publishing, communications fulfilled the task of communication and functioning of the mass media market. The term “post-industrial society” refers to the development of industrial technologies and the associated energy complex in the conditions of a mass consumption society. In this society, industrial technologies began to be used to produce goods and devices for personal use.

These are household appliances, cars, televisions. The production of such equipment required high-level design and service. The main argument in the competitive struggle of manufacturers was the quality of products. Advertising and other marketing technologies began to play an important role. Another argument was the low production costs. This criterion determined the transfer of production by transnational corporations to regions with cheap skilled labor, in particular to the territory of the PRC.

The term “information society” is understood as a social system in which the main role is played by transnational corporations focused on creating and developing a market for digital information services. This market is localized by social and enterprise digital technologies. It is associated with the structures of

industrial and post-industrial societies through the practice of automating these structures. Society has always been an information society, since communication (information) played a key role in the formation and functioning of its institutions. For a long time, society has used analog technologies for transmitting and storing information. At the industrial stage, mail, printing, telegraph, and then radio and television played a major role in them.

As the volume of information in decision making grew, a situation arose where managers without the support of digital technologies could not make effective decisions. The idea of these technologies was formulated in modern times. B. Pascal designed a calculating machine to help his father, an accountant. G. Leibniz formulated the principle of operation of digital technologies by analogy with calculations. J. Boole developed the apparatus of mathematical logic for this purpose.

The tutorial describes the features and technologies of digital communication, taking into account such a problem as artificial intelligence bias. This problem is generated by modern man, who, at the level of semantic artificial intelligence, expands his ideological space and makes digital communications part of his own anthropology and peculiarities of thinking. As a result, forms of conflict consciousness such as bullying, trolling, and terrorism migrated from information practices of people's communication to digital practices of people's communication. An expanded space of risks and threats has formed, which has become the subject of study. Methods of digital ethnography and legal sciences are used. The philosophy focuses on the study of digital communication institutions, as well as on the study of modifications of the extended person.

This is the subject of cybernetic philosophy. For students of the Belarusian National Technical University, in particular, the Faculty of Information Technologies and Robotics, this textbook is an important resource for independent study of current issues related to consciousness and artificial intelligence.

Artificial intelligence technologies required hardware, operating system and software.

Hardware of artificial intelligence technologies

In the 19th century, the development of mechanical computing automation devices began. One of the first such devices was the adding machine, invented in 1820 by Charles Babbage. In 1822, Charles Babbage created a computing machine.

In the 20th century, electronic computers (electronic computers) based on tubes were designed. The first computer was created in 1945 in the USA. Its weight was more than 27 tons, and its dimensions were 30 by 15 meters. It was used to calculate the trajectories of artillery shells and performed 5 thousand arithmetic operations per second.

The transition from tube devices to transistors became important. The year of invention of the first working semiconductor is considered to be 1947. It was created by three physicists from Bell Laboratories: John Bardeen, Walter Brattain and William Shockley. A year later, he improved the invention, turning it into a bipolar junction transistor. And seven years later, in 1956, three physicists received the Nobel Prize for their development. The invention of the transistor led to the development of semiconductors, microprocessors, and integrated circuits, which are used in modern computers.

In the 50s of the twentieth century, computers became smaller. The IBM 701 became the basis for the development of computing technology. In the mid-1960s, computers became compact and were used in universities and scientific laboratories. In the 70s of the twentieth century, personal computers came into use. The compactness of computers was created by the transition to transistors. In 1971, Intel released the first microprocessor, the Intel 4004, which contained 2,300 transistors. It was developed for use in calculators and became the basis for the development of compact computers.

In 1975, Altair Computer introduced the first personal computer, the Altair 8800, which became a popular microprocessor-based computer. It was built on the Intel 8080 and had 256 bytes of RAM. Apple Computer was founded in

1976 by Steve Jobs, Steve Wozniak and Ronald Wayne. They started production of the Apple I, which was built on the MOS Technology 6502 microprocessor and had 4 kilobytes of RAM.

In 1977, Commodore released the Commodore PET, which was the first computer built into a monitor. It used a MOS Technology 6502 microprocessor and had 4 kilobytes of RAM. In 1981, IBM launched production of the IBM PC, which became the first modern personal computer. It used an Intel 8088 microprocessor and had 16 kilobytes of RAM.

In 1984, Apple Computer released the Macintosh, which was the first personal computer with a graphical user interface. It used a Motorola 68000 microprocessor and had 128 kilobytes of RAM. With the advent of the Internet in the 1990s, computers became not only tools for work and learning, but also a platform for communication and social contacts. A new era in the development of hardware devices began with the production of smartphones. Many computer functions were transferred to the telephone basis.

Operating system

Without an operating system, a computer is just a collection of chips. All programs run on the operating system. The speed and productivity of your computer depends on the operating system. A modern computer consists of one or more processors, RAM, disks, a printer, keyboard, mouse, monitor, network interfaces and other input/output devices. It turns out to be a rather complex system. Managing all its components and making optimal use of them is a challenge. For this reason, computers are equipped with a special layer of software called an operating system, whose task is to manage user programs as well as manage all system resources.

GM-HAA was the first operating system for computers. It was created in 1955 by Robert Patrick with General Motors and Owen Mock with North American Aviation. It was based on a system monitor and ran on mainframe comput-

ers. Its function was to automatically execute a new program when the old program terminated.

The first UNIX system was developed in 1969 by AT&T's Bell Labs division. Distinctive features of UNIX systems include:

1) use of text files to configure and manage the system;

2) widespread use of utilities launched on the command line;

3) interaction with the user through a virtual terminal device;

4) representation of physical and virtual devices as files.

UNIX systems are recognized as one of the most historically important operating systems. This operating system popularizes the idea of a hierarchical file system with arbitrary nesting depth.

In 1972, the PLATO system was developed. It had an orange plasma panel. It included memory and raster graphics functions. The PLATO plasma display supported the ability to quickly draw vector lines. Many innovations introduced by PLATO OS later became the foundation for the development of other computer systems. Some technologies were borrowed and improved by Apple.

The first version of Windows appeared in 1985. In 1992, version Windows 3.1 was updated. 32-bit accessibility to the hard drive has begun. In 1998, the Windows 98 operating system entered the consumer market. The advantages, compared to previous samples, were: full integration with the Internet, more advanced interface management, a new Pentium II processor, an AGP graphics portal, and a USB bus.

The development of the Windows XP system was underway, in which it was decided to abandon 16-bit in the system kernel and switch to 32-bit, with a new architecture and structure. This is the first of the systems with a fully customizable interface, introducing an intelligent Start menu. The panel that controls the PC has been redesigned. Windows 8, unlike its predecessors Windows 7 and Windows XP, uses a new interface called Modern (Metro). The system also has a desktop, but as a separate application. Smartphones running on vari-

ous operating systems are attracting growing interest from users: Windows Phone, Boda, I OS. The most popular it of them are I OS and Android OS.

IOS (mobile operating system), created on the Linux kernel and developed and released by the American Apple. It was launched in 2007 for iPhone and iPod Touch. It is installed on all Apple devices. It is installed on all Apple devices. Innovations such as the Safari mobile browser, visual voicemail, and virtual keyboard have made iOS one of the most popular systems for smartphones. The Android system is developing dynamically. It is designed for smartphones. It is a simplified version of similar Windows and Linux systems used on desktop PCs and laptops, oriented towards the touchscreen. The Android platform consists of an operating system, an interface connecting software and powerful applications.

Google Chrome OS (cloud operating system) is designed for various devices and supports x86 and ARM processor architectures. The Google Chrome operating system is open source, based on an optimized Linux kernel and driven by the Chrome browser. It is distinguished by the dominance of web applications over regular operating system functions. The browser plays a key role.

The strategy for creating a new product implies an architecture that is undemanding to the hardware resources of the personal computer used to access the Internet. The applications that the system runs are web services. There is no need to install offline applications. As a result, working in Chrome OS does not require powerful computer resources, since processes do not run on the computer itself, but on the servers of the corresponding services. The user's operating system has become similar to a web browser.

Programming

The first generations of computers did not have screens or keyboards. To work with them, punched cards were used. Programs were written using machine code. To make the process easier, programming languages were invented.

Ada Lovelace, daughter of the poet George Byron, is considered the first computer programmer. She came up with the idea of using the binary number system when working with the device and introduced the basic programming terms that are still used today. With her participation, it was possible to find out what was needed to create a computer. This is a coding device or punched card, memory, control unit, device for counting and viewing results.

The formal concept of an algorithm appeared in 1936, when cryptographer Alan Turing proposed the abstract computing "Turing Machine." During the Second World War, the scientist's female employees operated the first computers at the Bletchley Park Government Code and Cipher School. They found a way to break the German Enigma encryption machine.

After the creation of an electronic digital computer, it became clear that programs needed to be written in a language understandable to it and use binary code. Like an electronic computer, it translated data from punched cards into understandable binary code, made calculations and showed the result in decimal code. Digital computers looked bulky and filled all the free space in the rooms. The language of interaction with the computer was complex and cumbersome. The programs looked like a sequence of zeros and ones. It was easy to make a mistake, for example, by swapping numbers.

Creating programs was expensive and required increased attention. For each computer it was necessary to create its own program and delve into the features of the operation of each block of the device. It was decided to automate the typing of machine code. In 1947, Kathleen Booth, along with other scientists, developed assembly language. In assembler, a shortened set of letters or shortened words were used to denote commands and objects. This made it much easier for programmers to work on the code. Until the 50s. In the 20th century, computer programs were written by the people who directly developed them. Each had its own programming language of sets of instructions: basically a sequence of operation numbers and memory locations. The code looked like a sequence of numbers.

To write a program, you had to learn machine instructions, write the code on paper, and test it several times. But there was a problem of staff shortage. The solution was Assembly language, the name of which comes from the English “assemble” – to assemble, assemble. As a result, letter commands were added to the numeric commands.

In the history of programming, women played an important role because they were better suited to the position of human computer. One of the first to work in this position was Barbara Can right. The volume of work increased, and departments of women emerged to deal with calculations. In the 50s In the 20th century, real computers began to be used, but most male engineers and scientists did not trust the machines. As a result, computer programming became a woman's job. In 1960, more than a quarter of programmers were women. By 1967 there were even more of them.

The percentage of women in the profession began to decrease since 1984. This is explained by the spread of personal computers. In the 70s In the 20th century, the first Commodore 64 or TRS-80 began to appear in homes. Parents often gave them to boys - and they gradually mastered coding. As a result, more prepared young men came to universities to study computer science, and programming gradually began to be considered a male profession.

Programming languages

An important step was the emergence of device-independent programming languages and the creation of compilers. The first compiler, or program that automatically translated data in a programming language into machine code, was created by Grace Murray Hopper in 1952. The number of compilers grew exponentially. From 1954 to 1957, IBM scientists led by John Backus developed Fortan. It is considered the first mainstream programming language. The extensive use of Fortan led to the calculation of precise, technical calculations. It is still used today. After Fortan spread rapidly among the scientific community,

competitors began to think about creating an even more convenient language. Another language was Algol (a language for describing computational algorithms). As the language spread, new compilers were created.

Contemporaries of Fortan and Algol were the programming languages Lisp and Cobol. The first language was created for working and processing long lists of data, and the second language was created for economic transactions and tasks. Both Lisp and Cobol continue to be used in the banking industry.

The next stage was structured programming. It uses procedures and functions. The new methodology made it possible to reduce program code and make it more understandable. Instead of performing the same task, you can declare a function and not write the data several times. The structure helped to break the program down into its constituent elements and made working with a large amount of data much easier. Although this type of programming was convenient, it became exhausted when the code reached a certain length. Therefore, scientists are seriously thinking about developing a new approach.

In 1964, Thomas Kurtz and John Kemeny developed a universal symbolic instruction code (Basic) for making simple programs. This programming language was based on Fortan and Algol. Basic was created in a simple and understandable language for teachers who pass on their knowledge to students.

Simula and Smalltalk were the first object-oriented languages. Thanks to them, real-time code editing and dynamic typing became possible. They were created on the basis of structured programming, with the concepts of polymorphism and inheritance. The use of structures became even more effective when they were combined into classes containing not only variables, but also functions for working with them. It became possible to test not the entire program, but to break it into classes.

One of the top-level structural languages that quickly gained popularity was Pascal. It was developed as a tool for teaching computer programming. It was invented in the late 60s of the 20th century as a language for teaching students programming. But it began to spread not only in the scientific community.

Pascal began to be used by programmers to solve applied problems. In 1975, Pascal was modernized. Based on Pascal, Object Pascal was developed, which is classified as an object-oriented language.

Dennis Ritchie and Kenon Thompson worked on the C programming language. In the late 70s of the twentieth century, C began to be used more often than Basic. In the mid-80s. In the 20th century, it was adapted for the IBM-PC, the first mass-produced personal computer, released in 1981. This caused a surge in the popularity of this language. Part of the UNIX operating system, one of the most commonly used operating systems in the world, was written in C. C++ is used in MS Office, Adobe Photoshop, game engines and other high-performance software.

Until 1986, Guido van Rossum created the ABC programming language, which became the prototype for Python. It was conceived as a language with a simple syntax that would be comfortable to work with. Over the course of 30 years, it has changed and become a programming language known throughout the world. At the end of the 90s of the twentieth century, the second version of the language was released, and in 2008 the third version of Python 3.0 was released. There were no malfunctions in it, and the architecture of the language was largely redesigned.

Ruby is most often used in high-level development. Its author is Yukihiro Matsumoto. Ruby is convenient for writing the server side of websites and web programs. The distinctive features of this language include interpretability, block support, and multithreading. His companies include Twitter, Hulu and Groupon. In 1994, Rasmus Lerdorf did not think about creating a language, but only made a personal home page. It formed the basis of PHP. It is considered one of the flexible programming languages, PHP helps in making applications. Initially, PHP was just a set of scripts, and in 20 years it has become a language that is annually ranked among the most basic programming languages.

Java was created by engineers Patrick Naughton and James Gosling. They wanted to make a programming language for consumer electronic devices that

have small memory systems. It was important that the code, once written, could be read on any device, and not be created anew. If at first we were talking only about small household electronic devices, then later we started developing an operating system for television set-top boxes. And in 1994, Gosling realized that they could make a browser based on Java. With the emergence of this language, the browser was able to set the structure and dramatically expand the capabilities of providers.

System of unified computer networks

The system of unified computer networks is built on the use of the IP protocol and routing of data packets. The Internet forms a global information space and serves as the physical basis for the World Wide Web and many other data transmission systems (protocols).

The World Wide Web is a distributed system that provides access to related documents located on different computers connected to the Internet. It is formed by millions of web servers. Most resources are hypertext. Hypertext documents are called web pages. Several web pages, united by a common theme, design, as well as interconnected links and usually located on the same web server, are called a website.

A unified information transmission system began to be created in the 60s of the twentieth century. In 1971, the first program to send email over the Internet was developed. In 1973, organizations from the UK and Norway were connected to the US network via a transatlantic telephone cable. The network has become international. The network was used to forward email. The first mailing lists, news groups and bulletin boards appeared. The network could not easily interoperate with other networks built on different technical standards.

Data transfer protocols were created and standardized in the 1980s. Jon Postel played an active role in the development and standardization of network protocols. On January 1, 1983, the ARPANET switched from NCP to TCP/IP. It

is still used to connect networks. In 1983, the term “Internet” was assigned to the ARPANET network.

In 1984, the Domain Name System (DNS) was developed. The title "Internet" began to smoothly pass to NSFNet. In 1988, the Internet Relay Chat (IRC) protocol was developed. Thanks to it, real-time communication (chat) became possible on the Internet. In 1989, Tim Berners-Lee developed the HTTP protocol, HTML language, and URIs.

In 1989, while working on the organization's intranet at CERN, Tim Berners-Lee proposed a global hypertext project. The project involved the publication of hypertext documents linked by hyperlinks, which would facilitate the search and consolidation of information for CERN scientists. To implement the project, Tim Berners-Lee invented URIs, the HTTP protocol, and the HTML language. Between 1991 and 1993, Berners-Lee refined the technical specifications of these standards and published them.

As part of the project, Berners-Lee wrote the world's first web server, "httpd", and the world's first hypertext web browser, called "WorldWideWeb". This browser was also a WYSIWYG editor (short for What You See Is What You Get). Its development began in October 1990 and was completed in December of the same year. The program worked in the NeXTStep environment and began to spread on the Internet in the summer of 1991.

Berners-Lee created the world's first website at http://info.cern.ch/ (the site is archived). This site appeared online on the Internet on August 6, 1991. The site described what the World Wide Web is, how to install a web server, and how to use a browser. The site was the world's first Internet directory because Tim Berners-Lee later posted and maintained a list of links to other sites there. Since 1994, the main work on the development of the World Wide Web has been taken over by the World Wide Web Consortium (W3C), founded and headed by Tim Berners-Lee. This is an organization that develops and implements technology standards for the Internet and the World Wide Web.

The W3C develops common principles and standards for the Internet (called “recommendations”, W3C Recommendations), which are then implemented by software and hardware manufacturers. Compatibility is achieved between software products and equipment of various companies, which makes the World Wide Web more advanced, universal and convenient. The recommendations of the World Wide Web Consortium are open. They are not protected by patents and can be implemented by anyone without any financial contributions to the consortium.

There are two eras in the history of the Web: [before Marc Andreessen's Mosaic browser] and after. The combination of Tim Berners-Lee's web protocol, which provided communication, and Marc Andreessen's browser (Mosaic), which provided a functionally perfect user interface, created the conditions for interest in the Web.

In 1995, the World Wide Web became the main provider of information on the Internet, overtaking the FTP file transfer protocol in traffic. The World Wide Web Consortium (W3C) was formed. The World Wide Web has transformed the Internet and created its modern appearance. You can connect to the Internet through communication satellites, radio channels, cable television, telephone, cellular communications, special fiber-optic lines or electrical wires.

Artificial Intelligence Computer Program

A successful artificial intelligence program was created by Christopher Strachey in 1951. In 1952, it played checkers with a human and amazed with its ability to predict moves. On this occasion, in 1953 A. Turing published an article on chess programming.

The term artificial intelligence (translated from English as “artificial intelligence”) was first used in 1956 by John McCarthy, the founder of functional programming and inventor of the Lisp language, at a conference at Dartmouth University.

In 1965, Joseph Weizenbaum developed the Eliza program, which is considered the prototype of Siri. In 1973, the Stanford Trolley was invented, the first self-driving car controlled by a computer program.

Artificial intelligence received new development in the mid-90s. XX century. In 1997, the IBM supercomputer Deep Blue beat world champion Garry Kasparov at chess.

Artificial intelligence is a computer technology that makes it possible to perform tasks that previously could only be performed by humans. This may include decision making, problem solving, speech and image recognition, and data analysis. Artificial intelligence is implemented in the form of software that can run on computers and servers, or in the form of chips that can be built into phones, cars and home devices.

The term artificial intelligence refers to a broad field of scientific research related to the creation of intelligent machines. There are several types of artificial intelligence, including rules and knowledge bases, genetic algorithms, machine learning and neural networks. Each type has its own advantages and disadvantages, and the choice of a particular type depends on the specific problem that needs to be solved.

Knowledge base

A knowledge base (KB) is a semantic model that describes a subject area and allows answering questions from this subject area, the answers to which are not explicitly present in the database. The knowledge base is the main component of intelligent and expert systems.

A knowledge base management system is a complex of software, language and intellectual tools through which the creation and use of a knowledge base is realized. Knowledge base components: knowledge base; mechanism for obtaining decisions; interface.

Structure and functions of the knowledge base system. Knowledge in the knowledge base is divided into algorithmic and non-algorithmic knowledge. Procedural knowledge is algorithms that calculate functions, perform transformations, and solve specific problems, for example, a library of programs.

Non-algorithmic knowledge consists of mental objects called concepts. A concept has a name, definition, structure (component elements), it is connected with other concepts and is part of some system of concepts. Other non-algorithmic knowledge is connections between concepts or statements about the properties of concepts and the connections between them. The contents of the knowledge base are divided into facts and rules.

Facts are elementary units of knowledge (simple statements about the characteristics of an object), rules serve to express connections, dependencies between facts and their combinations.

The knowledge base includes mathematical and non-mathematical concepts; data; rules, dependencies, laws, connections; algorithms and procedures. The direct use of knowledge from the knowledge base to solve problems is ensured by the mechanism for obtaining solutions (inference engine - inference engine) - the procedure of searching, planning, solving. The solution mechanism makes it possible to extract answers to questions from the knowledge base and obtain solutions formulated in terms of concepts stored in the database.

Interface - provides work with the knowledge base and the mechanism for obtaining solutions in a high-level language, close to the professional language of specialists in the application field to which the special knowledge base belongs. The goal of research in the field of AI is to create systems that, on the one hand, can use a large amount of knowledge transmitted to them by specialists, and on the other, are able to enter into dialogue and explain their own conclusions. This requires effective management of a large and well-structured knowledge base, strict delineation between different levels of knowledge, multiple useful representations for rules, predicate schemas or prototypes, and a well-defined process for exchanging information between different sources.

The system needs to know what it knows. Eight main types of knowledge are used according to the following characteristics. Basic elements, objects of the real world, are associated with direct perception, do not require discussion, and are added to the base of facts in the form in which they are received. Statements are considered to be reliable in advance. Concepts are rearrangements or generalizations of basic objects. To build each concept, its own techniques are used. Relations express both the elementary properties of basic elements and the relationships between concepts. The properties of relationships include their greater or lesser likelihood, greater or lesser connection with a given situation. The representation of knowledge in expert systems is close to the models used in the database. In this way, a relational (generalized) database model was built in the OPS, PROLOG, SNARK and TANGO systems.

The pair of concepts “property - value” (relationship - entity) is well known in semantic networks. Frames and scripts are simple binary relationships. Some expert systems (INTERNIST, BAOBAB and SPHINX) use existing databases as a factor base.

Rewriting theorems and rules are a special case of production rules with certain properties. Theorems are of no use without expert rules for their use. The presence of theorems in expert systems represents the main difference from classical database management systems, in which they are either absent or programmed. Modifying or adding new theorems is a time-consuming, although necessary procedure, since it is necessary to ensure good structured database management and optimize the receipt of answers.

Decision algorithms are necessary to perform certain tasks. They are associated with knowledge of a special type, since the sequence of actions they define turns out to be formed into a block in a strictly necessary order, in contrast to other types of knowledge, where elements of information can appear and be located without connection with each other. It is difficult to work with long procedures consisting of a large number of different actions. The use of pure algo-

rithms is limited to special cases, most of which are related to the processing of numerical information.

Strategies and heuristics are innate or acquired rules of behavior that allow one to make a decision on the necessary actions in a specific situation. They use information in the reverse order in which it was received. Metaknowledge exists on many levels and represents knowledge of what is known and determines the value of the confidence coefficient in this knowledge, the importance of elementary information in relation to the entire set of knowledge. This includes organizing each type of knowledge and indicating when and how it can be used.

Finite automata, programs, predicate calculus, and production rule systems are equivalent to each other because they can be reduced to a universal Turing machine, although their operational characteristics are very different. Frames, scripts, semantic networks are of great help in understanding the language. Frames are complex data structures that describe a typical situation, such as waiting at the airport or attending a family dinner. A frame consists of positions for placing objects that characterize a given situation. The position can be transferred to another frame. In addition, it contains information about the actions being performed, how to act in typical and atypical cases, and the influence of neighboring frames.

A script or diagram is a description of a stereotypical scenario of actions involving certain objects. Scripts are related to the current culture. They can call other scripts and have more power than frames to describe the dynamic aspects of knowledge. Semantic networks are graphs that represent a combination of the two previous concepts and the object of description of which is the elements of the surrounding world and the connections between them. They have much in common with relational database models.

Images and graphs are used effectively to prove theorems. They provide great assistance in checking the absence of looping of stages, in complete and effective storage of the task in memory, in organizing the input of new elements.

The following tools can be used to create knowledge bases.

1. Traditional programming languages - C, Basic, Pascal, Lisp, etc. The functional programming language Lisp stands out in particular in this series. Its main properties: data is presented in the form of lists recursion is used to obtain solutions.

2. Knowledge representation languages (such as Prolog) - have specific means of describing knowledge and a built-in mechanism for searching for output.

3. Empty shells of expert systems - contain implementations of some knowledge representation language and means of organizing the user interface.

Knowledge bases are described in the form of specific facts and rules of logical inference over databases and information processing procedures that present information and knowledge about people, objects, facts, events and processes in a logical form. They are classified into worldwide knowledge bases (Internet); national knowledge bases; industry knowledge bases; organization knowledge bases; expert systems knowledge bases; specialist knowledge base.

Expert systems are considered together with knowledge bases as models of behavior of experts in a certain field of knowledge using logical inference and decision-making procedures, and knowledge bases are considered as a set of facts and rules of logical inference in the selected subject area of activity.

The characteristic features of an expert system are: clear limitation of the subject area; ability to make decisions under conditions of uncertainty. And also – the ability to explain the progress and result of a decision in a way that is understandable to users; a clear separation of declarative and procedural knowledge (facts and inference mechanisms); the ability to replenish the knowledge base, the ability to expand the system. The result is given in the form of specific recommendations for actions in the current situation, which are not inferior to the decisions of the best specialists. Focus on solving unformalized (the method of formalization is still unknown) problems.

The solution algorithm is not described in advance, but is constructed by the expert system itself. There is no guarantee of finding an optimal solution

with the opportunity to learn from mistakes. The knowledge base consists of rules for analyzing information from the user on a specific problem. The expert system analyzes the situation and, depending on its direction, makes recommendations for resolving the problem.

The knowledge base of an expert system contains facts (static information about the subject area) and rules - a set of instructions, applying which to known facts you can obtain new facts. The purpose of creating a knowledge base is to reduce the time and effort required to resolve common incidents.

Genetic algorithms

Genetic algorithms are designed to solve optimization problems. The genetic algorithm is based on a random search method. The main disadvantage of random search is that it is not known how long it will take to solve the problem. To avoid wasting time when solving a problem, methods discovered in the study of the evolution and origin of species are used. A similar algorithm was first proposed in 1975 by John Holland at the University of Michigan. It was called the “Holland reproductive plan” and formed the basis for almost all variants of genetic algorithms.

Any organism can be represented by its phenotype, which actually determines what an object is in the real world, and its genotype, which contains all the information about the object at the level of the chromosome set. Moreover, each gene, that is, an element of genotype information, is reflected in the phenotype. Bit strings are used to represent the genotype of an object.

Each attribute of an object in the phenotype corresponds to one gene in the genotype of the object. Gene is a bit string, most often of a fixed length, which represents the value of this trait.

To encode such features, the bit value of this feature is used. This allows the use of a gene of a certain length, sufficient to represent all possible values of such a trait. But such coding is not without its drawbacks. Neighboring numbers

differ in the values of several bits, for example, the numbers 7 and 8 in the bit representation differ in 4 positions, which complicates the functioning of the genetic algorithm and increases the time required for its convergence.

To avoid this problem, encoding is used in which neighboring numbers differ in a smaller number of positions, ideally by the value of one bit. Such a code is the Gray code.

When encoding an integer attribute, it is divided into tetrads and each tetrad is converted using the Gray code. In practical implementations of genetic algorithms, there is no need to convert trait values into gene values. In practice, the inverse problem occurs when, based on the value of a gene, it is necessary to determine the value of the corresponding trait.

For encoding, a bit representation is used, although this option has the same disadvantages as for integers. Therefore, in practice, the following sequence of actions is usually used: the entire interval of permissible values of the attribute is divided into sections with the required accuracy; take the gene value as an integer defining the interval number (using Gray code); the number that is the middle of this interval is taken as the parameter value. When encoding non-numeric data, you must first convert it to numbers.

In order to determine the phenotype of an object (that is, the values of the characteristics that describe the object), it is necessary to know the values of the genes corresponding to these characteristics, that is, the genotype of the object. In this case, the set of genes that describe the genotype of an object is a chromosome. In some implementations it is also called an individual. In a genetic algorithm implementation, a chromosome is a fixed-length bit string. Each section of the line corresponds to a gene.

The length of genes within a chromosome can be the same or different. Genes of the same length are used. In genetic algorithms, an operator called crossing (also called crossover or crossing over) is responsible for transmitting the characteristics of parents to offspring. This operator determines the transfer

of characteristics of parents to descendants. Two individuals are selected from the population to become parents.

Machine learning

"Machine learning" involves training a neural network based on a statistical sample. In a marketing sense, the terms "neural network" and "machine learning" can be considered synonymous. A huge number of machine learning methods and neural network architectures have been developed. Deep learning is a type of machine learning.

Creating a machine learning solution involves two tasks: collecting and preparing training data, selecting an existing machine learning strategy or model, such as linear regression or decision tree. Data scientists select important data features and feed them into the model for training. They continually refine the data set by updating data and checking for errors. The quality and variety of data improves the accuracy of a machine learning model.

Machine learning solutions require a dataset of several hundred data points for training, as well as sufficient computing power to operate. Depending on the application and use cases, a single server instance or a small cluster of servers may be sufficient. HPC use cases require thousands of machines working together to achieve complex goals. Training functions can be created, run, and controlled from the Amazon Web Services (AWS) cloud.

Practical AI functions

The boom in AI applications is largely driven by two factors: the ubiquity of powerful, low-cost computing capabilities enabled by cloud and edge technologies, and the continued advancement of AI and data processing algorithms. Manufacturers who have implemented smart factory and Industrial Internet of Things (IIoT) initiatives are addressing the increasing volume and complexity of data with increasingly powerful and sophisticated analytics tools.

Modern artificial intelligence allows manufacturers to move from descriptive and diagnostic analytics to predictive and prescriptive ones. The first is designed to answer the questions: “What happened?” and “Why did this happen?”, to answer the questions: “What will happen?” and “What should I do?” By being able to predict behavior and further prescribe actions based on those predictions, manufacturers can limit the frequency and impact of negative incidents.

Generative design is a growing area of AI application that can automatically create models from a set of product requirements. In a computer-aided design (CAD) environment, engineers can specify design conditions such as loads, connections and materials, as well as performance goals, and

AI will select geometries that meet these criteria. Recent advances in generative design have greatly expanded the types of conditions and performance goals that can be included and considered in a solution. Additional functionality allows generative design to be extended from a performance perspective to include manufacturability.

Artificial intelligence allows engineers to quickly explore the design space and evaluate dozens of candidates that meet performance and production requirements. Entry-level mechanical engineers who lack years of practice implementing standard methods and rules can now create viable designs as quickly as their more experienced colleagues, thanks to generative design. Experienced designers can use generative design to explore new geometries that they might never have discovered using traditional design approaches. Generative design speeds up the early stages of the product development process, reduces the frequency of late-stage changes, and facilitates the creation of differentiated and optimized products.

The value of computer vision applications has increased significantly in the areas of quality control as well as training and productivity. Traditional computer vision applications for quality control rely on feature detection, identifying edges, corners, and colors, and comparing them to predefined thresholds. In applications based on artificial intelligence, pass/fail criteria are no longer

programmed into quality control systems, but are identified by a system based on intensive training using good and bad samples. As a result, modern systems can, with high accuracy, respond to many different and much more subtle quality characteristics.

The ability to recognize complex objects and features is a key component of modern augmented reality (AR) applications. Incorporating AI-powered computer vision, augmented reality applications like PTC's Vuforia Expert Capture provide digital tools and information within the context of the environment. AR with object recognition can guide an operator through a series of complex assembly steps or reveal to a technician the location of a faulty component in a failed device. Simple applications such as displaying IIoT data at relevant locations on a production line make it easier for workers to quickly identify and respond to operating conditions.

Moving material through factories and warehouses is a fundamental component of logistics efficiency. The introduction of autonomous mobile robots (AMR) has become a practice. Robots do not need to integrate a control system into their environment. Material handling solutions rely on spatial computing technology to determine their location in a factory or warehouse.

And also for navigating the environment, including traffic generated by people and other robots.

For manufacturers, service delivery has become a key competitive differentiator. The need for faster service is being met by incorporating artificial intelligence into material planning systems to ensure the right parts are delivered to the right place at the right time. For spare parts suppliers, the goal of material planning is to optimize the balance between cost and availability, as well as storage time and location. Achieving this optimal balance becomes increasingly difficult as supply chains become more complex and customer demands increase. New, sophisticated analytical tools, such as multi-level optimization found in PTC Servigistics software, address these challenges by simultaneously optimizing all parts and service centers across multiple levels of the supply

chain. These decision support systems use AI algorithms to optimize the supply chain, from predicting future demand to determining the optimal placement of parts in a complex, interconnected supply chain to matching supply and demand on any given day.

Ethics in AI technologies

The ethics of AI are fundamentally different from the ethics of other technologies, such as data ethics. In relation to other technologies, general issues of changes in professional ethics, ethics of application, and ethics of responding to social challenges (for example, the risk of mass unemployment) are discussed. The ethics of AI technologies is interested in the problem of ethical behavior of an intelligent system in a situation where its decision concerns people.

There are technologies that can be used for illegal activities. For example, deepfake is the substitution of an image in a video of one person with the image of another. New tools may also carry new social risks, including communication risks, and pose a threat to human identity and the safety of personal data. Geoffrey Hinton developed an artificial intelligence system for Google.

But in 2023, he left the company due to the fact that he wanted to openly express his point of view on technology development. He is confident that artificial intelligence is many times superior to the human thought process and this carries significant risks for humanity as a whole.

AI ethics governs the relationship between developers and the development of these technologies. With the help of AI technologies, various tools are created, the operation of which may be associated with certain risks. Difficulties can be associated both with the malicious use of knowledge and technology, and with errors in their application. In areas where the use of AI may be associated with certain risks, special measures are being developed to reduce them and ensure safety. AI systems have neither their own consciousness, nor their own

goals, nor their own will. Whether they bring benefit or harm depends primarily on those who use these tools.

The first attempt at an international regulation of the activities of AI was the conference in Azilomar, during which the main provisions regarding artificial intelligence, which were called the “Azilomar Principles,” were adopted. They imply that teams developing AI systems should actively collaborate with each other and not try to win by ignoring safety standards. AI systems must be developed and operated in such a way as to be compatible with the ideals of human dignity, human rights and freedoms, and cultural diversity. The economic prosperity achieved through AI should be used to benefit all humanity.

In the absence of AI regulation at the level of ethical principles, one may encounter bias in information systems. For example, a developer creates an AI-powered recommendation system and can configure it to suggest products from a specific manufacturer first. This approach does not provide equal rights for all market players and can lead to unhealthy competition and business risks. A biased facial recognition system may identify people of certain nationalities as potential lawbreakers. In 2018, an AI-powered recruiting tool discriminated against women. About 60% of the candidates selected by the AI were male, which was due to patterns in a particular developer's historical hiring data.

Anthropology of the human-machine environment

Cybernetic anthropology studies man from the point of view of his organization and self-government. The starting point is the thesis that the brain controls a person through the function of thinking. Thinking, in turn, functions on the basis of subject ontologies (programs). Innate programs ensure dynamic balance of the human nervous system.

Digital anthropology studies digital generations in the social environment of the 21st century. One of the forms of life of digital generations has become nomadism. In 1997, Wiley published a book by Tsugio Makimoto and David

Matters called Digital Nomad. The book describes a digital nomad - a new person who, thanks to Internet technologies and mobile communications, is not tied to a specific place of work, study or leisure.

Nomadology was shaped by the efforts of Marshall McLuhan, Felix Guattari and Gilles Deleuze. At the beginning of the 21st century, computers became affordable and appeared in almost every home, and programming became a popular hobby. Those who were not involved in programming played, and those who did not play sat on the Internet. The information literacy of young professionals in the 2010s was ahead of the world around them. A person's life on the open Internet was considered an indisputable secret for parents, employers, and especially the state. Digital youth began to monetize this knowledge and earn money online. Remote digital work has emerged.

The first wave of digital migration consisted of programmers and developers. Data transfer speeds over the Internet and mobile communications have increased, costs have decreased, and social networks and voice calls over the Internet have appeared. Skype has been in operation since 2003. Dropbox was born in 2007. As a result, cloud data storage capabilities have expanded. The demand for developer services was massive. E-commerce began to emerge.

Millennials, whose childhood was in the 90s of the twentieth century, at the same time became a lost generation that was not attached to their country. They became the first global generation to grow up in the Internet era. They quickly began to reject the classical scheme of wage work and ordered life. The concept of digital nomads, or nomads, did not yet exist in 2014.

Digital nomads became a new breed of remote workers, which was very different from the proto-nomad downshifters. The meaning of their life became self-improvement and constant improvement of the results of their work. In return, the nomads sought a high level of comfort and its stable growth. Professions have also changed: with the development of e-commerce, online media and social networks, there are many more designers, marketers, SMM special-

ists, copywriters and translators among digital nomads. The life of the new formation became more nomadic.

While downshifters sought to find a comfortable place to live and stay there, digital nomads made moving a model of behavior and a separate cult. Thanks to them, travel has become a fetish - constantly traveling and working from anywhere in the world. Co working and co-living spaces have appeared. In form these were cafes and hotels, but they were strikingly different in content. Co working spaces have replaced digital nomads' offices and noisy cafes with poor internet. Co-living spaces have become temporary hostels of interest for digital nomads from all over the world. Loud music and alcohol were replaced by yoga and acai bowls.

Digital nomads have become a fast-growing group of people with a huge number of their own needs and their own full-fledged infrastructure. Constant movements and a kaleidoscope of impressions created the illusion of a rich and fulfilling life, which did not always coincide with reality. The first and most important problem was social connections. Nomads easily converged with each other, but just as easily diverged. Added to this was the fatigue from moving, the periodic desire to find a home, and the standard problems of a freelancer-remote worker in finding work and delaying payments.

Personal relationships suffer first. There are many like-minded people in the nomad community: it’s easy to meet people and start relationships here. But romantic relationships begin just as quickly and end just as quickly. When traveling, people come together faster because it’s cheaper. After this often ill-timed step, everything goes wrong. Internal crises happen regularly: what am I doing here, how did I get here? Digital nomads live in a state of uncertainty. This is a very high level of anxiety.

The digital nomad had new problems that needed to be recognized, accepted and solved. This is a large amount of semi-legal work, tax evasion and misuse of visas of receiving countries. Another problem is neocolonialism. Most often, large communities of digital nomads are formed in developing countries.

This leads to the creation of a social circle isolated from local residents and a parallel economy. India, Thailand, Vietnam, Indonesia, Mexico and Colombia are the most popular countries among digital nomads. The more the level of earnings grows, the more often countries such as Portugal, the UK or the USA appear on the lists of the best places for digital nomads.

The essence of the digital nomad lifestyle is to constantly move, develop your own skills and self-confidence. For those who have learned to build personal boundaries, plan time, self-learn and constantly develop, the boundaries of states and time zones ceased to exist.

Digital generations no longer write regular letters, but use instant messengers, do not send postcards, but congratulate friends on social networks, do not turn to reference books or address bureaus, but use Google. They don't buy tickets at ticket offices at train stations and airports, but do it on airline websites. New technologies are influencing language and communication, replacing it with online communication styles.

The Internet allows not only the exchange and trade of information, but also acts as a medium for the formation of new practices and communities - typical objects of anthropological interest. Works on various issues in digital anthropology appear regularly in many journals. The focus of consideration is digital technologies and devices, their impact on developers and users, on the behavior of people in cyberspace, as well as methods for studying virtual environments, devices and forms of interaction with them and ways of knowing these environments and devices.

Digital anthropology is represented by the research of Tom Boellstorff, Michiko Ito, Christopher Kelty, Gabriel Coleman, Gert Lovink, Dan Miller, David Hakken, Nancy Baym, Christine Hein, Donna Haraway, Sarah Pink, and Sherry Turkle. One of the first books on the ethnography of the World Wide Web was Dan Miller and Don Slater's monograph "The Internet: An Ethnographic Approach," based on long-term field research of users on the island. Trinidad (Miller and Slater 2000). The authors found that Trinidadians adapted

the network to their political, economic, religious and ethno-linguistic interests, turning it into part of their own material culture.

Anthropological studies of cyberspace and related technologies were the application of established concepts and methods in the discipline to a new environment, the projection of traditional themes and methodology into new territory, the characteristics of which were yet to be understood. Very soon this traditional approach was complemented by methods from science and technology studies (STS) and media studies. These three areas of knowledge retain their influence in the methodology.

The choice of methods depends on the nature of the objects being studied. Therefore, specific studies of digital devices and phenomena are considered as a source of methodological solutions for the study of cyberspace and its inhabitants. Anthropological studies of digital technologies that affect people's everyday lives began with the advent of these technologies. One of the first works analyzing the etiquette of talking on mobile phones and the manner of handling these devices was a research project by anthropologist Kate Fox commissioned by British Telecom. During the study, it turned out that mobile devices make it possible to restore the lost spontaneity of communication characteristic of preindustrial societies, relieve alienation and stress, and improve psychological well-being.

It was found that women use the phone as a kind of bodyguard. Having it on the table performs the barrier function that a magazine or newspaper previously played. The variability of rules for handling mobile phones was also studied depending on the social status and age of the owner. Demonstrative use or disconnection of the phone in different situations, the device model as a sign of the owner’s status.

The formation of virtual communities has become one of the phenomena caused by the spread of new technologies and has attracted the attention of researchers and large telecommunications companies. It turned out that the will-

ingness to incorporate new technologies into one's everyday life affects one's career just as significantly as, for example, education or social class.

The need to maintain digital equipment and the new opportunities created by the digital environment have led to the formation of new professions. Web designers, hackers and spammers, bloggers and copywriters, website administrators and system administrators and webcam-girls have become in demand. As a result, the subject areas of anthropology have expanded.

Digital technologies have given birth to new forms of art and sports, new activities and hobbies, and have given rise to many languages, written and spoken genres. Thanks to them, offline professions have changed, for example, biologists and astronomers began to spend much more time in front of computer screens than in front of telescopes and microscopes. The profession of journalist has changed. Searching for news is less and less done offline. Details are gleaned from digital device screens.

The mediation of keyboards and interfaces changes the essence of writing and poetic creativity, human communication in general. Strange algorithmic languages and new written traditions emerged. Communities of lovers of new genres of cybernetic poetry emerged. International law affirms the view of access to the Internet as an inalienable human right. In May 2011, the UN Special Rapporteur on the right to freedom of opinion and expression, Frank LaRue, presented to the UN Human Rights Council the results of his research on trends and threats to the individual's right to seek, receive and impart information via the Internet.

The expanding range of human activities taking place in virtual environments and cyberspace has made it necessary for anthropologists to turn to their study using the methods of their discipline. Attention to cybernetic anthropology has grown. Research is being conducted on biohacking and biohacking in relation to new medical and information technologies. An analysis of ethical problems of human interaction with artificial intelligence is carried out. There is a

tendency for the predominant development of digital approaches in medical and museum anthropology, and in the anthropology of technology.

The emergence of these areas of scientific research is associated with the release of Donna Haraway's "Cyborg Manifesto", published in 1985, and an article by Arturo Escobar. Cyborg anthropology is associated with the study of the results of cyborg organic synthesis that arose during the development of biotechnology, as well as the consideration of the human body as originally a cyborg organic body. Digital anthropology focuses on the study of digital devices. She studies their impact on society and culture. She uses digital methods. In some contexts, the term “cyber anthropology” is an alternative name for digital anthropology. Consideration of the Internet and the World Wide Web as communication tools made it possible to talk about the formation of a new type of sociality – techno sociality.

Digital anthropology and computational linguistics

Computational linguistics is concerned with understanding written and spoken language from a computational perspective and creating artifacts that usefully process and produce language in conversational environments. Computer understanding of language provides insight into thinking and intelligence. The goals of computational linguistics include formulating grammatical and semantic frameworks for characterizing languages in ways that enable syntactic and semantic analysis to be implemented from a computational perspective.

Discovery of processing methods and learning principles that use both structural and distributional (statistical) properties of language; and developing cognitively and neuroscientifically plausible computational models of how language processing and learning may occur in the human brain.

The tasks include effective text search on a given topic; efficient machine translation (MT); Question Answering (QA), ranging from simple factual questions to questions requiring inference and descriptive or discursive answers

(possibly with justifications); text summary. Analyze texts or spoken language for theme, mood, or other psychological characteristics; conversational agents to perform specific tasks (purchases, technical troubleshooting, travel planning, scheduling, medical consultations).

The initial focus was on developing practical methods for applications such as machine translation and simple quality control. Central issues were lexical structure and content, characterization of sublanguages for specific domains such as weather reports, and conversion from one language to another using special graph transformation grammars or transfer grammars. The goal was to characterize the question patterns found in a particular field. An example of a program that relied minimally on linguistic or cognitive theory was Joseph Weizenbaum's ELIZA program. ELIZA relied on matching user input to stored patterns (short sequences of words interspersed with numbered slots to be filled from the input) and returning one of a set of output patterns associated with a matched input pattern generated using material from the input.

A different view of linguistic processing came from ideas about associative processes in the human brain. M. Ross Quillian proposed a model for disambiguating the meaning of a word, based on the activation of the distribution in a network of concepts usually corresponding to the meanings of nouns, interconnected by relational connections usually corresponding to the meanings of verbs or prepositions.

Another line of work inspired by psychology was started in the 1960s and continued for over two decades by Roger Schank. The goal was to fully understand the story and answer the question logically. The central principle of the work was that the representation of sentential meaning, as well as knowledge about the world, is centered around a few action primitives, and inference is governed by rules associated with these primitives. The most important aspect was the recognition that language understanding and inference depend on a large stock of background knowledge, including knowledge of numerous prototype methods.

Approaches based on artificial intelligence appeared in the 60s of the twentieth century, and were presented in systems such as Sad Sam, Sir and Student. They introduce devices such as pattern matching. Transformation for the analysis and interpretation of limited subsets of the English language, knowledge in the form of relational hierarchies and lists of attribute values, and quality assurance techniques based on graph search, formal inference protocols, and numerical algebra.

The idea that emerged was that knowledge in AI systems should be generated procedurally rather than declaratively. To know something means to be able to perform certain functions. Two systems illustrating this methodology have been developed by Shrdlu and Lunar. They contained complex procedural grammars and rules for converting syntax into semantics and could function quite reliably in simulated table blocks.

Challenges have been in expanding the linguistic coverage and reliability of parsing and interpretation in moving from microdomains, or covering a few paragraphs of text, to more diverse and broader domains. Much of the difficulty in scaling was due to the difficulty of encoding and retrieving the many facts and rules needed for a more general understanding.

Since the 1970s, there has been a trend away from purely procedural approaches towards approaches that aim to encode more linguistic knowledge into more understandable, modular, reusable forms with stronger theoretical foundations. This trend was created by the emergence of the development of syntactic-semantic structures. These structures include Generalized Phrase Structure Grammar (GPSG), Head-Driven Phrase Structure Grammar (HPSG), Lexico-Functional Grammar (LFG), Tree Adjacent Grammar (TAG), and Combinatorial Categorical Grammar (CCG), where in each case close theoretical attention has been paid to both the computational power of parsing and the mapping from syntax to semantics. An important development was Richard Montague's understanding of the logical intensional semantics of language.

At the end of 1995, there was a transition to corpus-based statistical approaches. The corpus-based approach has been successful in creating moderately accurate speech recognizers, POS taggers, parsers for learned probabilistic grammars of phrase structure, and machine translation and text-based quality control systems and summarization systems. But semantic processing was limited to superficial aspects, such as extracting specific data regarding specific types of events from text, such as location, date, performers, victims of terrorist bombings, or extracting clusters of argument types.

There is currently a growing movement towards integrating formal logical approaches to language with corpus statistical approaches to achieve deeper understanding and smarter behavior in language understanding and dialogue systems. Attempts are also being made to combine connectionist and neural network approaches with symbolic and logical approaches.

Language is structured on several levels, starting in the case of spoken language with patterns of acoustic signal that can be mapped to telephones (the distinguishable sequential sounds that make up languages). Groups of phonemes that are equivalent for a given language (without affecting the words recognized by the listener if they are swapped) are the phonemes of the language. Phonemes, in turn, are components of morphemes (the minimal meaningful segments of a word). They form the constituent parts of words.

In written language, symbols, graphemes, syllables and words are spoken instead of symbols. Words are grouped into phrases, such as noun phrases, verb phrases, adjective phrases, and prepositional phrases, which are the structural components of sentences that express complete thoughts. At even higher levels there are different types of discourse structure.

Methods developed for speech recognition in the 1980s and 1990s were highly influential in turning research toward the new corpus-based statistical approach. One of the key ideas was that of hidden Markov models, which model noisy sequences, such as telephone sequences, phoneme sequences, or word sequences, as if they were generated probabilistically by "hidden" underlying

states and their transitions. Individually or in groups, sequential hidden states model the more abstract, higher-level components that must be extracted from observed noise sequences, such as phonemes from phones, words from phonemes, or parts of speech from words.

The generation probabilities and state transition probabilities are parameters of such models, and they can be learned from the training data. Models can be effectively applied to analyze new data using fast dynamic programming algorithms such as the Viterbi algorithm. These successful techniques were subsequently generalized to higher level structures.

Before considering how grammatical structure can be represented, analyzed and used, it is important to find out on what basis a particular grammar can be considered correct. Traditionally, formal grammars were designed to concisely reflect linguists' intuitions about the correctness of construction, which allowed generalizations to be made within a particular language and between languages. The discovery that traditional phrase structure supports elegant compositional theories of meaning provides support for traditional theoretical methodology. But traditional formal grammars do not cover any one language comprehensively and draw sharp boundaries between correctness and incorrectness of construction, when in fact people's judgments about the grammar of many sentences are vague or ambiguous. Idealized grammars needed to be made robust to variation in most practical applications. This need is satisfied by adopting many more rules for constructing phrases.

The most commonly used declarative representations of grammatical structure are context-free grammars (CFGs), as defined by Noam Chomsky, due to their simplicity and efficient intelligibility. Chomsky argued that only deep linguistic representations are context-free, while surface form is generated by transformations, resulting in non-context-free language. However, it was later shown that, on the one hand, Chomsky's unrestricted transformation grammars allow for computationally intractable and even undecidable languages, and on

the other, that the phenomena considered by Chomsky as requiring transformational analysis can be handled within context-free analysis.

Therefore, within the framework of non-transformational grammar, they speak of unlimited (or distance) dependencies instead of uncontrolled movement. Some natural languages have demonstrated moderate context dependence.

Traditional formal grammars have proven to be too limited in scope and too rigid in their criteria for grammaticality to provide a basis for reliable coverage of natural languages as they are actually used. This situation persisted until the advent of probabilistic grammars.

Constructive grammars that emphasize the relationship between the ingrained structures of language (including the structure of common phrases, clichés, and idioms) and their meanings and discourse function will provide the conceptual basis for building statistical models of language that are accurate enough to provide syntactic parsing accuracy similar to that of the human model. Natural language analysis was based on matching patterns to the input data for analysis. This depended on having a very limited discourse and task domain. By the end of the 60s and beginning of the 70s. In the 20th century, quite sophisticated methods of recursive parsing were used.

The method most commonly used for the complete analysis of sentential structure is through diagrammatic parsing. This is a dynamic programming method. It begins by assigning possible analyzes to the smallest constituents and then makes inferences about larger constituents from these until it finds a top-level category instance that covers a given text or text segment. There are many variations, depending on whether only complete components are postulated or also incomplete ones (which must be gradually expanded), and on whether the process moves along the verbal stream from left to right or in some other order.

The diagram is used both to avoid duplication of already constructed components and to reconstruct one or more global structural analyses. If all possible diagram elements are plotted, the final diagram will allow all possible analyzes to be reconstructed. Chart analysis methods have been carried over to

PCFG without changes. Typically there is a layer of input units (nodes), one or more layers of hidden units, and an output layer, where each layer has connections (excitatory and inhibitory) to the next layer, conveying evidence of the higher level constituents of that layer. There may also be connections within the hidden layer that implement cooperation or competition between alternatives. A linguistic entity, such as a phoneme, word, or phrase of a particular type, can be represented within a layer either by the activation pattern of units in that layer or by a single activated unit.

One problem is that the input data is ordered in time. Therefore, in order to combine the constituent parts, the network must store information about the recently processed parts. Two possible approaches are the use of simple recurrent networks (SRNs) and robust activation in localist networks. SRNs use direct feedbacks from the hidden layer to special context units.

In the next cycle, the hidden units can use their own previous outputs along with new inputs from the input layer to determine their next outputs. In localist models, it is common to assume that once a unit denoting a particular concept becomes active, it remains active for some time, so that multiple concepts corresponding to multiple parts of the same sentence and their properties can be active simultaneously. The problem is how the properties of an object that are active at a given time can be correctly bound to that object and not to other activated objects.

One solution is to assume that device activation consists of pulses emitted at a globally fixed frequency, and trains of pulses that are in phase with each other correspond to the same object. Contemporary connectionist research borrows from symbolic processing perspectives, suggesting that parsing assigns linguistic phrase structures to sentences and views structure choice as simultaneously satisfying symbolic linguistic constraints or biases.

More radical forms of hybridization and modularization are being explored, such as coupling an NN parser to a symbolic stack or using a neural network to learn the probabilities needed in a statistical parser. or connecting the

parser network to separate prediction and learning networks. Natural language is ambiguous at all structural levels. Alternative structures lead to alternative meanings.

Digital technologies for corporate dialogue

Dialogue is interactive, goal-directed behavior. The immediate goal is to change the mental state, especially the beliefs, desires and intentions of the listener(s). Speech act theory is concerned with how certain types of speech acts directly or indirectly cause such changes. To select speech acts, each participant must take into account the mental state of the other participants in the dialogue, in particular, each must recognize the beliefs, desires and intentions of the other person. Discursive conventions in collaborative conversation are adapted to facilitate this process. Speakers use expressions that reveal their intended consequences. Confirmations and turn-taking strengthen rapport. A dialogue of mixed initiative and, possibly, joint action in the subject area is achieved.

As with creating rich descriptions, narratives, and arguments using RST, the natural perspective here focuses on goal-directed planning. The application of this perspective to dialogue historically precedes its application to extended discourses. In a state where the dialogue system has no immediate obligations and the user asks a question, the system makes a commitment to answer the question and enters a state in which it will attempt to fulfill that commitment.

Systems that rely primarily on reactive methods lack deep insight and behavioral flexibility. Knowledge-based inference and planning are replaced by mechanical behavior driven by various features of the current discursive state and observations. Deliberate reasoning and synthesis of plans seem necessary for an agent to autonomously develop effective goal-directed plans and behaviors. Supervised learning and learning by imitation are training options, but their potential is limited. Random trial and error may be impractical in the extremely large state space of linguistic and common sense behavior.

A hand-crafted body of common sense knowledge is a Cyc or ResearchCyc knowledge base. It contains an ontology of several hundred thousand concepts and several million facts and rules, supported by an inference mechanism. It has been used for analysis, decision support, and other types of projects in business, education, and the military.

The ontology and content of the knowledge base were motivated primarily by project-specific knowledge engineering considerations rather than by application to language understanding. This is reflected in its heavy dependence on very specific predicates, expressed as concatenations of English words, and on higher-order operators. The distance from language makes it difficult to apply ontology to understanding language, especially if the goal is to extract relevant concepts and axioms from this base and integrate them with the concepts and axioms formalized in a linguistically oriented representation. Examples of hand-coded knowledge bases are the Component Library and the Hobbs and Gordon Collection of Common Sense Psychological Axioms.

Adaptation of knowledge from semi-formalized sources may, for example, consist of extracting information about parts of speech and subcategories, as well as standard phrases and idioms from relevant dictionaries. This may also involve converting hierarchies of hyperonyms, meronyms (parts), or antonyms cataloged in sources such as WordNet into some form suitable for disambiguation and inference.

The main limitations of hand-coded lexical knowledge are its reliance on linguistic intuition without direct consideration of its role in language understanding and its inevitable incompleteness given the ever-expanding and changing vocabularies, jargon and styles of expression in all living languages.

In addition to sources of lexical knowledge, there are sources of knowledge in semi-formalized form, such as tables and gazetteers, as well as information blocks in online knowledge resources. Such sources provide knowledge in a systematic and easily collected form, and they do so only for

named entities (such as people, organizations, places, and films) and multiple entity types (such as species and chemical compounds).

Moreover, much knowledge about ordinary concepts such as a tree or driving a car is not easily obtained in the form of attribute-value pairs and is generally not available in this form.

Extracting knowledge from free text is learning by reading. The extraction method can be either direct or indirect. The direct method takes sentential information from some reliable source, such as word meaning glosses in WordNet or descriptive text in encyclopedias such as Wikipedia, and maps this information into a formal syntax for expressing general knowledge. Indirect methods abstract formal generic knowledge from language patterns found in various reports, stories, essays and weblogs.

The most actively researched approach to extracting knowledge from text over the past two decades has been indirect. Many variants have been developed with improvements such as automating bootstrapping and pattern discovery methods, often using machine learning techniques to select, weight, and aggregate local features in close proximity to relata of interest. Relations other than hyponymy that have been targets relevant to language comprehension include part relations, cause-and-effect relations, and bodily relations.

A crowdsourcing approach to general knowledge acquisition consists of obtaining verbalized information or annotations of such information from a large number of Internet users, sometimes using either small financial rewards or participation in simple games as an incentive. Crowdsourcing has proven to be quite reliable for simple annotation and classification tasks. But general knowledge offered by non-expert users is less carefully formulated than encyclopedia entries or dictionary definitions of words, and require natural language processing if formal statements need to be abstracted.

The problem of ambiguity has always been the focus of attention when creating parsers and language understanding systems. The ambiguities that influence the desired mappings are too numerous, subtle, and interrelated to be

amenable to heuristic arbitrage. Linguistic phenomena must be viewed as stochastic, and the distributional properties resulting from these stochastic processes must be systematically exploited to arrive at robust hypotheses about their underlying structure.

Normalized frequencies of certain words (or classes of words) and punctuation may be used to classify significant documents. Especially for shorter texts, various discrete functions can also be included, such as functions with values 0, 1 indicating the presence or absence of certain keywords or structural features. Documents are represented as numeric vectors with values in a multidimensional space, with distinct classes presumably forming several distinct clusters in that space. A variety of classical pattern recognition methods are applicable to the problem of learning to assign new documents (as vectors) to the appropriate class.

The Bayesian approach assumes that each class generates feature values that are independent of each other. Generating frequencies are estimated from the training data, and class membership probabilities for an unknown document (vector) are calculated using Bayes' rule. What can be done using successive updates of the previous class probabilities. Selecting the class with the highest resulting posterior probability provides the decision criterion. A general generative model for real-valued features, allowing for feature interactions, treats the known members of any given class as a sample of a multivariate normal (Gaussian) random variable.

Training consists of estimating the mean and covariance matrix of each class. A traditional discriminative approach, not based on any generative model, involves computing hyperplanes that separate clusters of instances of known classes from each other (optimizing certain metrics including within-class and between-class variance); new instances are assigned to the class whose section they fall into. Perceptrons provide a related method because they determine class membership based on a linear combination of feature values; their particular ad-

vantage is that they can learn incrementally (by adjusting feature weights) as more and more training data becomes available.

The loglinear type of model is widely used in many statistical problems. Support vector machine (SVM) can distinguish between arbitrarily configured classes by implicitly projecting the original vectors into a higher (or infinite) dimensional space where the classes are linearly separable. The projection is mediated by the kernel function - a metric of the similarity of pairs of vectors. The components of a multidimensional vector correspond to the terms of the kernel function if it is decomposed as the sum of products of features of the original unexpanded pair of vectors. But the actual expansion is not performed, and the classification criterion obtained from a given training corpus only requires computing a kernel function for a given feature vector (representing the document being classified) paired with some special support vectors and comparing a linear combination of the resulting values with a threshold. The support vectors belong to the training corpus and define two parallel hyperplanes that maximally separate the classes under consideration in the extended space.

SVMs provide high accuracy because they allow for nonlinear interactions of features in the original space, and partly because the maximum field method focuses on class separation rather than conditional probability modeling of classes.

Features are selected to reflect both properties of the target word or phrase (e.g., morphology) and how they relate to the context of local syntactic dependency relationships and broader-spanning features such as word frequency or document class. The same supervised learning and classification methods can be used. It is difficult to create a meaning-annotated training corpus that contains many instances of all meanings. Annotations are limited to the meaning of a few ambiguous words.

Methods have been developed for unsupervised or semi-supervised learning. The most intensively studied type of statistical translation of sentences is statistical machine translation. One of the oldest machine translation systems is

SYSTRAN, which was developed as a rules-based system beginning in the 1960s and was widely used by government agencies in the United States and Europe.

Translations contain errors, but their quality is usually sufficient for readers to grasp the general meaning of the original content. Machine translation applications on portable devices designed to assist international travelers may be accurate enough for limited purposes, such as requesting directions or emergency assistance, interacting with transportation personnel, making purchases, or making reservations. When high-quality translations are required, automated methods can be used to assist human translators.

Information retrieval has long been a central topic in computer science, covering the retrieval of both structured data, such as that found in relational databases, and unstructured text documents. The search criteria for these two types of data are not unrelated because both structured and unstructured data require content-oriented search. This is achieved using inverted files, which essentially index objects by their attributes and values rather than by their IDs.

Text documents can be retrieved using some unique label, or they can instead be retrieved according to their relevance to a specific query or topic title. The simple concept of relevance is that documents must contain the terms (words or short phrases) of the query. Terms that are distinctive to the document should be given more weight.

Document clustering is useful when you need to organize large numbers of documents for easy access to topic-related items, such as in collections of patent specifications, case histories or abstracts, legal precedents, or images with captions, often in hierarchical order. Clustering is also useful in exploratory data analysis. Clustering is used in biological and medical research and epidemiology, market research, grouping and recommending items for purchase, educational research, social network analysis, geological analysis.

Extracting knowledge or constructing summaries from unstructured text are becoming increasingly important applications given the flow of documents

coming from the media, organizations and individuals. The flow of information makes it difficult to review items relevant to any specific purpose, such as basic data about individuals, organizations and consumer products, or information about accidents, earthquakes, crimes, company acquisitions, product maintenance and repair work, and medical research results.

One of the knowledge extraction methods used is based on the use of extraction patterns; they are intended to match the kinds of common linguistic patterns used by authors to express information of interest. Extraction patterns can be thought of as targeting specific attributes within predefined attribute value frames.

Sentiment analysis refers to identifying positive or negative attitudes on the part of authors of articles or blogs towards commercial products, films, organizations, people and ideologies. The methods used are based on sentiment dictionaries, which classify the affective polarity of vocabulary items, and on supervised machine learning applied to texts from which word and phrase features have been extracted. Which were manually marked as expressing a positive or negative attitude towards a topic.

Chatbots are descendants of Weizenbaum's ELIZA and are used with an animated talking head character for entertainment or to attract the attention of visitors to certain dot-com websites. They may be equipped with large handwritten scripts that allow them to answer simple questions about the company and its products, with some ability to respond to various topics and exchange greetings and pleasantries. A less innocuous application is the use of chatbots posing as visitors to social networking sites or interactive gaming sites in order to obtain private information from unwitting human participants or recommend websites or products to them.

Convivial conversational agents relied on chatbot techniques, proprietary input patterns, and corresponding output. But the goal is to surpass these methods by creating agents with talking heads or other animated characters with personality traits that can show emotion and empathy. They must have semantic

and episodic memory, learn about the user over time, and provide services to the user. These services may include, in addition to companionship and support: advice in some areas of life, health and fitness, scheduling, reminders, answering questions, tutoring (for example, languages), games and Internet services.

Convivial systems remain limited in the conversation topics they can handle, their understanding of language, and their ability to bring broad general knowledge to conversation and use knowledge in inference.

Voice services on mobile devices represent a rapidly expanding area of applications. Services range from organizers (grocery lists, appointment schedules, reminders, contact lists, etc.) to in-vehicle infotainment (routing, road conditions, hazard warnings, iTunes selection, finding nearby restaurants and other places, etc.). to allow the use of various other applications such as email dictation, contact dialing, financial transactions, booking and ordering, Wikipedia access, help desks, health advice and general question answering.

Some of these services, such as dialing and iTunes selection, fall under the category of hands-free controls, and such controls are becoming increasingly important in transportation (including autonomous vehicles), logistics (resource allocation), and manufacturing, serving as common backends for more specific voice services. The key technology in these services is speech recognition. Simple organizers use high expectations about user input to recognize, interpret, and respond to that input. They resemble menu-driven systems. More versatile systems, such as car intercoms that can handle routing, music requests, and venue searches, rely on dialogue management capabilities. They allow you to switch between topics.

Collaborative problem-solving systems deal with less predictable problem situations and user input than tutoring systems, and accordingly, the former place much more emphasis on flexible conversation processing than the latter. Therefore, conversational learning systems are closer to commercial practicality, with demonstrated learning benefits over conventional learning in various evaluations, than collaborative problem solving systems for realistic applications.

Training dialogue systems have been created for many areas and potential clients. If the training is aimed at teaching interpersonal skills, creating realistic virtual human characters becomes an integral part of system development. Modeling the user's state of mind in learning systems is primarily a matter of determining which of the target concepts and skills the user has or has not yet acquired, as well as diagnosing misunderstandings.

Robots are beginning to be equipped with web services, question-answering capabilities, chatbot methods, and training functions. The transfer of such technologies to robots has been slow, primarily due to the very complex challenges involved in equipping a robot with the hardware and software necessary for basic visual perception, speech recognition, exploratory and goal-directed navigation in the case of mobile devices. Many open problems remain, such as problems of speech recognition in the presence of noise, wider linguistic coverage, parsing and processing of dialogues, adaptation to new problems, mental modeling of the interlocutor and other people in the environment.

Digital dialogue tools

These are online platforms or software applications used by businesses or individuals to perform fast and streamlined functions. The collaboration software, which replaces other Microsoft messaging and collaboration platforms such as Skype and Classroom, consists of a chat feature through which users can seamlessly communicate with other users either one-on-one or as part of a group, sharing files, meetings, live events and video/audio call function.

Microsoft Teams provides an online workspace where team members can get work done. Zoom was the fifth most downloaded mobile app in the world in 2020 with 477 million downloads. Whatsapp Business app is a digital tool. QR codes to invite new customers. WhatsApp Business enables businesses to improve operations and provide them with a professional and personalized way to interact with their customers.

Zendesk helps optimize customer relationships with features such as real-time messaging and chat, ticketing, voice, and answering. Sage software is equipped with advanced inventory, inventory management, invoicing, accounts receivable management features and can be used across all industries.

Managing multiple social media accounts simultaneously requires social media management tools like Hootsuite. Google Workplace is the most used digital tool for businesses and individuals due to its simplicity and seamless integration. The collaboration suite includes well-known digital tools such as Gmail, Calendar, Docs, Slides, My Tasks and Drive, which employees can use to share information in real time.

Twitter is distinguished by its ability to reach a large audience in a matter of minutes. This makes it an affordable marketing tool for small businesses. Created by former Facebook co-founder Dustin Moskowitz, Asana is a web and mobile app designed to help teams organize, manage, and track their work. Google Marketing Platform offers solutions such as Data Studio, analytics for reporting, optimization for testing an app or web product, and surveys to quickly get reliable opinions from customers for both small businesses and enterprises.

Social digital communication

Internet resources (websites, forums, social network accounts, email) have become a tool for implementing many communication tasks. The Internet has become a space for building social capital, a resource on which the distribution of financial flows depends.

At the same time, the facts of substitution of a subject by a software algorithm, even at the linguistic level, are separated from the communications of citizens. Artificially created “bots” are not perceived in social networking practice as full-fledged actors with their own consciousness and free will.

The idea of the role of Internet communications is based on an understanding of internal and external communications. This typology also extends to

virtual space. Internal communications include administration, registration, accounting and coordination.

The technical side of interaction is filled with social meaning. Internet resources of civil society are capable of self-organization, provided that communication relations within many individual segments, while maintaining visible and fairly clear boundaries, remain open to external relations. The interaction of subjects (individuals, groups and organizations) in civil society is quite dynamic and quickly forms a complex system.

Internet resources of public structures, both state and civil, are used to implement three main tasks of online communication. First, the organization's online space should provide citizens with free access to information that presents the organization in a favorable light. Secondly, Internet resources should provide optimal opportunities for interaction between both the organization's employees and citizens who are interested in the organization's activities to varying degrees. Thirdly, Internet communications managed by a public structure should encourage direct or indirect participation of citizens in the activities of such structures.

In a technical sense, Internet communications make any documents, including bills, available remotely. From the point of view of interaction, online resources of civil society are mediated communication, mediated, firstly, by texts and audiovisual content, and secondly, by the web technology itself. In the first case, citizens are faced with the problem of understanding and interpreting the transmitted information. Technological limitations (software compatibility, availability of a network in remote areas, level of technical training of citizens, availability of computer equipment) are associated with the problem of digital inequality in modern society.

Barriers to access to Internet technologies remain in the most remote geographical locations and among vulnerable social groups. Such restrictions give rise to civil initiatives to eliminate them. Volunteers often take on the responsi-

bility of teaching older people computer technologies and helping them overcome their fear of them. Problems of understanding and interpreting

Internet content stimulate the development of relevant fields of knowledge (computational linguistics, cognitive sciences, social informatics) and contribute to the popularization of these scientific areas, actualize the negotiation process and dialogue in society.

The goals and objectives around which citizens group in the Internet space cover a variety of social, ideological, organizational and practical problems.

The transition from interaction to participation occurs as people find sufficient reasons to plan joint actions. Participation is characterized by the presence of a clear algorithm of actions agreed upon in the course of mutual understanding achieved online.

Accessibility, interaction and participation are the key characteristics of Internet resources that provide both external and internal communications of various segments of civil society, which directly depend on the computer culture of citizens.

The concept of e-government is implemented in the form of a Public Services Portal, which is designed to optimize regulatory processes in various spheres of socio-economic life of society. With the advent of various forms of e-government, public authorities have established themselves as entities providing various services. Internet communications have significantly undermined the corruption schemes of interaction between citizens and government officials.

Online marketing communications often use a variety of hidden technologies to control the behavior of Internet users. The range of customer manipulation technologies has already formed entire branches of applied knowledge: advertising communications, SMM, brand management. Product sales promotion shapes online communication methods. Many methods of product promotion are taken as a basis in the promotion of non-profit projects. This is how social advertising practices were formed.

Of interest are the issues of coexistence of virtual and real interactions of network users.

Subject of digital communication

The main subject of digital communication is “generation Z”, or as it is called “digital generation”, “network generation”, “digital natives”. These concepts are used to designate generations of children and youth who have been socialized in the context of the widespread use of digital technologies in everyday life, education and professional activities.

The concept of “digital generation” appeals to the theory of generations, which began to be developed in the XX century. The founders of generational theory are Neil Howe and William Strauss. In 1991, in the book Generations: A History of the American Future, 1584 - 2069, they formulated the main ideas of their concept of generations, which formed the basis for both their own interpretations and the work of other researchers.

According to the theory of Howe and Strauss, a person’s behavior depends on the conditions in which he lived and was raised until the age of 12 - 14. The values of generations are deep, subconscious, do not have an explicit form, including for the representatives of generations themselves, but at the same time they determine the formation of personality and influence the life, activities and behavior of people.

Next to the digital generations are generations of digital immigrants. These are people who have integrated into a new digital environment for them.

Digital communication environment

This is a virtual space that has a unique set of tasks, each participant of which contributes to achieving the goal. The digital environment represents a new type of human environment due to the possibility of creating virtual multiple worlds with its help.

The digital environment increasingly fills the space of a person's life: the sphere of his communication, activity, and social relationships. Mastering the subject environment determines the possibilities of a person's orientation in the subject world and mastering it, the development of the child as a subject of interaction with the subject world (transformation of the subject environment in accordance with the needs, individual, age and psychophysiological capabilities of a person, the development of practical thinking).

Mastering the social environment presupposes a person's orientation to the requirements and norms of society, active actions to find individual ways of integrating into the environment, and transformation of the social environment in accordance with changes in the value-semantic sphere.

Mastering the cultural environment involves ascending into the world of culture, mastering basic values, and morality. The digital environment represents a new type of human environment due to the possibility of creating multiple virtual worlds with its help. This gives rise to the possibility of both positive and negative consequences.

This may be the loss of the image of the Self and the ability to distinguish between Self and non-Self, experiencing oneself as an appendage of the digital world. The number of "clicks" in virtual reality can be interpreted as a basis for self-esteem. Anonymity and disembodiment play a role, the danger of split consciousness, the formation of clip and NET thinking - pragmatic, non-intuitive, superficial; the child's absorption in the digital environment, their co-dependence, changes in the value-semantic sphere and the child's system of experiencing himself and his relationships with the world.

The positive contribution of the digital environment to the development of the value-semantic and emotional sphere is associated with the development of the child as a subject in relation to the digital environment, mastering it as one of the means of self-development.

Social network

A social network (SNS from social networking service) is an online platform in Web 2.0 format, which is used for communication, dating, creating social relationships between people who have common interests or offline connections, as well as for entertainment with music, films and for professional work. Social bookmarking is also used. Such sites can be used to find users with common interests. Social catalogs are reminiscent of social bookmarking.

They are aimed at academic use, allowing users to work with databases of citations from scientific articles. Social libraries provide services and tools that allow visitors to leave links to their collections, books, documents, and audio recordings that are available to other users. Support for a system of recommendations and ratings is provided.

Social media storages provide services for sharing media files. They are classified according to the type of files hosted on servers. Thus, specialized social networks unite people according to the criteria of age, gender and hobbies. Professional social networks are created for communication on professional topics, exchange of experience and information, searching and offering vacancies, and developing business connections. Corporate social networks solve the problems of organizing and supporting company activities. Services for collaboration with documents are also used.

Geographic social networks build social connections based on the user's geographic location. Various geolocation tools are used (for example, GPS or hybrid systems such as AlterGeo technology), which make it possible to determine the current location of a particular user and correlate his position in space with the location of various places and people around. Short video platforms TikTok, Likee and Yappy are also used.

Social networks have gained popularity since 1995, with the advent of the Classmates.com portal. In 2003-2004, LinkedIn, MySpace and Facebook were launched. Social networks are used in marketing research. Users voluntarily

publish information about themselves, their views, interests and preferences. Advertisers can determine which users will be interested in their ad and target their advertisements to specific users based on their profile information (age, gender and location). This is how targeted advertising was established.

A way to attract customers through social networks is to create communities on social networks. Such communities allow you to convey new information to users who will be interested in the company's products or services. Users often do not understand that the information they post on social networks may not necessarily be found and used with humane intentions. Information about a person on social networks can be found by their employers, relatives, debt collectors, criminals and other interested parties. Bailiffs sometimes use social media to find defaulters or obtain information about their property.

Some employers prohibit the use of social networks to prevent information leakage. Social media users may face harassment and criticism. A list of the most frequently mentioned problems in connection with social networks has been compiled. It includes: sexual violence and pedophilia, intimidation and harassment, threats and violence, the spread of nationalist ideas. There are so-called death groups on social networks that promote suicide and can drive children to suicide. This is a type of cyber terrorism.

Cybernetic terrorism

Cybernetic terrorism contains a complex of illegal actions in cyberspace that pose a threat to state security, individuals and society. It can lead to damage to material objects, distortion of information and other problems. The main goal of cyber terrorism is to influence the solution of social, economic and political problems.

Cyber criminals can organize the shutdown of production facilities. Criminals use all the capabilities of modern technologies, including modern gadgets and software products, radio-electronic devices, and advances in other fields

(even microbiology and genetic engineering). Officially, cyber terrorism is recognized as acts committed by one person or independent groups consisting of several participants. If representatives of governments or other government agencies take part in actions falling under this definition, this is considered manifestations of cyber warfare.

The actions of cyber terrorists are aimed at: hacking computer systems and gaining access to personal and banking information, military and government confidential data; failure of equipment and software, creation of interference, disruption of power supply networks.

They are aimed at stealing data through hacking computer systems, virus attacks, software bookmarks; leakage of classified information into the public domain; spreading disinformation through hijacked media channels; disruption of communication channels. Special software is used to hack the computer systems of companies and organizations.

Cybernetic terrorists threaten by computer means: disabling a large company computer network, destroying bank customer data, disrupting the operation of factories and power plants in order to obtain ransom. To achieve these goals, various methods can be used: illegally gaining access to state and military archives with classified information, details of bank accounts and payment systems, personal data; exercising control over infrastructure facilities to influence their performance up to the failure of individual components and the complete shutdown of life support systems; theft or destruction of information, software or technical resources through the introduction of various types of malicious programs; false threats of attacks that could lead to destabilization of the economic or socio-political situation.

The methods of carrying out these and similar operations are constantly changing due to the development of information security systems that are used in various computer networks. A relationship has been identified between the level of development of information infrastructure and the number of hacker at-

tacks. States, international organizations, large corporations and small companies are equally likely to be attacked by online terrorists.

The actions of cyber terrorists can be aimed at civilian infrastructure and military facilities. The energy and telecommunications industries, air traffic control towers, financial institutions and defense enterprises are most susceptible to terrorist cyber attacks. Attack targets may include equipment, software, network data transfer protocols, stored information, information technology specialists and service personnel. Typically, such actions are carried out by individuals who share the views of terrorists and are their accomplices.

The criminals themselves mainly carry out actions aimed at destroying communications and damaging information and transport channels. If the objects under attack are part of critical life support systems, third-party interference in their operation can lead to large-scale destruction and casualties, as in ordinary terrorist attacks.

It is necessary to distinguish cybernetic terrorists from other hackers who write and distribute viruses and other malware for personal gain, and are computer scammers or hooligans. Their actions become terrorism in cases where they have serious consequences: destruction, loss of life. Many radical groups try to ensure that their acts create as much resonance as possible, and that the maximum number of people around the world learn about them. Some organizations have entire departments of programmers who create and update websites, blogs and pages on social networks. The largest groups also have their own television channels and radio stations.

The leadership of the groups resorts to cyber terrorism because it provides the desired result with minimal investment (which is especially important for people from poor countries), and also complicates the search for direct perpetrators. The motives for a crime should not be considered in its pure form as an internal motivation that directs a person to commit certain illegal acts, regardless of the fixation of goals. Accordingly, setting a goal also involves choosing adequate means to achieve the planned result.

Thus, hacktivism involves the illegal commission of computer operations using special software (information hacking tools) associated with civil disobedience in cyberspace.

Hacktivism refers to low-level computer network attacks or digital activity that in most cases only cause temporary inconvenience. Like cyber terrorists, hacktivists pursue political goals, but their activities, both quantitatively and qualitatively, do not correspond to the possible result of cyberattacks. Hacktivism (hacking, worms, computer viruses, spam, phishing, damage to websites and theft of personal data) in itself is not a manifestation of cyber terrorism, but, if additional conditions are present, it can act as a functional element of cyber terrorism.

It is obvious that it is impossible to define cyber terrorism only in the form of a type of terrorist act. These are also acts that are committed in support of terrorism through the abuse of the Internet. These include propaganda of terrorist practices and ideology; inducing, recruiting or otherwise involving a person in the commission of crimes of a terrorist nature; training individuals for terrorist purposes; financing of terrorism; justification of terrorism, as well as public calls for terrorist activities; communications on social networks. These acts are also committed in the digital information environment and are associated with the creation of conditions for carrying out acts of terrorism in the future. Such conditions, in particular, include the creation of a favorable socio-psychological climate that justifies, explains and stimulates illegal activities.

Actions aimed at raising funds on the Internet indicate the creation of material conditions for carrying out terrorist attacks, as they allow one to accumulate the necessary funds in order to subsequently prepare and carry out planned acts of terrorism. Internet resources can also be used to facilitate communication between terrorist groups and individual terrorists. Anonymous email accounts and encryption can be used to conceal terrorist communications. Websites can be used to spread propaganda or recruit members, and the Internet can act as a way to gather needed information

Black Hat and hacktivism

The term "Black Hat" is used in hacker culture to describe a classic cyber criminal who uses his knowledge and skills to carry out criminal activities - hacking programs or websites, stealing data, encrypting information for ransom. Unlike ethical hackers (“White Hats”) who help improve the security of systems, Black Hat operates solely for financial gain or public recognition. The term has analogies in Westerns, where the bad guys often wore black hats.

Unlike regular black hats, hacktivists do not seek financial gain. Their targets are large organizations, government agencies or public figures whose actions contradict the hacktivist ideology. The attack may be directed against an organization that hacktivists believe violates human rights or freedom of information. Experts who attack organizations in order to draw public attention to vulnerabilities can also be considered hacktivists.

To achieve their goals, hacktivists use the same methods as ordinary cyber criminals. Thus, defacement involves changing the content of the attacked site. Hacktivists publish materials promoting their ideas on hacked pages.

Doxxing is the collection of confidential information about a user or organization for the purpose of further disclosure. DDoS attacks carried out from multiple devices simultaneously are aimed at making a particular resource inaccessible to users.

Hacktivists publicly claim responsibility for such an attack and voice the motives for their actions. Geo-bombing involves using geotags on YouTube to link multiple videos addressing a particular social issue to a specific location on a map. Videos tagged with a geotag are displayed on Google Earth maps in the corresponding location.

There are hacktivists who specialize in creating and distributing tools for exchanging information without censorship, such as secure browsers and instant messengers, anonymizers, and content blocking tools. Both individuals and teams of like-minded people engage in hacktivism. A hacktivist can participate

in the activities of several groups at once. They use criminal methods that are prosecuted in most states.

Technological components of digital communication

It is the transmission and reception of data in the form of a digital bit stream or digitized analog signal transmitted over communications through copper wires, optical fibers, wireless communications using the radio spectrum and computer buses. The data is presented in the form of an electromagnetic signal of electrical voltage, radio waves and microwave infrared signal.

Analog transmission involves the transmission of voice, data, image, signal or video information using a continuous signal whose amplitude, phase or some other property varies proportionally to a variable. Messages are either represented by a sequence of pulses using a linear code (bandwidth transmission) or by a limited set of continuously varying signals (bandwidth transmission) or a limited set of continuously changing signals (bandwidth transmission) using a digital modulation technique.

Bandwidth modulation and corresponding demodulation are carried out by modem equipment. Baseband and passband signals representing bit streams are considered digital transmission. Another definition considers only the baseband signal as digital, and the transmission of digital data in the passband as analog conversion.

The transmitted data are digital messages originating from the data source. It may also be an analog signal digitized into a bitstream using pulse code modulation or other source encoding schemes. Source encoding and decoding are carried out by encoding equipment.

Theoretical aspects of data transmission are considered by information theory and coding theory. The first practical method for solving the problem of accurate data reception by a recipient using a digital code was the Barker code.

Digital communication with the end user using digital network services with integration of services began to be used in the late 80s of the 20th century. Since the late 1990s, ADSL, cable modems, fiber-to-the-building (FTTB), and fiber-to-the-home (FTTH) have become common in small offices and homes. The trend is to replace traditional telecommunications services with packet communications like IP telephony and IPTV.

Transmitting analog signals in digital form allows for expanded signal processing capabilities. The ability to process the communication signal means that errors caused by random processes can be detected and corrected. Digital signals can also be sampled instead of continuously monitored.

Multiplexing multiple digital signals is easier compared to multiplexing analog signals. The digital revolution has also led to the emergence of digital telecommunications applications that utilize data transmission principles. Technologies include second generation cellular telephony (1991), video conferencing, digital television (1998), digital radio (1999), and telemetry.

Analog transmission involves transmitting a constantly changing analog signal over an analog channel. Digital communication is the transmission of discrete messages over a digital or analog channel. Messages are represented either as a sequence of pulses using a linear code (bandwidth transmission) or a limited set of continuously varying waveforms (bandwidth transmission) using a digital modulation technique. Bandwidth modulation and associated demodulation (also known as detection) are performed by the modem hardware.

Both baseband and passband signals representing bit streams are considered digital transmission, while an alternative definition considers only the baseband signal as digital and passband digital data transmission as a form of digital transmission and conversion to analog.

Social technologies of hidden authoritarianism in digital liberal communication

The main forms of digital communication are chat rooms, online forums, email, social networking via Twitter, mobile applications such as SMS or Whats App, audio or video communication applications Skype and Viber, communication functions in online multiplayer computer games and game consoles.

Digital communication is determined by recommendation technologies. They recommend which movie to watch or which store to buy this or that product. Digital platforms will be required to provide the user with the ability to turn off the algorithms that shape their feed from specially selected content. There is an increase in demand for specialists involved in the creation and promotion of search and recommendation services. The role of social networks and instant messengers is increasing.

The importance of television and other media is declining. The desire of users to increasingly control their data has become obvious. This leads to increased transparency in the activities of technology companies. End-to-end identification is being developed - a single secure account for access to various independent services. This will update the work on further regulation of issues of working with personal data (including biometric).

The value of people's and businesses' digital footprints and other data will continue to rise. The ability to record and use data on the interaction of users and business, people and the state without violating basic human rights and freedoms can become a competitive advantage.

The widespread dissemination of information technologies in all spheres of human life has a significant impact on his social adaptation. Modern human life in society is almost impossible to imagine without the Internet. The Internet is becoming an increasingly significant factor in the socialization and social adaptation of children and adolescents. Along with the emerging possibilities of using the Internet as a tool of socialization, thanks to which the boundaries of

knowledge are expanded, the possibilities of satisfying needs increase, the scope of communication and interaction expands, the risks of a negative impact on the psychological well-being, emotional well-being, health and even the life of the child increase. The risks that an Internet user faces are manifold.

Content risks contain links to third-party resources containing violence, aggression, pornography, obscene language, information, and racial hatred. As well as propaganda of anorexia and bulimia, suicide, gambling and drugs.

Communication risks are associated with the interpersonal relationships of Internet users and include the risk of being subjected to insults and attacks (grooming, cyberstalking, cyberbullying). For such purposes, chats, online messengers (ICQ, Google talk, Skype), social networks, dating sites, forums and blogs are used.

Electronic cyber risks indicate the possibility of theft of personal information, the risk of being subject to a virus attack, online fraud, spam attack, and spyware. Consumer risks include the risk of purchasing low-quality goods, handicrafts, counterfeit products, loss of money, and theft of personal information. Internet addiction demonstrates an obsessive desire to access the Internet and the inability to exit the Internet. The spread of risks associated with the involvement of minors in dangerous groups is causing concern.

These are, first of all, the so-called “death groups”, which involve children and adolescents in performing dangerous tasks that lead to suicide. These are also extremist groups that instill in minors ideas about the injustice of the world order and their special purpose in “improving the world” by “cleansing it of the unworthy” and involving them in illegal extremist activities. These are also groups that offer minors “work” that consists of illegal activities (primarily the distribution of narcotic and other prohibited substances and literature).

Attackers involve children and teenagers through social networks and instant messengers. Closed groups appear on the Internet with different names, and instead of blocked pages, new ones are created. The creators of such groups use clever ways to spread information about themselves using “hashtags.” Each

of these types of risks can cause irreparable damage to the emotional well-being and psychological health of the child, and therefore requires careful analysis and leveling. The study of Internet addictions, factors and causes influencing their spread, and approaches to correction has become relevant.

Participation in social networking groups is justified by teenagers themselves based on fashion factors.

The groups created by attackers are closed. Teenagers "earn" membership in such groups by completing tasks related to aggressive actions, reports of which are posted online and rated with "likes." Children are gradually involved in life-threatening games. The organizers of such groups skillfully exploit the socio-psychological mechanisms of fashion. Thus, the group is created using modern technologies, which reflects the value of fashion as modernity. Belonging to such a group is demonstrated by posting reports on the completion of tasks online, which is based on the use of fashion value.

The value of fashion as a game is also exploited. Group members are involved in a dangerous game associated with performing heuristic, exploratory, complex tasks associated with risk. Receiving "likes" for reports on completed tasks creates in a teenager a feeling of joy of "victory" associated with self-satisfaction. Organizers, as a leading fashion mechanism for involving groups, use emotional contagion, manifested through the transmission of a certain emotional state against a background of excitement.

Thanks to the support of the experience of the "secret", the hidden discussion of this "secret" with many group members, receiving evidence of "admiration", the teenager subconsciously assimilates patterns of behavior dictated by fashion. The mechanism of suggestion is actively exploited. Various methods of verbal and non-verbal influence on adolescents are used in order to create a certain emotional state in them and encourage them to take certain actions.

The emotional richness of information and its constant replenishment creates the effect of "emotional contagion" and stimulates the desire to follow the

imposed patterns. Teenagers, due to their little life experience and low social status, are more susceptible to the suggestive influence of fashion.

The mechanism of imitation also plays a great role. Adolescents maintain in every possible way a sense of belonging to a “special caste”, a closed, secret group, to which it is prestigious to belong, which creates the basis for the operation of the imitation mechanism. The “exploits” of the group members (who often committed irreparable things) are discussed. And are heroized, individual participants are elevated to the rank of “stars”. “Stars” enhance the attractiveness of actions, which creates the basis for the operation of the identification mechanism. The described mechanisms of fashion are superimposed on the age characteristics of adolescents and lead to the intensive spread of fashionable behavior among them and involvement in groups.

A justified choice of approach to building the prevention of Internet risks requires more attention. Augmented reality technologies have enormous potential to influence the mechanisms of normative and value regulation and the formation of life strategies among young people, which requires a more attentive attitude towards them on the part of the state. A new philosophy for presenting content that has emerged on the basis of the latest media platforms - transmedia storytelling - can also become a significant factor in destabilizing the information and communication space. The narrative (story) is revealed through verbal and non-verbal communications, using various media (video, photos, images) and media platforms (television, mobile application, YouTube channel, Vkontakte).

The main feature is that stories are not repeated in different forms of storytelling, but, on the contrary, complement each other in order to construct a complete information space. This method of presenting information allows us to achieve subjectivity of perception through multidimensionality and hyperlinking. In this case, the narration is carried out on behalf of several characters, and not from one source or from one journalist, and the consumer has the opportunity to perceive information along an individual trajectory. The effect of presence

is created by interweaving the narrative using text, audio, video information, as well as the latest technologies. As a result, transmedia stories are becoming increasingly popular due to the ability to create a picture of a fictional world, while blurring the line between the real and virtual worlds.

This form of presenting content opens up wide opportunities for manipulating public opinion, spreading "fake news," and creating pseudo-knowledge. False narratives are not simply passed from person to person on social networks, but are constructed from disparate pieces of information received from several sources, gradually becoming part of a plausible reality. Websites play different roles in promulgating false narratives. Some are used as evidence, while others combine evidence to create richer stories.

Information security

The goal of information security of social entities comes down to "protection of information and protection from information," which determines the development of two basic directions related to: 1) the development of a technical basis for ensuring the stability of information network software and maintaining confidentiality and integrity of information (technological approach); 2) with identification, assessment of consequences, neutralization, protection from manipulative information. The macro level addresses issues of sustainability, controllability and reproducibility of social systems in new information and communication conditions; at the meso level, the identified issues are updated within various social groups and organizations. The micro level reflects the problems of ensuring the information security of an individual in the space of network communications, without solving which the existence of system-forming structures of society is impossible.

Technological risks can be identified - virus software, personal data leakage, account hacking, etc.; economic – unauthorized withdrawal of funds, financial fraud, viral marketing; psychophysiological – memory disorders, sleep dis-

orders, low physical activity, Internet addiction; cognitive – unfocused attention, difficulties with memorizing, understanding, reading text information; content - materials that clearly contain illegal, destructive information; manipulative influences – materials that hiddenly contain information to influence the motivation and behavior of users; negative communication – unwanted contacts "cyberbullying" or cyberbullying, cyberstalking, "grooming" or sexual harassment on the Internet; self-isolation – refusal of social life.

"Cautious" teenagers start using social networks mainly at the age of 14. "Cautious" teenagers note that they are more likely to encounter technological risks of virus software, personal data leakage, and account hacking. Content risks are not actualized by either "cautious" or "brave" teenagers.

"Brave" young people begin to use virtual social networks earlier, while material well-being and participation in solving social problems are priorities for them. "Cautious" young people of 20 years old keep education and knowledge in the first place. They associate the main threat to their security on the Internet with technological risks (virus software, theft of personal data, account hacking). Content risks are not updated in any of the age groups.

The Internet is a self-organizing communication environment. This environment is programmed and described mathematically. Objects can be manipulated algorithmically. Thus, using certain algorithms, you can automatically remove "information noise" from a photo and change its proportions. Modularity means that each element is part of the whole. A multimedia project can consist of many photographs, frames, sounds, which are played in turn. But, since they retain their originality, it is possible to change only one component without changing the whole.

Numerical coding and modular structure lead to the possibility of automating many operations in media creation. Shooting, layout, and printing are automated. Behavior and intelligence are modeled. "New media" consists of two layers: a cultural layer and a computer layer.

Transcoding is the mutual influence of these layers. Thus, photography, on the one hand, correlates with other cultural spheres of society, then its content, authorship, and meaning are important. On the other hand, a photograph is a computer file with essential characteristics such as file size, format, and date of saving. Transcoding means that these layers can influence each other. The computer layer can influence the cultural layer of "new media", their content, organization and genre – and vice versa.

Negative and positive effects of digital communications

The effect of cognitive reduction is an uncritical attitude towards Internet content; lack of skill in selecting high-quality and reliable information on the global network; inability to work with large amounts of data. It is expressed in the phenomenon of information overload; making it more difficult to find data relevant to tasks; formation of fragmentation of consciousness; lack of systematic vision of phenomena (the phenomenon of concentrating attention on details to the detriment of seeing the big picture).

The effect of digital alarmism and gaming mania is manifested in the susceptibility to manipulation of mass consciousness in new media. It manifests itself in the phenomenon of transferring the focus of attention to the virtual environment and moving away from objective reality; the negative impact of low-quality paid online courses; the negative effect of the spread of pseudoscientific knowledge and the difficulty of its verification; online gaming addiction and inability to distinguish reality from virtual space.

The effect of communication destruction is the loss of interpersonal business communication skills; decreased authority and understanding of the service hierarchy; decreased depth of communication and underdevelopment of emotional intelligence.

The effect of atrophy of the professional environment, norms and values. lies in the inability to build long-term relationships in the professional sphere;

waste of working time on social networks. The effect of imposing digital communication is the mandatory requirement to use gadgets and software as an element of employee prestige in the organization; replacing professional proficiency with the latest digital tools.

The effect of access to wide databases is the development of unique abilities to search, process and analyze information due to the development of information technologies, search programs and, consequently, greater efficiency and competitiveness of young people in the labor market in comparison with older generations. The effect of communicative mobility is associated with the possibility of improving the professional culture of young people due to the ability of young people to constantly be in touch and quickly respond to work tasks; increasing the labor productivity coefficient; use of communication technologies in the HR field.

The effect of stimulating intellectual flexibility and readiness for design thinking is associated with the use of mobile technologies, gadgets and virtual reality to develop creative thinking and increase creative abilities. The effect of digital competence is the increased readiness of young people to use digital technologies and special software in education and the professional sphere.

Digital communication regulators

In theory, civil society itself should block people who spread lies and panic. But in the absence of social initiatives, the function of the regulator is assumed by the state. As an example, consider the experience of the People's Republic of China. The social credit (rating) system began to be developed by the PRC government in 2010. This is a system for assessing citizens and companies using data collected through digital applications, gadgets and surveillance cameras that are installed everywhere in the PRC.

Since 2016, the government has introduced sanctions for those with low ratings, such as a ban on working in government agencies and denial of social

security. There is a thorough search at checkpoints and a ban on holding leadership positions in the food and pharmaceutical industries.

These practices include the inability to choose luxury options in restaurants and hotels, refusal to purchase tickets and a ban on children's education in prestigious schools and universities.

The Internet network of the People's Republic of China is provided by one large provider. Twitter, DropBox, Instagram and all Google services in China are blocked. Any blocked resource has a national counterpart, which is made taking into account the local consumer mentality. For example, YouKu's interface is almost completely identical to YouTube.

The Chinese know well that under no circumstances should they post videos that could be seen as criticizing the modern power structure. At the same time, you can criticize the local economy, the local market, the leader at the county or city level.

If you buy games online, your social credibility obviously goes down. But books, online courses, or especially contributions to charitable foundations will add a significant number of points. The rating is also based on data from banks and administrative courts, where good behavior and discipline in repaying loans are rewarded with points. The most important tool is the "Golden Shield" - "The Great Firewall of China".

An interesting program is the implementation of the "smart cities" model, which is being implemented in the PRC by the state in cooperation with the largest IT companies (Alibaba, Tencent). The authorities plan that this program will cover about 500 cities, including almost all provincial centers and cities at the autonomous prefecture level.

Among the already implemented examples is Hangzhou, the city where Alibaba's headquarters is located, where there is already an artificial intelligence system that controls traffic lights, monitors accidents and traffic jams. Shops and public transport are equipped with Alipay mobile payment service terminals,

which have also begun introducing a system for paying for goods and services using a facial recognition system.

“Smart cities” in China are part of an indicator created at the initiative of the state, based on the processing of big data, which takes into account human behavior in various areas (payment of taxes, utility bills and fines; repayment of loans; nature of purchases; activity on the Internet and social networks). This is a joint project between the state and private companies, primarily Alibaba. It is modeled after Alibaba's Sesame Credit rating system, which analyzes customers' consumer behavior and then awards them special points that entitle them to preferential terms on loans, online purchases, car rentals and hotel rooms.

For private companies, this is an effective marketing tool; for the state, it is an element of a new management model. The Chinese authorities are integrating into the social credit system a huge network of public and private surveillance cameras (about 176 million units), equipped with facial recognition, integrated and managed by the infrastructure and algorithms of “smart cities”.

The system was tested in selected cities and rewarded those with good ratings with benefits.

Since mid-2018, sanctions began to be applied to holders of low ratings: denial of employment in the public service system and certain positions in the private sector, blacklisting with a ban on purchasing airline tickets, booking hotels, and educating children in private schools. The mechanism for calculating a personal rating is not disclosed, but given that it is also formed on the basis of monitoring social networks, a system emerges when a citizen’s rating is influenced by his friends on social networks and their behavior.

It can be tempting to deceive not only the technology, but also the people who control the technology, for example, ruining someone's rating by reporting to the police that the person is doing something illegal. But each claim is carefully verified using data. There are departments and courts for this. In Beijing, such cases are handled by a neural network.

This is a virtual female judge who accepts and analyzes applications and provides online consultations on various issues. In 2019, nearly 13 million Chinese were placed on “untrustworthy” lists. The system has introduced several sanctions restrictions depending on points. This relieves legal services, but the issue of pre-trial restrictions on freedoms immediately arises.

For a bad citizen, this is a restriction in movement. He cannot buy train or plane tickets online at reasonable prices or they are simply not available. For good Chinese, tickets are always available with discounts of about 40%, for example, on very early and late flights. The bank will issue a loan or mortgage at a high interest rate or not at all. A painful sanction, especially for students, is associated with restrictions on renting bicycles, which are very common in China. If the rating is lowered, in addition to the rent, you also have to pay a deposit, which is a very large amount for a student. Companies with low ratings may not be given loans or subject to audits.

Digital communications of the enterprise

The functions of digital communications of enterprises are reduced to stimulating sales of products and creating demand for them. The goals of digital communications are aimed at fulfilling the general marketing objectives of enterprises, such as: formation of buyer motivation; creating or updating the needs and desires of consumers; forming or maintaining positive relationships with consumers, partners and employees of the enterprise; creating a positive image of the enterprise; informing and notifying the public about events and activities carried out by the enterprise; informing about the properties of goods and services of the enterprise; creating a positive attitude towards the brand of goods or products; a reminder about the company and its products.

The main functions of digital communications of enterprises, emphasizing their importance and significance for increasing promotion efficiency, are informational, expressive and pragmatic functions. The information function in-

volves the transmission of data and messages to the target audience. The expressive function involves the expression of evaluative and semantic information. The pragmatic function involves influencing the consumer to influence his preferences and opinions.

Two main approaches to organizing digital communications have been adopted. This is the separation of digital communications into a separate direction within the business processes of the enterprise and the integration of building digital communications with the marketing department. Both directions have strengths and weaknesses and are chosen by enterprises taking into account their specifics. For most trading enterprises, the second scheme for building communications is preferable.

Digital communications do not contradict the basics of marketing, although they introduce their own special tools into the marketing mix. It is ineffective to have two separate departments and activity plans, one of which is responsible for offline and the other for online. Consumers do not draw the line between these two directions, which for the advertiser means the need to synchronize the periods of advertising activity of retail enterprises.

The process of building an enterprise digital communications plan is becoming increasingly important. The digital communications plan should differ from the offline one in terms of teams of performers and reporting, and have specific performance indicators. The SOSTAC system is used to plan advertising campaigns. This system allows you to take into account the connection between the client's business and its marketing activities, including digital communications. SOSTAC means:

Situation - where are we now?

Objectives - where do we want to be?

Strategy - how will we get there?

Tactics - how exactly do we get there?

Actions - what action plan?

Control - how will we understand that we have achieved our goal?

An important feature of building digital communications for enterprises is the analysis of promotion practices in the digital environment, which reflects the level of elaboration of the digital strategy by leading brands.

If alcoholic beverages are promoted, children must be protected from visiting such sites. To do this, it is possible to use the age verification page. The age at which you can drink alcohol varies by country, and in some (for example, Iran) alcoholic beverages are completely prohibited. When trying to access a site indicating this country, the visitor is redirected to the internal pages of the site. Further viewing has no restrictions. It is recommended that you check the websites of products that have legal restrictions to ensure compliance with the laws of the countries where the site is available.

Many brands have mono-brand stores. However, some brands choose to hide this information or reveal it in a limited way. It is important to enter store location information into digital databases.

Search engine optimization is one of the main tools for generating website traffic. The first page of search results should not contradict the brand's reputation. It reflects information that is important to convey about the brand.

The main promotion tool is contextual advertising in search engines. In search advertising, you can observe the presence of pawnshops, fly-by-night sites on free hosting, and multi-brand stores that also promote other brands.

With the growing audience of smartphone owners, technical restrictions for users to visit mobile sites are being lifted. The audience will not put up with the imperfections of mobile versions of sites and will expect from the mobile web the same convenience and level of service as from Internet sites and stores. Despite the high percentage of smartphone penetration among the target audience, not all brands use mobile web and applications.

The communication risks of not having a mobile site must be assessed separately. Considering the low investment threshold required to implement a mobile website, it is recommended to carry out work to adapt the website for smartphones. You need to start working on the mobile website and then switch

to the application. A mobile site allows you to draw conclusions about the demand for content and user behavior, on the basis of which you can begin developing an application.

There are several fairly popular platforms in the smartphone market, such as Android, Blackberry and Windows Phone. Failure to use versions for these platforms may exclude a large percentage of potential users. To prevent this from happening, it is recommended to develop versions of the application for all the most popular systems, or create a mobile site that will be displayed on all devices, regardless of the operating system.

Many brands use a mobile website or app with basic information in it. Brands use directories of nearby brand stores, but online ordering cannot be done using a mobile app. There is no functionality for online orders in applications and websites.

The rapid development of mobile commerce poses a challenge for retailers to consider providing purchasing opportunities using mobile devices. An online store should be user-friendly, with user-focused navigation and effective merchandising. It is important to place a search bar on every page. An effective search engine on a website is the key to success. Consumers do not have the time and convenience to search that they have sitting at their home computer.

Many apps created by brands to support existing marketing activities are designed for seasonal promotions and do not work for long-term goals.

Thus, the applications do not have the ability to register a user or log in using your existing login. Thus, some useful statistics about the user are missed. Integrating mobile web resources with other marketing initiatives improves the quality of services.

Brand advertising requires clear targeting of users who are interested in the brand. Targeting (from the English targeting - to aim) can be used in this case to cover two types of audiences - based on the selection of sites with the appropriate audience, or by using technological settings in the campaign.

Classic targeting carries out passive audience selection. Audience targeting gives an advertising campaign the opportunity to choose a scenario of user behavior in accordance with the goals and objectives of the marketer. An example of audience targeting is frequency targeting. The main task of frequency targeting is to narrow the audience and eliminate ineffective impressions.

Boomerang is an advertising campaign in which the criterion for selecting users for subsequent display of advertising is their visit to the site or individual pages of the advertiser's site during a specified period of time. "Boomerang" allows you to extend communication with the user during or after the completion of the advertising campaign.

Consumer segments are audiences with similar needs. These are people who show a strong interest in a particular topic and visit the same thematic sites or certain sections of these sites. Advertising aimed at a specific consumer segment has two significant advantages. Firstly, such advertising is consistent with the current needs of the user. Secondly, it is demonstrated not only on thematic sites, but also on any other sites where the user visits, that is, away from competitive offers. An example is the following situation.

A frequent visitor to sites about men's fashion and style, such as GQ.com, can be identified as a potential buyer when an advertiser uses technology using an advertising network. A collection of similar users, with the help of a technology partner, can enter the consumer segment. Thanks to targeting technology, the user, with the help of advertising management systems, can be shown an advertisement for a new fragrance on a partner site.

An online store is a website or section of a website with a product catalog and a shopping cart for placing an order from the catalog. While browsing the catalog, a website visitor can place the item he is interested in in the order basket. If there is a wide range of models, the site may use tools to help you choose a product based on certain criteria. To pay for your order, you can use the online payment system, issuing an invoice, cash on delivery or payment on delivery. An example of an online store with a filter by parameters is the section of a

brand’s website for the UK, which offers its customers the opportunity to purchase brand products online.

In the online store and catalog, special attention is paid to a detailed description of the product, its appearance, and consumer properties. You can enlarge the photograph of the item and choose different models that differ in color. The site offers additional services.

To understand the behavior of online audiences and build effective digital communications with them, you should use basic communication patterns and consumer behavior. However, it should be borne in mind that these diagrams provide only a general idea of the decision-making mechanisms and information processing of the consumer. Since the digital landscape is constantly changing, in modern practice of building digital communications it is common to focus on basic models, adding to them features found in the online environment.

This approach includes the technique of constructing so-called user paths, that is, possible patterns of online consumer behavior. Thanks to the diagram, you can identify the most important touch points with the audience and use those that help achieve the advertiser's goals.

To build a detailed user journey, it is necessary to use additional sources of information about the consumer. Due to technological features, the digital environment is measurable in detail, but data on these measurements, as a rule, cannot be found in the public domain. For this reason, the analysis of the features of constructing digital communications is based on publicly available information, which may not reflect the actual state of affairs, which reduces the effectiveness of promoting enterprise products.

Man in the environment of digital communication

In the digital era, human dispersion across different environments takes on new dimensions. A fundamental feature of a person’s existence in a modern “hybrid” (“online”/”offline”) environment is his presence in several places at the

same time. This is not just a sequential switching from one communicative situation to another. A parallel type of switching has arisen. Human existence is fragmentarily presented in the form of texts, images and media files.

Such features of the digital environment create new challenges for humans. With an increase in the number of communications and an increase in the availability of information, the quality suffers - communications and familiarization with information become superficial, the information received is less recorded in long-term memory. Changes occur in the way a person uses his memory. Instead of memorization, trust in external digital memory media is growing. Memory is delegated to artificial assistants.

A person must take into account his digital extensions. The distributed essence of man is a key characteristic of homo digitalis. A person in digital interaction loses his sense of reality and acts as if his opponent is a digital entity that does not contain anything real behind him. Interacting with computer bots, voice assistants, and voice-enabled AI systems is confusing. An increase in the number of digital interactions compared to non-digital ones leads to an increase in aggression. Where there is no feeling of direct contact with another person, mutual misunderstanding arises, and the level of responsibility for one's words and virtual actions decreases.

Despite the revolution in communications caused by the breakthrough of high technology, live communication still remains the most accurate and effective communication tool. It is as a result of live communication that the brightest and most effective joint decisions and the most successful projects arise.

The optimal platform for communication between potential partners (and competitors too) are major industry and cross-industry business events - such as forums, congresses, festivals, and conferences. Which is understandable: in order to stay "on the wave", it is important for business owners to constantly communicate with their partners and clients live, position their opinion as an expert, test new ideas and solutions on a wide specialized audience and thereby increase awareness of their own brand.

Forums and conferences are a powerful PR tool, because after personal communication, small events, forums provide an opportunity to convey your ideas to many and wider opportunities to communicate in person.

That is, a forum is effective communication with an audience and selective contact. The cost of such contacts is much lower than meetings in restaurants or advertising campaigns.

Business owners are always interested in promoting themselves as a personal brand or their services and products. Another thing is that there is a category of public people, and there is a category of private people. Some people know how to speak convincingly about themselves, about their business, but the majority do not know how to do this and, worst of all, do not learn it, not realizing how powerful a tool it is for promoting their services and goods.

Those who promote the networking format are successful, which indicates the prospects of the direction. Events are a concentration of information and trends in one place.

Trade events are organized for clients and partners to tell them about the latest company news: achievements, launches of new products, changes in production, technological innovations. Events allow you to show the benefits of products, improve the brand's reputation in the eyes of partners and customers, and exchange experiences.

Trade events take place in the format of conferences, seminars, presentations, forums, and summits.

Corporate events are held for company employees. Events help to unite the team, increase the authority of management, convey corporate values to staff, motivate them to work, and improve labor efficiency.

Events of this type include team building, corporate events, joint recreation, picnics, master classes, and trainings. Sometimes they involve invited partners, public figures, and company clients. Seeding has become one of the tools of digital communication. Bloggers, who are the authors of blogs, play an important role in the implementation of seeding.

Institutes of digital communication: blogs

A blog is an online diary (network journal, online diary, event log), to which entries of various nature are added. This is text, image or media file.

A blog entry is called a post. Post sizes (text length, number of images or media files) vary. It depends on the author's blogging style. There are restrictions on the length of texts, the number of images, sound and video files. New posts appear in a certain chronological order.

All entries are ordered in reverse chronological order and the most recent is always on top. You can leave a comment for each post. The blog author can limit or disable comments. Depending on the composition of the authors, blogs can be personal, group (corporate, club), or public (open).

Personal blogs are usually called a diary, group and public blogs are called a community. The author of a blog is called a blogger. The collection of all blogs on the Internet is called the blogosphere. The first blog is considered to be the personal page of Tim Berners-Lee, the inventor of the Internet. He published IT industry news there. Blogging services began with the launch of the free website Blogger.com in 1996.

In order to leave a blog entry, the author contacts the web server, after which, already identified in the system, he creates and saves the post. Most blog engines have the ability to create automatically processed lists of RSS and ATOM updates. Formatting text in HTML and other formats, as well as the ability to insert a picture or multimedia into a post, have become common practice.

The peculiarity of blog hosting platforms (platforms) on which diaries are posted determines the predominance of one or another target audience. There are many students on the Liveinternet blog service, and on Diary.ru there are anime fans and online writers. Both ordinary users and specialists in various fields of activity maintain blogs on Ya.ru (a Yandex service). There is a gradation among bloggers. Blogging platforms dominated by teenagers with similar views include aeterna.ru, beon.ru, darkdiary.ru and www.privet.ru.

Standalone blogs are separate sites. Popular engines for creating a standalone blog are Wordpress, Joomla. The advantages of these blogs include the absence of censorship, the ability to create a design exclusively for yourself, and greater scope for monetizing the blog. Disadvantages include the need to pay for hosting, difficulties with promotion, the importance of having minimal skills in programming and web design, and high (compared to collective blogging services) susceptibility to DDos attacks.

A traditional online diary contains entries on such topics as politics and social life, music, subculture, photography, cinema, relationships within the blogosphere, a description of the author's life (in online jargon - lytdybr), supplemented by emotional reasoning, emphasizing certain things.

Fan fiction (literary work about idols created by their fans) is periodically published. There are often surveys and tests, which are negatively assessed by many bloggers, and not necessarily "serious" ones.

Blogs created solely for monetization, as well as entertainment diaries, are common. Entertainment diaries contain a large amount of content from other sites, pictures, funny stories, photo jokes. Along with blogs, a popular type of blogging is microblogging. A post on microblogs is limited to 100-150 characters, while the ability to add media files is retained. The ability to comment on posts is also preserved. A popular microblogging service is Twitter. Many users maintain microblogs on social networks.

Institutes of digital communication: forums

A forum (web – forum) is a special site, or section on a site or portal, which is organized for communication and exchange of opinions. Forums are intended for thematic communication. They are hobby clubs. The essence of the forum is the creation of topics by users and their subsequent discussion. Thematic surveys can be created for each topic.

The main goals of the online forum: communication, discussion, exchange of opinions and experiences. The forum and chat differ in that chat communication is purely thematic. Each forum has a structural hierarchy.

The conference implies an engine. This section unites several forums into a group based on certain characteristics (similarity of topics). The forum, as a section unit, unites thematic subforums. Subforums, in turn, combine topics. Subforums are used to relieve forums and are needed if there are many thematic threads on the forum. Topics highlight an issue.

The leading first message in a topic usually reveals its essence, and subsequent messages are a discussion of the issue. A message denotes the response of a forum participant (user) to a topic, his opinion.

The forum administration includes moderators and administrators. The administrator's responsibility is to exercise control over the work of the entire forum. A moderator appointed by the administrator maintains order in accordance with the forum rules in certain sections of the forum.

The forum administration determines the rules for users and has the authority to take action against certain users who violate these rules.

Forum users include registered group members and forum guests. The latter can only view topics, but they do not have rights to write messages. The forum uses a user account. This is an account that is issued to any user after registration. The option “Account blocking for violations” is used.

This is the blocking of a user's account by a moderator or administrator for violating the forum rules. The login reflects a certain unique name on the forum, which is an identifier and allows the user to log in to the system.

The password displays a secret combination of characters known only to the user to authorize the user. A topic denotes a topic. Quoting means citing. Offtopic records off-topic communication.

Institutes of digital communication: community

Community (from the English community) is an association of people with common interests. Online communities are formed on forums, blogs and social networks.

Audience, target audience and resource community are not the same thing. Many resources with a large audience do not have their own communities, and on some forums several communities are formed that hardly intersect or interact with each other. This is typical for city forums. There are almost always local communities of car enthusiasts, summer residents and music lovers who communicate mainly in their own sections and are not interested in what is happening in other sections.

The community criteria are as follows. This is the presence of common interests; regular communication on resource pages; personal interaction between participants; awareness by community members of their belonging to it; the emergence of users with certain roles and images.

In stable Internet communities, over time, their own slang is formed and local memes appear. Their presence can also be considered an important, but optional criterion. Communities represent a loyal and valuable part of the site's audience. Community members spend a lot of time on the resource, produce a large amount of user content, improve user metrics, and use paid products and services more often than others. They can attract new members who, over time, also become regular active users. Therefore, the owner of any site that may have its own community is interested in its creation and development.

Community managers are responsible for maintaining and developing online communities. Their tasks include: creating platforms for communication (for example, groups on social networks); attracting new community members; content management on the site (creation and moderation); creating resonant discussions; holding online and offline events; maintaining an optimal emotional atmosphere for the community.

Institutes for control and protection of digital communications: gatekeeping and Gatekeeper

The term “gatekeeping” consists of two English words: gate (“gate”) and keeping (“security”). Gatekeeping refers to control over the acquisition of resources, knowledge and power. Gatekeepers are like guards at the entrance to different communities: from gaming to religious and feminist. They decide who can call themselves a "real" fan or expert and who can't. Gatekeeping often intersects with sexism and other forms of discrimination.

Another name for gatekeeping is the gatekeeper theory. A gatekeeper has social, cultural, ethical and political influence. It could be a doctor who ignores a patient, or a mother who forbids her child to eat candy.

The concept of gatekeeping was introduced by Kurt Zadek Lewin. He mentioned it in a paper published in the journal Human Relations in 1943. Lewin studied the eating habits of people. He wanted to understand whether it was possible to effectively rebuild the diet of families during the Second World War.

During the experiments, the scientist found out that all the food in the house was in charge not of the man, who was usually considered the head of the family, but of the housewife. It depended on her what would be bought in the store and what would end up on the table. That is, in this situation, the housewife is the gatekeeper.

Kurt Lewin argued that gatekeeping theory is relevant not only for everyday issues, since the same model is used to spread news. In 1953, psychologist Carl Hovland and his colleagues at Yale University studied gatekeeping in mass communication. Scientists have concluded that content creators may be gatekeepers. They use expertise and image to persuade the audience. For example, readers automatically consider information in scientific journals and books by famous authors to be more reliable.

On the Internet, the power of gatekeepers has diminished. They filter information noise and help you not get lost in the space of fakes.

In thematic communities, gatekeepers perform face control tasks. They set the criteria that a true fan must meet. If we are talking about an actor, the candidate fan must know his entire filmography. In traditionally male-dominated fields, women often suffer from gatekeeping. Women are reluctantly accepted into gaming communities. They are more often asked uncomfortable testing questions, they are humiliated and criticized, regardless of their gaming skills. The term gamer girl is often used in a disparaging context.

Gatekeeper is software that is built into a network to protect it from external influences. It works thanks to a router with specially configured management tools and a UNIX-based server.

Gatekeeper protects not only the internal network from unwanted networks, servers and sites, but also prevents data from the internal network from entering the Internet.

The software features include managing overall IP communications from a central location; creating a blacklist of questionable servers and networks; blocking dubious and unwanted traffic; filtering connections based on a previously specified access control list; log of user statistics, errors, connections; working with IP/Ethernet address databases; statistics on service use.

Scientific research and access to the digital field

Access to the digital field involves establishing trusting relationships with potential informants and obtaining consent to be interviewed. There are four stages of access. They include the collection of primary information, negotiations; entering the physical space of fieldwork; access to informants, consent to interviews and access to the topic.

Empathic cooperation with informants ensures the subsequent selection of informants based on recommendations and contacts of previous informants. Sometimes physical access to a digital field is achieved without negotiations with gatekeepers. This is the name given to managers, owners and other persons

who have a power resource that can both limit and open the digital field to the researcher. Usually these are heads of departments or officials whose decisions can make access easier or more difficult (head of human resources, administrator of an online forum).

These situations include those in which assistance is provided by the researcher's acquaintances who come into contact with "gatekeepers" (gatekeepers). Or when the digital field is represented as a place of open public access on a par with cafes, shops and cinemas.

Difficult access to the digital field comes down to finding guides who can facilitate the research, getting the researcher into the study environment, and providing contacts of informants.

The main task of the researcher in relation to gatekeepers is the need to convince them that the research will not cause harm and that the researcher will benefit the participants in the study environment. Tactics for accessing the digital field and the degree of its complexity depend on the following properties: the more open the group is to the external environment, the easier it is to gain access to it; the larger the group, the greater the chance for "easy" access, since the potential number of contacts will be higher.

On the one hand, density has a positive effect on the further search for informants, but on the other hand, there is a high chance that negative cooperation will work and refusal will follow. People who are familiar with the practice of research are more willing to make contact, and those who are not familiar with it and see a danger in it are less inclined. Access is a creative process that requires ingenuity and ethics on the part of the researcher.

If access is unsuccessful, the digital field is not entered twice. The most rational way out of this situation is to find an adequate equivalent for the inaccessible digital field. Failures can be attributed to mistakes in negotiations. A combination of several, logically coordinated access tactics is productive.

This provides additional information, various entry points for searching for informants, a variety of perspectives, and increases the chances of exploring

hard-to-reach digital fields. After an initial acquaintance with the environment under study (social networks, available data, archives), you can find out its properties, communication culture for establishing communication, key points where you can look for informants, and which of them is most relevant.

The difficulty with participants recruited by a research organization is that the motivation for their participation is not always clear, and one cannot be sure of the sincerity of the informant and his declared status. The terms of reference for recruiting contain a detailed description of the planned field work (terms, time, full schedule by day) and the participants who need to be invited/recruited for the project. The greatest attention is paid to the requirements for participants: quotas and the required number of participants are prescribed in detail. The assignment specifies how long the interview will last, where it may be, what recording methods will be used, and how many participants from the researchers are planned to be present during the interview.

A key informant is an individual who is deeply immersed in the community being studied and whose experiences are most relevant to the development of the study. This informant has great social capital and shares his contacts with researchers and contributes to the development of the project. Unlike gatekeepers, he does not occupy an administrative status in the community, but is often an informal leader.

Empathic cooperation is characterized by a state when the researcher is no longer surprised by almost anything in the digital field; he is more of a participant than an observer.

How digital communication institutions are formed: the example of YouTube

The domain name youtube.com was registered on February 14, 2005 by Chad Hurley, Steve Chen and Jawed Karim. The first YouTube channel was created on September 16, 2004. The channel is called “Its Gets Better Project.” In October 2005, the video service introduced a channel subscription feature.

Most YouTube videos before 2006 focused on different forms of talent. YouTuber (youtuber, YouTuber; English YouTuber) is a person who publishes and films videos on the YouTube video hosting platform. The term “YouTuber” classifies people whose main or only platform is channels (personal accounts) on the YouTube video hosting site. Since 2006, Hollywood and music companies began offering collaborations with YouTubers.

In 2007, YouTube introduced the "Affiliate Program" as an advertising revenue sharing mechanism that allowed YouTubers to earn income from videos uploaded to the platform. In 2015, there were more than 17 thousand channels on YouTube, the number of subscribers of which was more than one hundred thousand, and about 1.5 thousand, the number of subscribers of which was more than one million. YouTubers have become an important source of information and entertainment for Generation Y. YouTubers are called micro-celebrities. Since YouTube is widely represented as a video platform and bottom-up social network, users believe that YouTubers are not connected to the established commercial system of celebrity culture, but appear to them to be self-governing and independent. People are confident that YouTubers are seen as the most reliable source of information, which is also facilitated by the direct connection between the YouTuber and the viewer using YouTube. The success of YouTube attracted the attention of various companies and corporations who were willing to sponsor YouTubers' videos in order to have their products appear in them. As a result, digital communication institutions have the prospect of sustainable sources of income through advertising opportunities.

Digital Advertising Institute

A banner is a graphic block of an advertising nature. It can contain text, video, static and animated images. A click on the banner leads to the advertised site and is monetized.

A banner performs the functions of lead generation, increasing brand awareness, motivation to action, advertising a new product or service. Banner advertising appeals to the target audience and promotes brand recognition. Banner advertising has disadvantages. It requires more traffic to download. It can irritate users due to an incorrectly selected site.

A graphic banner (PNG, GIF, JPEG) demonstrates a static image in JPEG format, clicking on which takes the user to the advertised page. An animated banner (GIF) lasts up to 30 seconds. Its speed must be less than 5 frames per second to display correctly on Google.

Flash banners use vector graphics, resulting in high quality on a small screen size. Flash banners can be accompanied by sound. They are more effective than graphic and animated banners. The success of a banner depends on the choice of site for its placement.

The effectiveness of an advertising banner is measured by the number of clicks, CTR and cost. The money invested and the profit received immediately allow you to understand how much the advertising justified itself. Requirements for banners require that you allocate space correctly, write a clear call to action, do not forget about the brand, be creative, use humor, maintain color balance, and distribute space correctly. It is recommended not to overload the user with a large amount of information, not to advertise many products in one banner, and not to use several calls to action.

The call to action should attract attention and motivate the user to click on the banner. You need to place only one CTA button with short text, for example “Learn more”, “Buy”, “Download”.

For a banner to promote brand recognition, it is important to use a logo, corporate fonts and colors. The user will be able to correlate the advertising message with the company and decide whether he trusts it.

An overabundance of banners on the Internet has created immunity among users in the form of banner blindness. Marketers actively use banners in

email newsletters, as they are a clear demonstration of the advertised product. They are placed before the body of the letter or after the first paragraph.

As a result, the banner exactly falls into the subscriber's field of view, since it is located on the first screen. By clicking on it, the user is taken to the product page or its category.

A banner in an email newsletter contains short text, a picture, a discount amount or promotional code, and a call to action. Animated banners and flash banners take longer to load.

An important role is played by mastery of the methodology for creating mini-applications and launching them on the VK Mini Apps platform. The idea of a convenient service should be looked for in your own and other people's experiences, in people's problems, in any area of life. Brainstorming with yourself, with relatives or friends is useful. Recording the results of brainstorming sessions will help you plan your development. Once the idea is fully formulated, its design begins. Creativity is replaced by routine processes.

Make sure the idea is viable. If you plan to make money from a mini-application and need traffic, conduct research on the potential market. Collect data, communicate with the target audience, study their needs. Write two or three user stories. Get involved in technical design. Make a list of features that you want to see in the MVP and in the final version. After this, you can proceed to creating an application prototype. You need to think about what the mini-application will look like.

When creating a mini-application, there is VKUI support. This is a set of React components with which you can create interfaces that are externally indistinguishable from the VK application. VKUI styleguide will come in handy. These are the available interface components. Thanks to them, the mini-application will look like a native client. VKUI assets for Figma are free, but are only available in the paid version of the program. The React Tutorial will come in handy if you have not worked with this framework yet. Then you can return to the VKUI components. A set of SVG icons presented in the form of React

components, as well as the Happy Santa VK App UI Style Guide, will not hurt. This is a useful material for desktop implementation of mini-applications.

After development, the moderation stage of the mini-application begins. Moderators check whether it complies with the rules for posting services on the VK Mini Apps platform and whether the placement criteria are taken into account. They can also note where the UX and UI need to be improved.

Moderators' comments will help improve the application, and at the final test, eliminate vulnerabilities that threaten user data. This is followed by beta testing in the Testpool system. At the stage of final moderation, entry into the catalog is carried out.

All that remains is to upload icons and covers for display in the catalog and on snippets. After this, the project will be published in the official catalog of the VK Mini Apps platform. There is a separate auction for advertising mini-apps. This means that there is no competition with offers of earnings and registration for nails. The cost of impressions and transitions is 2-3 times cheaper than regular ads.

There are two monetization models for mini-applications. These include in-app purchases and advertising. They can be used separately or together.

Usability and UX design

Usability refers to how easy it is for a user to learn and use a product to achieve a specific goal. Can a visitor easily complete an order in the app? Can he quickly and easily find a specific section on the site? If the goal of usability is to create a product that is easy to use, then the goal of UX is to make the user happy before, during, and after using the product. Solving a problem requires user experience, usability, value, adaptability, and desirability.

The main thing is to check the user’s mood at every step. This directly affects the project. Without the user's opinion, it will not be successful. Without feedback from users, it is difficult for a project to be successful. That is why the

process of receiving, processing and timely response to user feedback is necessary in any scenario: be it software development or improving an existing one. This is where usability testing helps - a method for evaluating the interface in terms of ease of use and efficiency of use. To achieve this, you need to attract representatives of the target audience of the software product.

In usability testing, there are two stages: the user completing an N number of tasks (quantitative or qualitative tests), as well as a conversation, filling out questionnaires or in-depth interviews with the user (qualitative research). During usability testing, project team members observe and analyze how users perform tasks or complete an oral survey, and take notes on where they encounter problems, are confused, or are delighted with the product's functionality.

The testing process takes on average one to three months. The testing period depends on many factors: the availability of different types of product, the complexity of the scenarios and the availability of their alternatives, the number of user roles. There are many usability testing tools that can help automate or remove part of this process.

All of these tools will help improve the usability of your website or product. Based on the results, you can change the navigation structure, understand which icons users are confusing, or adjust the copy of the buttons.

The project must both attract new users and retain old users. UX design is seen as an iterative process of researching, planning, testing, and refining every touchpoint along the user journey. User testing should be performed at every step of this process. User testing requires the developer to evaluate what users do and how they feel while using the product from start to finish. There are many user testing tools that allow you to collect feedback from different sources. For example, analytics solutions that allow the developer to see how users interact with a website, identify conversion opportunities, and know if errors or glitches are occurring.

One of the mistakes of UX design is the imbalance between aesthetics and functionality. To offer a great UX, a product must look good and perform well.

Functionality should be a little more important than aesthetics. It is important that the product looks beautiful, but it is even more important that it works. It's worth making sure that users can get the most out of what they're trying to do with the product. It's worth starting with a basic structure of tasks that need to be performed during the design process. If a design element distracts from this process, it should be removed or adjusted.

The main mistake a developer makes is thinking that he knows better than the user. What is obvious to the creator of a product is not always clear to the end user. Users need to be at the center of everything and it is critical to take their feedback seriously to close the gap in understanding needs. Mistakes can be avoided by using surveys in usability testing.

Nothing turns users off more than a bunch of different pop-ups when opening a product. The user has to deal with closing or navigating from pop-ups before beginning their product use or web journey. Instead of using onboarding, the app fills the screen with multiple windows that must be closed before using the service.

To create user-friendly pop-ups, you need to consider how many of them will be called and when. It's best to stick to one window per page and make sure it doesn't interrupt the UX by taking up the entire screen. Pop-ups should be easy to close, accessible in just a few clicks, and positioned appropriately.

Good UX design is able to anticipate not only ideal scenarios, but also unexpected circumstances. It is worth considering the entire user experience with the product throughout the entire design process. You need to cover the beginning, the end and the in-between. When a user signs up for a free trial on a site, they will be faced with an initial registration page and a success page. It's always worth considering the full user experience, mid-state design, core states, and best-case scenarios. And build high resiliency so that the product still provides a great UX even when mistakes happen.

The design space is full of UX trends that come and go. While it's important to stay on top of trends, you don't have to agree with everything others

say just because it's trendy. For example, flat design became a popular UX trend in the early 21st century. Flat design represents a branch of minimalism, characterized by the absence of three-dimensional visual elements. It has largely fallen out of favor due to the UX problems it presents. This design can confuse users as to which elements are clickable and which are not.

When designing, you should always consider how the design trend will affect users. Data overload can quickly confuse users if they don't have time to think about and digest the information you give them. The so-called Hick's law comes into play, which states that the time required to make a decision increases with the number and complexity of available options.

The first screen of an app that users see shouldn't be overwhelming. If it's overwhelming or contains a lot of different elements, users won't know where to start and may leave the page without learning anything. To avoid this design mistake, you should start with the essentials and be careful about how much content the user sees at once. The ideal option is when users can start working with a new product intuitively, without unnecessary training at the initial stage.

One of the most commonly discussed responsive design mistakes is designing with the desktop in mind and ignoring mobile devices. Often, mobile-first design elements leave a lot to be desired when viewed on larger screens. The large amount of white space and tiny icons make it clear that this interface was not designed with big screen use in mind.

Great UX design is responsive no matter what device it is viewed on. The best option is to aim to design for the most form factors and make sure the development team takes the time to brainstorm and test what looks and works best on different screen sizes.

Some UX designers either forget to add labels to icons or simply feel it isn't necessary, partly due to minimalist design trends.

The lack of labeling on icons is a mistake for two main reasons. Commonly used icons such as hearts, checkmarks, or emojis mean different things on different sites, which can confuse users. Icons that are too detailed, unfamiliar, or

complex can be confusing, requiring users to spend extra time and effort trying to figure out what they mean. The most popular website structure is block structure. Designers often use various blocks to easily swap them around, make layout easier, and be able to easily create adaptive versions.

Designers interpret the concept of “information block” differently. Someone uses this definition for all blocks on the site where there is at least some information. Some people use this concept for text content. Some people call pop-up windows information blocks. Text content is presented in blocks of text only. These include descriptions of goods and their characteristics, companies, pages with terms of delivery and payment.

The blocks called “Information in the header and footer of the site” contain contact information, shopping cart icons, and links to pages with terms of purchase. Calls to action can be considered information blocks, as more and more designers put information about the company and additional benefits when ordering into blocks. Pop-ups are separate pop-up windows with information about company promotions and web forms for ordering. Announcements about working with the site inform users about technical problems or conditions of use, and tell about the rules for working with the site.

Information blocks on product cards contain a description of the terms of purchase, blocks describing the delivery and payment algorithm. Sidebar blocks are elements located on the side panels of the site.

Using the text on the site, the user learns basic information about the company's activities and makes a purchasing decision. If you don’t pay enough attention to the design of text content, site visitors will not learn about the benefits and promotions carried out by the company, and will not be able to understand how to interact with the product. It is important to pay attention to typography. Readable fonts, bright headings, and well-placed spacing help the user to easily perceive the information.

When designing text content, it is advisable to use various icons and images. They attract the user’s attention to elements and facilitate the perception of

text thanks to associations. The header and footer of the site contain the company's contact information. This is the address, telephone number, operating hours of the organization. When creating a design, it is important to pay attention to: the size of the text, whether it is possible to make out the inscriptions without effort; is it possible to notice the inscriptions on the background, is the text in harmony with the main shades on the site; whether images are used in the header, whether the icons are associated with their purpose. The magnifying glass symbol is most often used for searching, so it is better to use it.

The text should not overlap other inscriptions or images. There must be enough space. It is recommended to fix the header so that the information is always visible to the user. Some information blocks may be located in the footer of the site. It doesn't have to be text.

An important role is played by the call to subscribe to the newsletter, order a product or service, or a promotion with a discount when ordering in the near future. There is a tendency in design to make appeals as clear and understandable to the user as possible. Users are more willing to take targeted actions if they understand the benefits they receive. This could be a free gift, a discount on your first order, or something similar.

To draw attention to the information block, you can design the element using bright colors, a gradient or a bright image. The user will fix his gaze on the block and, possibly, take the target action. It is important to position the block in such a way that it does not disrupt the overall composition of the site and, at the same time, stands out among the content. It is best to place calls to action on the first screen (the most viewed part of the site) and embed them into the content.

Pop-up windows are information blocks. Users are presented with information about current company promotions or additional favorable conditions. Some sites post interactive information blocks that collapse when clicked.

Popup design needs to pay attention to the information that is presented to users. Briefly describe the advantages of shares, specifically formulate the con-

ditions for receiving them. Vivid images will attract attention and hold the user's gaze before he closes the window. But, you should not overuse the use of pop-ups. Pop-up windows are often perceived by website visitors as annoying advertising. A potential client may go to competitors.

Another type of information blocks on the site are small blocks with information about the operation of the site. This may be a warning about the use of Cookies, a request to subscribe and send notifications, blocks describing technical shortcomings, etc. They must be visible to the user so that he is warned about possible problems and nuances of working with the site. To do this, such blocks are placed in visible parts of the site, for example, at the bottom or top of the page. Elements can be painted in dark or bright colors, depending on the site's palette.

But these blocks should not distract the user from the content part or destroy the overall concept of the site. Therefore, they try to make buttons on such blocks in the same style. The text on the elements should be short and understandable to users, otherwise the visitor may leave the site without understanding what the problem is.

The sidebar also often contains information blocks that reflect information about the company, ongoing promotions, and popular articles. When creating the design of such blocks, it is necessary to take into account the size of the sidebar. Typically, the sidebar takes up 20 to 40% of the total space on the page. Therefore, the blocks will be approximately the same width; too large text will not fit into narrow frames.

Due to the frequent placement of advertisements in sidebars, users often began to ignore the contents of the sidebar. To prevent this from happening, you need to make the blocks informative and useful for site visitors. To attract the user's attention to information, it is better to use small images, icons and other semi-decorative elements. If you remove them, the inscriptions will become less noticeable, and most users will not pay attention to the text. Blocks with links to social networks and the opportunity to get advice are often placed in the sidebar.

Information blocks on product cards play a significant role, as they are the main factor in the user's decision making. In the design of the product card there is a place to describe the characteristics, right under the choice of the quantity of the product and the button. When creating the design of information blocks in product cards, it is important for the designer to take into account the content of the text. It is necessary that the text is understandable to the user and answers his questions. Is delivery available to his region and how can he pay for the goods.

It is important that the descriptions and call to action (in this case the button) are visible to the user. To make it easier for the user to perceive information and navigate the page, you can use small images (for example, when describing the algorithm for further actions) and icons. When developing a product card, you need to pay attention to the presence of zoom on the page or the ability to select product characteristics using buttons.

Information blocks: post and Instagram Stories

A post is an information block posted by a user on a social network, blog, microblog or forum. Social networks use informational, entertainment, advertising (product) posts and information graphics. The main goal of the post is to encourage readers to like, share (repost), comment, or follow a link. Posts are posted on Facebook, VKontakte, Odnoklassniki, Twitter, Linkedin, Blogger, Google+, MySpace and Moi Mir.

Limit the amount of posts on social networks. Their length should not exceed 140-200 characters. A post published on a social network should contain only one call to action accompanied by a link. There should be advertising of goods and services, but at the same time it should be creative and valuable for readers of the text in the form of a bonus or useful information.

Shorten URLs and links. Long links clutter posts and give them a sloppy appearance, thereby reducing the quality of posts and reader attention to them. You can use a short link generator, such as Google Url Shortener. Each post

should have a picture attached that catches a person’s eye. It is better to distribute the days of the week among publications. To maintain a calendar, no special programs are required; it can be compiled in regular Excel.

Instagram Stories is a feature that allows you to post photos and short 15-second videos, add text notes and emoji to them. It disappears after 24 hours.

This feature was launched on the platform in 2016 and almost immediately became extremely popular among users. This is because the content is not stored forever. Users have more interest in photos and videos, which will soon be deleted forever.

Stories have two main modes. These are pictures and videos. There are many subspecies of them. If you click on the circle to record stories, you will see many modes. Using the standard mode, you can post both photos and videos. If you simply press the circle, a photo will be taken; if you hold it down, a video will be recorded. Once the content is ready, additional effects can be added to it.

Live broadcast is represented by an option located slightly to the right of the normal mode. If you drag the options ribbon to this value, you can start a live broadcast and communicate with subscribers live. This text mode allows you to post content. Users can choose the background color on which their text will be published. A small circle centered at the top of the screen represents the background switch.

The Boomerang option allows you to publish looped videos. When the video ends, it will immediately start again. Superzoom allows you to record three-second videos with enhanced dramatic effects. After recording starts, the camera's focus gradually approaches the subject. It is also possible to add special sound effects. Reverse Recording is similar to Boomerang in many ways, with the only difference being that the video is played in reverse order.

By choosing the hands-free mode, you can record a standard 15-second video in stories, only in this case you will not need to keep your finger on the mug all the time. You only need to click once to start recording. The library allows you to publish photos and videos from the user's device memory.

Instagram allows images in 9:16 format to be posted in stories. In a vertical screen layout, the size of story pictures is 1080×1920 pix. Videos can be downloaded in MOV, MP4 or GIF format. Its extension must be at least 720r. The file size should not exceed 2.3 GB. Photos and videos are stored in the archive and can be reactivated at any convenient time. Stories Highlights allow you to group by topic and pin important stories under your profile header. This way, subscribers always have access to important materials. Animated thematic stickers (gifs) can be attached to stories in order to diversify the content and attract attention to it. The GIF library is constantly updated. You can find the gif you need by entering a keyword in the search.

Several dozen excellent font options are available with just one click on the “Aa” button in the upper corner of the screen. Thanks to the text notes feature, you can write notes on 4 different backgrounds, and then publish them for everyone to see. The masks on Instagram are almost a complete copy of the masks from Snapchat, but who cares if the idea works and the collections are replenished and grow exponentially. A new method of promotion is being used by creating new masks. An image for the mask is invented. It is activated if it is approved by the Instagram administration, new people subscribe in order to get the filter they like into their collection.

The “swipe up” function to obtain this or that information is available only to large accounts with 10 thousand subscribers or more. It allows you to transfer followers to external sources, be it a website, a Google form to fill out, or anything else. The attention of developers to this category of content also fuels user interest. Instagram Stories allows you to publish content that cannot be published in other sections of the social network. Instagram developers are positioning Stories as a section in which you can publish not very important content about everyday life. For example, homemade or insufficiently high-quality photographs, which previously would have simply gathered dust in the archive, can now be shown to friends without cluttering up the feed.

Stories have become one of the most important categories for growing a business on Instagram. By publishing stories, you can reach an additional audience that comes to Instagram just to watch Stories. With posts in stories, you can advertise specific posts in your feed. Instagram stories allow you to add content that can increase audience engagement. Everything that is recorded in the “here and now” format is perceived more sincerely and arouses genuine interest among followers. Secondly, polls, links and many other features can only be attached to stories to increase engagement.

Official advertising from the social network is cheaper than in other channels. The Stories section is not yet as cluttered with commercial posts as the feed, so advertising content posted here is perceived less hostile and more often finds a response from the audience.

Even if the same person watched a video online several times, this indicator will count him as a one-time visitor. This is where coverage differs significantly from impressions. Therefore, before collaborating, you need to ask bloggers for statistics not on impressions, but on coverage. The total number of views may increase due to multiple views of your story from the same account. Scrolling back indicates that followers were returning back to previous material in order to see, listen to, zoom in, or examine it.

Instagram stories allow you to remind yourself more often. Unlike a news feed, there can be not just a lot of content in stories, but even a lot. In this case, a huge number of posts is not bad manners, but the key to competent SMM promotion. Unlike the news feed, posts in stories are published in chronological order, which means that the more often you post, the higher the likelihood of getting to the top positions in the search results.

It is recommended to publish at least 5-10 posts in stories per day. A similar number of posts on a feed can trigger unsubscription due to spam. It is important not to over-advertise the product offered. All published stories should give readers a WOW effect. When the account has more than 10,000 subscribers, an additional option to add a link will open.

This will allow you to send subscribers directly to a product page or lead page. This option can be used to provide links to contacts, for example, instant messengers and other social networks.

Links to accounts placed in this way receive more response from the audience than those placed at the top of the screen. Therefore, if necessary, you can attach a link to your profile to any story, which will increase the number of visits to the page. Eternal stories can be saved forever in the story album. This is a functionality with huge potential for promotion, because it can be used to present new company products; create a FAQ section with answers to frequently asked questions; create a menu; create a section with reviews; publish the terms of cooperation; write a section about yourself or about the company.

A properly completed account that uses stories can replace a full-fledged website. Instagram Stories is a convenient tool for conducting surveys. Only a minimum of effort is required from users to give an answer, and therefore the response is high.

Instagram algorithms have a special relationship with Direct. Communication between users in a personal format plays an important role in ranking posts in the feed. For the Instagram algorithm, personal messages contain a sign that the account does not belong to the category of bots, and the content offered on the page is interesting to users. Comments left by users under the story are automatically included in Direct. The activity of subscribers under published stories is more valuable for high ranking than activity under posts.

The more activity in Direct, the more actively Instagram algorithms will promote content in the user's feed. Users really enjoy watching the real life of a person or company. Such publications make the content sincere and increase audience loyalty to the brand. In live broadcasts, you can conduct master classes, present new products, and create question-and-answer sections. It is important to notify subscribers in advance about the date and time of the broadcast.

Digital Communities

There are several types of communities that are often confused - publics and groups. Although they may look similar and serve to communicate and share information, there are a few key features. The main difference between publics and groups is that a public is a one-way community where users can only read posts and comments, but cannot create them. Publics are created for the centralized dissemination of information; their participants are passive observers. They have the opportunity to subscribe to the public and receive its updates in the feed, but cannot take an active part in its content.

Groups, unlike public pages, provide the opportunity for active communication and interaction with other participants. In groups, users can create and comment on posts, exchange messages, upload photos and videos, and participate in polls and discussions. Groups can be public, closed or secret, depending on your privacy settings. Publics are more public and aimed at a mass audience, while groups are more focused on a specific circle of people with common interests or goals.

The public is an open community accessible to all users of the social network. A group may be closed or partially closed meaning that its content and members can only be accessed after a request has been approved. In a group, admins can manage members, assign different roles, and set permissions to participate in discussions and posts. In public, community management is limited. Users can only join and view content.

In a group, you can organize content into sections and categories to make it easier to navigate the community. In a public page, content can be presented in the form of a simple news feed without structuring. In a group, admins can send mass messages to all members, which is useful for disseminating important information. In public there is no such opportunity, since it is aimed at a wider audience and provides only one-way communication.

In the public page, users can subscribe to updates to receive notifications about new publications and comments. There is no such option in a group, and users can only join the community and view its content. A public page is often created to disseminate information, provide news, or publish interesting content to a wide audience. A group is most often created for communication and interaction between participants on a specific topic or interest.

A group may have a limited number of members, usually not exceeding several thousand. The group can be configured to confirm applications for membership, which makes it closed and controls the composition of group members. The public has no restrictions on the number of participants and subscribers and can gather a huge audience. In publics, the number of subscribers, which is displayed on the public page, plays an important role. If the number of subscribers to a public site is huge (often tens or even hundreds of thousands), this is one of the signs that it is a public site. People who are not even members of the public itself can subscribe to publics. You can join the group only after confirmation of your application.

Comments allow the user to express their opinion, ask a question, or simply support the author of the material. Comments allow you to create discussions and discuss topics of interest with other community members. This makes the public an active and lively space where users can interact with each other.

Groups can also offer commenting and discussion opportunities, but in publics this function is often more active and varied. Comments can be sorted by time or popularity, allowing users to find the most interesting and relevant ones. Community management provides administrators with ample opportunities to customize and improve the work of a group or public.

An important part of community management is creating rules for members. Administrators can set rules of conduct, define restrictions on posting content and comments, and apply sanctions to violators.

Community privacy settings are also important for management. Administrators can choose whether the group will be open or closed, and determine the

availability of content for different categories of users. This allows you to control the level of information availability and privacy of participants. Important community management tools include post moderation. Administrators can review and moderate posts, rate comments, and filter content to ensure the safety and quality of posts.

To improve interaction with participants, the capabilities of various functions and tools are used. These are voting, surveys, feedback, mass mailing of messages. Using these tools helps activate participants and develop community. Various settings are also available to control the appearance and functionality of the community. Administrators can change community templates, add widgets, configure notifications, and change moderation settings. This allows you to create a unique and convenient interface for community members.

Proper setup and management of a community allows you to develop activity, attract new members and ensure security, as well as create convenient conditions for interaction with participants and the development of the community as a whole. When creating public pages and groups, administrators have the opportunity to configure various notification methods and formats for their audience. This allows you to effectively inform subscribers about new posts, promotions, events and other events.

News feed notifications are the most common way to notify subscribers. When an administrator publishes a new post, subscribers see it in their news feed. Users can subscribe to the newsletter by email. Every time the administrator publishes a new post or event, subscribers receive a notification in their email. When using the mobile app, subscribers can set up notifications to appear on their mobile devices when new posts or events appear.

In addition to selecting the notification method, administrators can also configure the notification format. Text alerts are the simplest and most understandable alert format. The administrator writes the text of the post or event, and subscribers receive it along with the notification. Instead of using a text alert format, administrators can use images or photographs to grab users' attention

and make the alert more attractive. To create more interesting and memorable alerts, administrators can use video materials. Video alerts can be professionally produced videos or simple video prompts.

Methods of digital ethnography

The specific nature of conducting ethnographic research imposes certain limitations and introduces significant uncertainty into the research design and process. Digital ethnography involves the analysis of social constructions of cultural life through online virtual worlds. The nature of the ethnographer's contacts with the people being studied is more indirect than direct. Ethnographers have the ability to maintain relationships at a distance and it is not entirely clear where the temporal and spatial boundaries of fieldwork lie. For a significant portion of people, their devices (phones and computers) are an integral part of themselves, many use them constantly. It becomes difficult, if not impossible, to determine when a field study begins and when it ends.

Digital ethnography can be used to conduct in-depth research through long and lengthy conversations with interlocutors in virtual chat and video calling platforms. Such platforms provide an exclusive space for both the researcher and the interlocutor to express their thoughts without fear of external interference. Such discussions also allow researchers to overcome the problems of traveling long distances and make it easier for them to talk with different informants who may be located in different and quite distant places from the researcher.

Another significant limitation of digital ethnography is the peculiarity of people's behavior in the online environment. This is the Hawthorne effect, when the interlocutor behaves differently, knowing that he is being observed in the online space. This also raises the question of whether participants in the study group should be told that the research study is underway or should they remain silent about it to avoid triggering the Hawthorne effect. There are no ready an-

swers, and the solution to the ethical dilemma remains the personal responsibility of the researcher.

Online ethnography views the field as a network of interconnected sites, explores intricate networks of online relationships in online spaces, and engages in multiple meaning-making frames. There are several ways to engage with digital technologies, all of which have clear impacts on the research, the interlocutors, and the researcher.

Even when research is conducted online, it should not focus entirely on the digital aspect. The focus of digital ethnography should not be on technologies, but on the experiences of people or groups of people behind them.

Research design is shaped by the specific research questions, the institutional context, and the ways in which research participants interact with it, while being open enough to adapt to rapidly changing digital environments and technologies. Digital ethnographers perceive the world as a digital, material-sensory environment and must reflexively question how they produce knowledge. Digital ethnography recognizes and seeks ways to develop knowledge about social realities that might otherwise be invisible and unforeseen if the very presence of the digital environment were ignored.

Determining routes and locations, research tools and design, and research subjects are of paramount importance for conducting digital ethnographic research. The interaction between man and technology can be viewed from different aspects, reminiscent of either virtual sociology or the study of new media discourse. One of the research topics was digital violence.

Digital violence

Digital violence can take many forms. Cybernetic bullying is common in relation to children and adolescents, as well as cybernetic grooming, which hides the attempts of an adult to make friends with a child on a social network in order to enter into sexual relations. Women are victims of upskirting and slut

shaming. Anyone can suffer from intrusive and unwanted calls, messages, photos, the same dick pics, or be subjected to slander or threats on social networks.

Women suffer more often from digital violence. Men and women experience different forms of digital violence. Men suffer from insults and humiliation, women suffer from online stalking and harassment. In close relationships, digital violence can be especially difficult to detect because the abuser may disguise their actions as caring.

The main goal of violence in close relationships is to subjugate a partner to your will, satisfy your own needs for dominance, and establish yourself as the boss. In response to this, the second partner may have a fear of not calling back, not answering, not showing the social network. After all, this can lead to dissatisfaction with the partner, even greater pressure and escalation of violence.

In a healthy relationship, partners respect each other's personal boundaries. At the same time, people may have different needs for communication: someone wants to constantly correspond, for someone a call once a day is enough.

Digital violence can leave the same traumatic mark as more obvious violence in the form of insults, threats, and beatings. It can have an even greater impact because digital violence can be committed anonymously, anytime, anywhere. Because of this, the injured party may not understand the connection between the offender’s actions and changes in their psychological state.

For many teenagers, communication on the Internet has become an important part of their lives. In this virtual world, they enter into the same interactions as in reality, communicate with peers, trust them with their secrets, search for information and exchange it.

Children come into contact with strangers, make new friends, learn and develop value systems, play, and become very vulnerable. Virtual friends are usually strangers whom they trust and communicate with regularly. Consequently, most of the children’s time is spent on contacts with strangers, so the virtual world, as well as the real one, can become dangerous.

Cyberspace makes it possible to establish contacts with children without the knowledge of adults, which is often difficult to do in the real world. Criminals who prey on children in cyberspace most often establish contact with them in chat rooms, instant messaging, email or forums. They try to attract the teenager with attention, care, kindness and even gifts.

They are well aware of musical innovations and hobbies of modern youth. Therefore, teenagers often turn to virtual friends for help in solving problems. As a rule, these are children who do not find understanding with their loved ones, have difficulty making friends at school, in the yard, so they look for communication online. It is these children who most often suffer from violence, both in real life and in the virtual world.

An adult can go into places where teenagers gather, including chat rooms, forums, online games, etc., and observe and/or interact with the participants. It identifies potentially vulnerable children who appear lonely, upset or who are seeking help and support. The attacker listens to the problems of teenagers and sympathizes with them, gaining trust.

After establishing online contact, the adult can begin to convince the child or teenager to move from the public chat to a more private place. If the teenager agrees and continues communication, the adult can begin a more intensive grooming process. He begins to gradually involve the teenager in a discussion of intimate issues, showing materials of an overtly sexual nature, trying to weaken the moral prohibitions that hold back young people. Criminals are gradually assessing the possibility of meeting children in real life. Such tactics subsequently lead to the fact that the child does not resist receiving such materials and may agree to an offline meeting.

The targeted child may be involved in the production of pornography by sending photographs of themselves or through the use of webcams. Subsequently, this gives the offender an additional means of controlling the teenager, who can be threatened with exposure to a wider audience. Parents of a teenager can be subject to blackmail, especially if the child is from a wealthy family.

Cyberstalking of a targeted teen can be done through telephone text messages, pictures, emails, online discussion groups and personal web pages.

The specifics of virtual space contribute to the involvement of adolescents in the persecution of peers. Websites are being created dedicated to students who, for one reason or another, have become “outcasts.” They are sent anonymous offensive and threatening messages, have compromising photographs posted on the Internet, and indecent rumors are spread, accompanied by unfounded derogatory comments. On behalf of one or another teenager, offensive messages are sent to other peers, often accompanied by photographs.

The effects of this type of violence can be extremely devastating as teenagers may also begin to have difficulties with interpersonal communication and may feel like they have nowhere to hide. They are afraid that their humiliation may be watched by a large audience in cyberspace. Victims of bullying themselves begin to harass other teenagers.

Many teenagers do not report harassment because, firstly, they do not believe that adults are able to understand and help them; secondly, they are afraid of subsequent even greater bullying; thirdly, they fear that they will be prohibited from using a computer. The proliferation of the Internet increases the likelihood that children and adolescents may be exposed to age-inappropriate and harmful material. Teenagers receive information and invitations to suicide clubs, offers to join destructive sects, and take part in unconventional forms of sex. A new danger has emerged in the form of so-called “digital drugs”.

Products of a sexual nature are the most common. Most often, teenagers accidentally come across pornographic images, but some receive these images from potential criminals, and others deliberately go to porn sites. Regardless of how a child receives age-inappropriate materials, he or she will be harmed. For most children and adolescents, explicit sexual materials cause concern and anxiety, but for some children, viewing pornography later becomes an incentive to participate in the production of pornographic images. Child pornography on the

Internet is becoming rampant. The production, distribution and use of child pornography or child sexual abuse material is a type of child abuse in cyberspace.

Child pornography is one of the most profitable types of criminal business. It is part of sexual abuse, child trafficking for the purpose of sexual exploitation. Digital cameras make pornography easier and cheaper to produce while reducing the risk of detection. By combining two images into one, non-pornographic images of children are constructed into pornographic images, creating images of virtual children.

Children and teenagers use webcams, digital cameras and telephone cameras to create pornographic images of themselves, their friends and peers, and then transmit them into virtual space. This happens under peer pressure or at the request of strangers. Miniature cameras allow you to take photos and videos without the knowledge of the subject.

Child pornography can be produced offline and then circulated in cyberspace. Or it can be done by filming the sexual abuse of a child in real time in front of a live online audience using webcams.

The risk of encountering any form of cyber violence exists for children and adolescents from all social strata, no matter whether the children use the Internet or not. Those who do not yet have access to the Internet may become victims of child pornography offenders or be subject to harassment and intimidation via mobile communications. Victims of violence in cyberspace are most often children who suffer abuse in their physical lives.

Children from wealthy and apparently prosperous families are involved in the production of porn, who believe that participation in porn filming is fashionable. Teenagers are ready to take their own “erotic” photos and post them on their websites or send them to virtual friends.

Recording child abuse gives the abuser power and control. It has a profound effect on the child. It creates fear, which then makes it possible to exploit the child. Often, images of violence against one child are used to break down the resistance of another child who is being groomed to be abused in the future.

In all countries, the production and distribution of child pornography is criminalized. In the Republic of Belarus, amendments were made to the Criminal Code in November 2008. In accordance with the changes, the maximum sentence for this type of crime provides for 13 years of imprisonment (see Appendix 1, Articles 343, 3431 of the Criminal Code of the Republic of Belarus). Responsibility begins at age 16.

Just like in the real world, a child protection system must be created in cyberspace. A new and effective mechanism for suppressing violence in cyberspace can and should be the formation of an information culture among teenagers, teaching them the rules of safety in cyberspace. It is also necessary to create and implement training programs for adults, including specialists.

By communicating online, children can meet, communicate and add as "friends" people completely unknown to them in real life. In such situations, there is a danger of the child disclosing personal information about himself and his family. The young user is at risk of abuse, intimidation and harassment. Establishing friendly relations with a child for the purpose of meeting in person (grooming), entering into sexual relations with him, blackmail and exploitation can become especially dangerous. Such acquaintances most often occur in a chat, on a forum or on a social network.

When communicating in person, the attacker, most often introducing himself as a peer, gains the trust of the minor, and then tries to find out personal information (address, phone number) and arrange a meeting. Sometimes such people lure information from children, which they can then use to blackmail the child, for example, asking them to send personal photographs or provoking them to perform indecent acts in front of a webcam.

The word bullying is used in pedagogical literature as the name for the constant and persistent influence of a student or students on another student and other students, with the goal of excluding the victim from the peer group. The main forms of cyber violence are stalking, intimidation, blackmail using the Internet, publishing and sending mocking and compromising messages, pictures

and videos, as well as acting on the Internet under someone else's name against his will. The lack of fundamental pedagogical and legal experience in the field of countering cyber violence and legal prosecution of aggressors, as well as the diversity and dynamics of its forms, leads to the fact that this area remains in the shadow of other phenomena in the rapidly developing world of media and electronics.

The fight against cyber violence is complicated by the fact that the generation that must fight it, that is, parents and teachers, often does not realize the importance of the problem and is less versed in computer science than the recipients of electronic violence. The first media messages related to the phenomenon of online violence against peers appeared at the beginning of the 21st century. Harrasment, or electronic mobbing, differs from a war of curses in its duration and the ability to clearly identify the attacking and attacked sides.

Slander, defamation (eng. denigration) - distribution, sending via SMS, messengers, social networks or email of false information about a given person or edited photographs (usually of a sexual and compromising nature). Young users are most sensitive to the publication of compromising materials (videos or photographs) on the Internet.

Exclusion is based on the removal of an individual from the Internet community, which is equivalent to exclusion from the reference group. Cybernetic ostracism negatively affects the emotions of young people ("virtual death"). Cyberstalking is a form of cyber violence that is generally taken most seriously; acts as an element of traditional persecution (stalking).

Technical aggression is based on actions that are aimed at computer equipment belonging to the victim and are associated, for example, with sending a huge number of letters or files leading to blocking of the system, sending software that allows you to connect to the victim's computer, hacking computers and destroying / changing files .

Motivations for youth to engage in cyberviolence are often related to developmental factors. Young people want to feel a sense of belonging to a group

and the approval of their peers, and they strive to be attractive to the group. This leads to the fact that the young person is not guided by independently developed moral assessments, but reproduces the activities of the group, even if this activity violates the norms accepted in society.

Often the factor that drives a young person's behavior is the fear of becoming a victim. In order not to become a victim, he begins to play the role of an aggressor. The aggressor is strong, he is respected, he is not afraid and arouses a feeling of fear in others. The subject of cyber violence is often an individual with low social competencies: he is not able to attract attention (which he needs) and realize the needs that are important to him using accessible and socially approved communication methods. For such an individual, group assessment is extremely important; he wants to attract attention immediately, without waiting for the recognition deserved by traditional achievements.

The problem of helping teenagers is due to the fact that the generation of thirty-year-olds does not understand computer slang and does not know what teenagers watch, for example, on Youtube. They do not know that so-called YouTubers shape the worldview of young people and often determine their aggressive behavior online.

Stalker software

You cannot use stalker software without the consent of the person being spied on. The use of such techniques is a violation of confidentiality and a form of technology abuse. With the help of stalker software, people secretly monitor the private lives of other people. Such programs are often used for psychological and physical violence in relationships. These are commercial programs. With their help, you can access a large amount of personal data, including device location, browser history, text messages, social network chats and photos.

Stalker software applications are less common on iOS devices than on Android devices, since iOS is traditionally a more closed system. Attackers can

bypass iPhone restrictions using jailbreak, but this requires physical access to the phone. For abusers, it is another tool that allows them to share dangerous material or engage in behavior that can cause emotional, psychological or physical harm. Information technologies allow people to maintain social and emotional connections even over a considerable distance, but at the same time they can be used for cyber violence, and its negative consequences extend to the real lives of victims.

Mobile spies try to act unnoticed by the user, and yet most of them, one way or another, manifest themselves. The mobile Internet package ends earlier than expected, and the battery runs out faster than usual. This is a reason to be wary and check which applications are particularly active in using phone resources. Wi-Fi, mobile Internet or geolocation suddenly turns on. You need to see which programs consume traffic and have access to the user's location. There is a separate post about checking issued permissions in Android. You can read about permissions in iOS on the Apple website.

If the user has an Android phone, then you should check which applications have access to "Accessibility" (Settings -> Accessibility). They give applications the right to "spy" on other programs, set settings at their own discretion, and do much more as if on behalf of the user, which is why spies love them. Accessibility is one of the most dangerous permissions in Android and should only be given to an antivirus. Due to the controversial legal status of some mobile spy applications (stalkerware), many security programs call them not-a-virus, but still warn about them.

Some surveillance applications notify the user that an antivirus has appeared on the device. Helps users identify the TinyCheck spy. This is a discreet system for detecting spy apps on Android or iOS. TinyCheck is installed not on a smartphone, but on a separate device, for example, on a Raspberry Pi microcomputer. Therefore, a spy app on your phone will not be able to notice it. This separate device must be configured so that it acts as an intermediary between the router and the Wi-Fi-connected gadget.

Internet traffic will pass through TinyCheck, and it will be able to analyze it in real time. If your smartphone sends a lot of data to known spy app servers, TinyCheck will notice this and warn you. If spyware is found on your smartphone, there is no need to rush to remove it. The one who installed it will quickly notice, and removing the spy could lead to an escalation of the conflict. In addition, evidence may be needed, and if you delete the program, there will be no evidence left.

It is worth changing your smartphone and making sure that surveillance applications do not get onto your new device. You should protect your gadget with a strong password and not share it with your partner, friends, or colleagues.

You need to install a reliable security solution on your smartphone and scan the device regularly. You also need to change passwords for all accounts and not share them with anyone. You need to download applications only from official sources, for example from Google Play or AppStore.

Spy apps are used to spy on a partner; they contribute to gender-based and domestic violence and harassment. Due to the scale of the threat posed by surveillance software, the Anti-Stalkerware Coalition was founded in November 2019. The main goal of this union involves combating the use of technology for criminal purposes. To achieve this, the Coalition seeks to unite the efforts of organizations fighting domestic violence and the IT security community.

Cyber violence includes bullying, sexual harassment and stalking (stalking) committed through the use of electronic information. The increase in the number of cases of remote mental violence and their unequal legal regulation determine the relevance of the problem.

Cyberharassment, according to interviewees and most scientists, is one of the most dangerous forms of remote violence, therefore it is advisable to provide for criminal liability for such an act. Criminalization should cover cases where sexual harassment does not involve the use of threats, blackmail or dependence. This requires the correct definition of remote sexual harassment, since it is likely

to either affect socially acceptable behavior or miss types of socially unacceptable behavior.

Electronic stalking is a less dangerous form of cyber violence, so its criminalization may be justified if there is a likelihood of harmful consequences or serious violation of human rights. The intrusive presence of a person in electronic form should not be the basis for applying criminal legal measures against him. Since such actions are not socially acceptable, the use of administrative liability may be sufficient to limit them.

Electronic bullying comes in many forms and can cause significant harm to society. Therefore, the possibility of applying criminal legal measures should be allowed depending on the content. Actions aimed at inducing suicide or inciting hatred towards social groups must be strictly punished through the application of criminal law. If we are talking about insults, including systematic ones, then perhaps the use of administrative and legal measures will be sufficient.

Digital aggression is the pressure that the digital environment exerts on the human psyche. Any user is at risk and can become an object or even a victim of aggression in the digital environment. The problem exists at both the technical and humanitarian levels. That is both the devices, their interfaces and programs, and the people themselves who use these media for communications are under pressure.

The intensity of pressure can have different consequences: from mild irritation and fatigue to nervous breakdowns, psychosis and suicide. In addition to obvious cruelty, there are also various forms of gadget addiction, aggressive forms of behavior (trolling, cyberbullying, “attacks,” bullying) and harsh communication formats at the level of the media and the content they distribute (information wars, propaganda campaigns, shocking advertising). These are devices, as well as sites and applications that work with personal space, to which users trust secrets and personal information.

At the physical level, the gadget requires the owner to maintain it in certain conditions (temperature, humidity, cleanliness), comply with the rules of

use and safety, have a sufficient amount of energy and regular recharging, update applications, protect against unauthorized use and repair in the future.

The aggression of devices is promoted by aggressive forms of advertising and marketing that create or justify an imaginary need for technological innovations, set standards and fashion for their use.

Various currents of resistance to digital slavery have emerged. Among them are Digital Detox (a temporary refusal of digital interactions), Digital Asceticism (a rejection of digital forms of communication), Slow Communication (unhurried face-to-face conversations). The degree of frankness, cynicism and cruelty seems to correlate with the degree of anonymity of users. People are much more willing and easy to stoop to outright insults when communicating online due to the illusion of inaccessibility. The most common form of cybercrime is the theft of funds from citizens' card accounts. Moreover, in most cases, these crimes become possible as a result of the careless actions of victims who provided access details to their bank accounts.

Criminals use a specially created website with a form for entering bank account access details and a pretext communicated to the victim for going to this website and filling in payment details. Criminals use password guessing or phishing to gain unauthorized access (hacking) to social network pages, primarily VKontakte. Users added to the "Friends" section of the hacked page are sent messages asking them to provide a photo or bank card details under various pretexts. Also, an attacker hiding under the name of a friend may ask to transfer a certain amount of money to his card due to a sudden difficult life situation.

A gullible user, believing that he is communicating with the real owner of the page, transfers money or tells the criminal the details of his bank card (and often the security code sent in an SMS message by the banking institution), after which money is stolen from his card account. Vishing is expressed in making a call to the subscriber number of the victim or to his account in a messenger (mainly Viber or Telegram).

During the voice communication, the criminal introduces himself as an employee of the bank or law enforcement agency (the Ministry of Internal Affairs, the KGB, the Investigative Committee) and, under a fictitious pretext, finds out from the victim information about the availability of bank payment cards, their expiration dates, CVV codes (three-digit code on the back of the card), passport details, SMS codes in order to steal money. In some cases, the attackers know some details of bank payment cards, as well as the personal data of the persons in whose name they were issued. In most cases, criminals use IP telephony when making calls.

A form of Internet fraud is the placement of advertisements by criminals on virtual bulletin boards, thematic sites, social networks, and Internet messenger groups about the sale of any goods at "throwaway" prices. However, in order to receive the goods (allegedly by mail or delivery service), an advance payment or deposit must be transferred to the bank card or e-wallet specified by the "seller". After the transfer, the expected goods never arrive, and the "seller" stops communicating.

Attackers can threaten to disclose various incriminating information for the purpose of extortion. For example, having obtained unauthorized access to Internet resources (social network pages, e-mail correspondence and cloud accounts) and having taken possession of images not intended for public viewing, criminals enter into correspondence with the victims, demanding various amounts of money and threatening to distribute them on the Internet in case of refusal. Requests to top up a certain mobile phone number or payment card are also used; a call from a friend's or relative's number, in which the interlocutor claims to be a law enforcement officer, asks for a reward, promising to prevent the initiation of a criminal case against a loved one; when a fraudster calls and immediately cancels the call, calling back to the number displayed, the subscriber hears an answering machine or beeps, at this time money is debited from his mobile phone account, since the call is made using call forwarding to a paid number; when an SMS message arrives about some kind of win, after which the

subscriber is offered to send a paid message in response or send a small amount to a bank card to receive the "winnings"; when an SMS message arrives with a hyperlink, by clicking on which the user starts the process of downloading a virus; when a call comes from a "representative of a cellular operator", during which the attackers offer to re-register the SIM card, while the user enters a special code or sends an SMS message, after which money is debited from his mobile phone balance.

These are cases when an SMS message or a call is received stating that the subscriber has not paid a fine. After this, the person is asked to pay it by transferring money to a “special” bank account or by replenishing a bank account; when an SMS message is received with information that the payment card has been blocked, and a number is indicated by which one can get a certificate or assistance; after the call, the subscriber is asked for a PIN code, CVV code (three-digit code on the back of the card), card number and other data necessary for withdrawing money from a bank account.

Digital blackmail

The essence of such blackmail is that the victim is forced to perform certain actions, often of an overtly sexual nature, threatening to distribute her own photographs or videos (also often intimate), obtained by the blackmailer, as a rule, without authorization. In some cases, fraudsters do not disdain money. An attacker can install spyware on the victim's device, which will quietly copy all available photos or even turn on the camera, and then transfer the images to a remote computer.

This can be done with a regular PC, as well as with a smartphone or tablet, which also have a camera. If there is no direct access to the device, nothing prevents the fraudster from making the victim install the necessary software without noticing it: for this, you can use, for example, phishing or social engineering. Often, espionage is not required. Often, sexual extortion is carried out

by former partners who accidentally or maliciously saved some photos and videos that came to them before the breakup. It happens that an attacker gains access to other people's data by stealing a computer or mobile device.

On each person's computers and smartphones, you can find something that can be used against this person: documents, notes, letters, financial information. The main thing is not to store any information that can be used for harm.

Unauthorized activation of a webcam can be prevented. You can either turn it off when it is not in use, or install security software that will prevent intruders from accessing the camera.

So-called digital blackmail is widespread. Intruders gain unauthorized access to computers that contain important information and encrypt important information using cryptographic methods. Criminals demand up to a thousand dollars for the key used for decryption.

To hack, intruders find "weak spots" in the access passwords used by employees, or send emails to organizations that are disguised as official documents. Such notifications contain malicious code that allows unauthorized access. Afterwards, it is almost impossible to decrypt files without the appropriate key, since the strength of modern crypto algorithms guarantees tens of years of direct enumeration.

Employees of the organization that have been attacked in this way simply do not understand what is happening, automated accounting programs do not start, and official documents become inaccessible. As a rule, the attackers leave instructions on further actions, which contain contact information (e-mail address). During communication, they provide payment system details.

The owners of blocked information remain hostages of the attackers even after payment since there is no guarantee that they will provide the decryption key. To pay or not to pay: in each situation, it is up to the owners of the information to decide, but law enforcement officers recommend contacting the district police departments for each such incident.

The best way to combat digital blackmail is to follow simple information security rules. Here are some of them:

1. Use complex passwords consisting of letters and numbers;

2. If possible, do not connect computers containing important information to the Internet, and if this is unavoidable, do not use the standard settings of the remote desktop service to organize shared access;

3. Be sure to create backup copies of important information on other media;

4. Define a clear circle of people allowed to access important information and change passwords during personnel changes;

5. Do not run files received from unknown sources on computers. Do not open files with active content received by email, no matter what they are called;

6. Do not visit unknown sites with suspicious content on computers with important information.

Main types of cryptocurrency scams Fake sites: Fraudsters create fake platforms for trading cryptocurrency or fake versions of official crypto wallets in order to deceive unsuspecting users.

Phishing: to an email address or to a specific account. Next, the citizen enters their identification data, which allows them to log into their wallet. Once the attackers receive this information, they steal funds from the wallet.

Blackmail: Fraudsters send emails in which they claim to have information that compromises the user, such as evidence of their visits to adult sites, which they threaten to disclose unless they receive the private key to access the crypto wallet or a ransom in cryptocurrency. The use of cryptocurrency in the criminal environment is facilitated by: decentralization and anonymity of the transactions; use of cryptographic (specially encoded) methods of protecting information; completed transfers cannot be reversed; "tangled" transaction chains; the cross-border nature of such activities.

How investigators solve crimes using cryptocurrency: analysis of block explorers of "blockchain" networks: both manual analysis and with the help of special software tools; open source intelligence (OSINT) – detection of men-

tions of a crypto wallet address, transaction ID (hash) and other “blockchain” identifiers on network resources; investigators’ work with “big data” (Big Data, digital information arrays), their monitoring, collection, analysis and use in investigative activities; cooperation with crypto exchanges; analysis of information contained on computer equipment and other digital media seized during the investigation; use of specialized databases of the Investigative Committee.

In order to avoid getting caught up in various criminal schemes, you need to follow basic recommendations for safe investing in cryptocurrency.

For example: assess all the risks of carrying out activities with cryptocurrency (under your own property liability); analyze the services provided by crypto platform operators, cryptocurrency exchange operators (through reviews, recommendations about them, through personal requests); study how to store and exchange digital assets on selected platforms and services; use and promptly update antivirus software against spyware and malware; do not invest in one type of digital assets. Do not respond to dubious offers of "successful" investment in digital assets, follow phishing links and provide data that provide access to the wallet you are using.

In the Republic of Belarus, the legal conditions for the use of virtual currency are created by Decree No. 8 "On the Development of the Digital Economy", signed by the Head of State back in late December 2017.

Cryptocurrency is not a means of payment. The Belarusian ruble is used on the territory of Belarus. Salaries in digital money are not provided for in our country. At the initiative of the Investigative Committee, the Decree of the President of the Republic of Belarus dated February 14, 2022 No. 48 "On the register of addresses (identifiers) of virtual wallets and the specifics of cryptocurrency circulation" enshrined the principles of cryptocurrency circulation in criminal proceedings. A number of new regulations came into force on May 14, 2022.

Haters

Haters are people who write unmotivated angry, offensive and aggressive comments, posts and messages on social networks. Aggression can be directed at either an individual or a group of people. There is still no single understanding of it haters are. The name was given by people who began to encounter negative comments on the Internet. They used an existing word: in a broad sense, a hater (from the English hate - hatred) is a person who hates something. Of course, people who actively express their dislike for someone or something were born and live not only on the Internet. But hating flourished on the Internet.

Hating is different from criticism, which has a basis, albeit subjective. The critic can list the arguments that underlie his point of view. Constructive criticism, unlike comments from haters, can even be useful. Hating is distinguished by the lack of evidence and, especially, objectivity. The goal of haters is not to have any rational dialogue with the person they are paying attention to.

The main thing for them is to give vent to their emotions. The maximum task is to become noticed and provoke a negative reaction in the object of the attack. Watching successful people on the Internet, a person becomes even more convinced of his own failure. He often sincerely believes that someone really lives an ideal life, while he himself drags out a miserable existence.

Social media profiles have become new business cards. For influencers, models, fitness bloggers, this is also a portfolio in which there is no place for unsuccessful shots. Their good shape is a qualification that allows them to sign new contracts. There is a whole variety of filters, applications and other tools for transforming reality into a flawless picture.

A person who lacks upbringing or empathy does not always fully control their emotions and forgets about the personal boundaries of others. In real life, they have to take into account the norms of society and keep themselves within limits. Within the virtual environment, they care much less about controlling

themselves and are weakly or not at all aware of the consequences of their actions in real life.

Sometimes a person just gets bored and wants to try themselves in the role of a villain through their digital phantom.

Hate following partially explains the popularity of, for example, Instagram. The platform allows you to turn your phone into a pocket station for generating emotions. When a person subscribes to a blogger and watches them every day, they form a strong emotional attachment. And the brain does not care whether it is positive or negative: it wants to continue to feed this attachment and continue to receive emotions.

Before Instagram, tabloids took on a similar role, allowing you to follow the lives of celebrities, offering readers content for admiration and condemnation. Paparazzi stalked celebrities to capture them in their best outfits at film festivals or, on the contrary, tired, unkempt and unprepared for attention. Now Instagram has become, in a sense, a global tabloid, which is "scrolled" by millions of people every second. It is quite natural that some of them, consciously or not, come to produce a little "pleasure hormone" for themselves.

The motives that prompt haters to leave negative comments have always existed. But with the development of social networks, it has become especially convenient to show toxicity. This is due to the specifics of the digital environment. The virtual form of interaction and anonymity give courage and wash away psychological barriers that in the real world would limit the manifestation of inappropriate emotions in communication.

Leaving toxic comments to influencers, for example, living on another continent, is not difficult and does not pose much risk. Especially if you create an account with a different username. Users often do not understand the possible consequences of their actions on the Internet and do not realize that a virtual crime can lead to a real punishment. This is gradually changing: more and more countries are now adopting laws that provide for liability for insults or slander on the Internet. Algorithms will be able to truly effectively recognize comments

with hate content only in 5-10 years. Depressed people, deprived of support, but with a lot of free time, have become more active in hating on the Internet. Most haters are deeply unhappy people who are angry at the whole world.

Trolling is a form of social provocation in the online community, the purpose of which is to ignite conflict or manipulate public opinion. It is especially important for trolls to get an emotional response from either the owner of the page or his subscribers. The subject of trolling is not necessarily directly related to the owner of the site on which it takes place, and can concern broad topics that concern the maximum number of people.

Haters can be situational. But there are also regular haters who follow the page for a long time and methodically leave negative comments. As a rule, these people have a lot of free time. They do not find a better use for it than to try to ruin someone else's day, even realizing that, most likely, their comments will disappear into thousands of others. In some cases, messages with hateful content go beyond just insults and can become a tool for cyberbullying. Sometimes social networks are deliberately used as a tool for settling personal scores.

Firstly, social networks allow you to get contacts of the victim's circle, which can become a field for manipulation and blackmail, for example, if the hater has obtained some compromising information. The second point is the convenience of stalking, when a familiar victim can continue to be insulted from a distance and literally not give her a break. This problem is especially relevant among teenagers and young people for whom social networks are an integral part of life. Generation Z or people born after 1996 do not know the world without social networks. It is logical that their conflicts often spill over from offline to online. The fragile psyche of teenagers is especially susceptible to negativity online. Not only people, but also businesses can fall victim to haters' attacks.

There are examples when companies were hit by waves of negative comments or flash mobs were launched calling for a boycott. Often, such attacks are the result of erroneous or too risky marketing moves. At the same time, inconsistency in PR strategy can attract haters from different camps. The most reliable

way to get rid of an obsessive hater is to block his access to the page. Restricting a person’s actions is another tool that disarms the hater, making his comments invisible to other users.

Digital Market Manipulation

The Skinner-box marketing theory is based on an academic concept called "digital market manipulation". In the original theory, market manipulation is influencing the market by illegal means. At the same time, creating a situation where people act in a way that is not most beneficial for them selves is unpredictable. The drama lies in the fact that the transition of commerce to the digital plane opens up the opportunity for companies to interact with customers on a personal level. Companies can increasingly exploit human weaknesses and profit from the irrationality of human actions. It should be noted that the implementation of such manipulation via the Internet more often achieves its goal. Such technologies are usually called "dark patterns".

Dark patterns come in different forms: these are not mistakes at all, they are carefully worked out with an excellent understanding of human psychology, but their main goal is not related to satisfying the needs of the user.

The largest archive of dark patterns is the Internet resource darkpatterns.org, which contains “excellent” examples created to deceive the visitor. The authors of the site distinguish at least 14 categories of dark patterns. Let's consider some of them.

The black pattern “Turn on to turn off” functions as an anonymous device identifier for personalizing advertising IDFA (Identifier For Advertisers). In essence, we are talking about a function that allows advertisers to collect information about the device owner for more accurate targeting. Not only was the tab for turning off this function cleverly hidden in the device menu, but the wording of the switch (Limit Ad Tracking) can be confusing.

By default, it is set to “off”, which means that the collection of information is not disabled. To turn off this function, the engine should be turned on. Of course, most users, if they got to this tab, left it untouched, thinking that tracking was off, while on the contrary, it remained on.

The black pattern "Fake questions" consists of a non-trivial formulation of questions. It seems that you are being asked one thing, but in fact, the question is about something else. For example, you register on some resource, and as usual, you are asked to subscribe to an email newsletter. Usually, webmasters just offer you to check the box and click the "Subscribe" button. This is common.

Another thing is when you are asked to check the box if you do not want to subscribe to the newsletter. And if you do not check the box, you automatically confirm your consent. Most do not check the box, being sure that this action will "subscribe" them to the newsletter, but it turns out differently.

The black pattern "Forced renewal" is as follows: at first, you subscribe to a trial version of the service, usually free. After this period, the system automatically switches you to the paid mode and starts writing off money from your card. But there is nothing illegal here: you just forgot to uncheck the automatic renewal function. Usually, the message about this is in small print, and to turn off automatic renewal, you need to dig around in your account settings for a long time. The black pattern "Change of Focus" looks like this: you click on the link where you can download the file you need, and you get to a page where the resource owner offers you the benefits of paid use of the service. The link for paid download is also placed here. The link for free download of files is located just below (it is usually not very visible), or it appears a little later.

Violations of ethics in advertising are common. Read any book about the history of advertising to see what tricks were used and are used today. It is much easier to deceive and remain unpunished here.

Creating a sense of scarcity is a fairly common practice in Internet marketing. The client is intimidated by the fact that the product, which he may have liked, will be sold out very quickly, and he has only a few moments to make a

profitable decision. On the one hand, time is limited and a sense of scarcity is created. This is an effective persuasion technique. But the most harsh and aggressive version of it is widespread on the Internet. As a rule, there is no scarcity, and the manufacturer of the product simply manipulates people's emotions.

Usually, the author addresses the recipient with the words that the monthly subscription to the course has ended and there are no more free places available. Paradoxically, the annual subscription is still open. How this can be - it is not clear why this method of manipulation is effective - either.

Distracting criticism is common in the information business, but it is gradually becoming popular in other niches. The point is to reduce the level of skepticism of the buyer towards the offer and to form the impression in the person that the product is trustworthy and genuine.

AI Bias

As companies expand their use of artificial intelligence (AI), questions have arisen about why human biases creep into AI systems. This is especially true for multinational corporations that operate across continents. An example of bias is discrimination in hiring and promotions.

AI systems, such as resume screening tools or algorithms used to evaluate employees, can unintentionally favor certain groups while discriminating against others. This has a significant negative impact on diversity and inclusion in the workplace. If the data used to train an AI model is biased against women or minority groups, the AI system may perpetuate this bias by recommending fewer candidates from these groups for interviews or promotions. This perpetuates inequality and limits human opportunities.

Bias present in AI systems can lead to the exclusion of certain social groups, deepening the divide in society. Facial recognition software that primarily works on people with light skin creates a consequence whereby people of color may be effectively excluded from services or opportunities based on this

technology. This exclusion not only marginalizes these groups, but also limits their participation in various aspects of the workforce. It is critical to create a truly inclusive environment.

AI bias hinders the creation of a diverse workplace, which has far-reaching consequences. When AI-powered solutions exclude qualified people from underrepresented groups, organizations miss out on the benefits that diversity provides. These benefits include increased creativity, better problem solving, and the ability to attract and retain talent. By allowing AI bias to persist, organizations limit their potential for growth, innovation, and success.

Biased AI systems not only impact the workplace, they also reinforce harmful stereotypes and social biases. Such perpetuation can have profound cultural and societal consequences. When AI systems perpetuate stereotypes or discriminatory practices, they contribute to a society that is less inclusive and fair.

Organizations that ignore AI bias in their work practices expose themselves to legal and reputational risks. Unfair decisions made by AI can lead to discrimination lawsuits and significant damage to a company's reputation. Such consequences can have a direct impact on an organization's bottom line and its standing in its industry. It is imperative that organizations prioritize eliminating AI bias to mitigate these risks and promote trust and fairness in their operations.

Optimizing the data used to train AI models is a fundamental step in reducing bias. Organizations must ensure that their data sets are diverse and representative of all employee groups. This means actively seeking data from underrepresented groups and collecting data in a way that avoids bias. For example, when hiring, it's important to ensure that training data includes resumes and profiles of candidates with diverse backgrounds.

Regular and ongoing monitoring of AI systems is vital to identifying and addressing bias. This involves implementing audit mechanisms that assess how decisions are made. Auditors can compare the actual results of AI decisions with expected fair results and identify any discrepancies. When bias is detected, corrective action should be taken immediately to retrain models and adjust algo-

rithms. Involving diverse teams in building and testing AI systems is an effective way to ensure that the technology is fair. Diverse teams bring a mix of perspectives, experiences, and cultural knowledge, making them more sensitive to potential biases in both data and algorithms. They can challenge assumptions, identify unintentional biases, and offer different perspectives to improve fairness and inclusivity.

Using fairness-aware machine learning techniques is a specialized approach to reducing bias during model development. These techniques explicitly incorporate fairness metrics into the training process, ensuring that models are simultaneously optimized for both accuracy and fairness.

Data Ethics

The main ethical dilemma is the choice between observing the rights of citizens, the interests of social groups, society, the state, on the one hand, and creating new products, services, opportunities directly or indirectly related to the use of data, on the other. The maximum number of risks arise when collecting, analyzing and using the results of analyzing people's data, and these risks are concentrated in three areas: data processing using AI, video surveillance, and online surveillance. The most widespread risk is the violation of privacy.

The development of some technologies, primarily AI systems, is highly dependent on the availability of certain types and sets of big data. Big data and technologies for processing them are used to create not only purely commercial, but also socially important research projects. The need to protect personal data present in data sets often limits the ability of scientists and developers to use big data in the field of healthcare (health data is considered sensitive), public and personal transport, if facial recognition and surveillance of citizens are provided. The most experienced technologically advanced participants in the data market are data corporations.

These are large IT companies such as Microsoft, Amazon, Apple. Their existence became possible due to access to a huge amount of user data. Companies extract super profits by collecting, processing and selling user data. Data is their main resource and source of income. Most ethical problems associated with data arise due to the enormous cost of citizens' data and the enormous interest of corporations. In order to increase profits, corporations violate the rights of citizens when processing their data.

Data corporations collected and processed millions of audio recordings, which in addition to oral commands to voice assistants and "smart" speakers, included fragments of conversations and other sounds. The recording was carried out automatically, without warning users, and the data was used to train AI to recognize human speech. The state is the guarantor of human rights, therefore, when regulating data circulation, it must ensure compliance with ethical standards and at the same time take into account issues of national security. Then a dilemma arises: what is more important in a situation of conflict of ethical standards: the interests of individual citizens (primarily, privacy) or the interests of society and state security?

For the development of AI technologies, it is necessary to use data collection and processing technologies. The relationship between AI and data is almost 100%. The main question is: how to use the maximum amount of data with a minimum of risks? Thanks to modern computing power, AI technologies can analyze huge amounts of data and find complex and deeply hidden connections.

Thanks to the collection and analysis of big data with the help of AI, technology giants are able to build correlations that a person himself cannot yet understand. At the same time, complete data, even if they are conditionally depersonalized, can indicate a specific person, his relatives, profession.

Completeness of data is critical for the successful development of intelligent systems, but is potentially dangerous for privacy and human rights. Thanks to the collection and analysis of big data with the help of AI, technology giants

are able to build correlations that a person himself cannot yet understand and build, for example, based on his search queries.

Excessive restriction of access to data complicates and slows down the development of AI technologies based on both machine learning and other methods. Thoughtful legislation and careful law enforcement would allow maintaining a balance in regulating the volume and degree of anonymization of personal data without introducing numerous prohibitions. But such legislation has yet to be created.

Data collection "by default" is carried out when a person uses mobile devices, the Internet, and IoT devices. It is believed that the data that users post on free social networks, in correspondence in messengers, and leave as a digital trace, belongs to the people themselves. Data corporations manage this data only because they own the sites on which this data was left, but in practice this is not the case at all. For data corporations, user data has practically become a free and almost unlimited resource for making a profit.

The standard mechanism for obtaining consent for the processing and storage of data is gradually becoming irrelevant due to the impossibility of controlling this process, and with the condition of a long period of 10-20 years or more of data use, it is essentially invalid. Data is stored for so long that at the time of obtaining consent it is impossible to notify a person about what data and how exactly will be processed and used in the future.

Data leaks have become a mass phenomenon all over the world. Direct targeted hacking is rare. The reasons for data leaks are errors in legislation; insufficiently thought-out work of regulatory and supervisory authorities; errors of direct database developers.

For example, incorrectly configured servers, due to which third-party analysts can obtain data that should be closed to them by default. This can be the actions of unscrupulous employees who copy data for subsequent sale. Even more critical are leaks of data collected on the movements, social connections, and daily activities of people through the infrastructure of a “smart” city.

Even individual “smart” wearable devices can cause damage to their owners and entire countries due to the unintentional disclosure of information. Due to a misunderstanding or irresponsibility of employees, significant government data becomes public, including that which may constitute a state secret. 59. Data enrichment and ethics

Additional information makes the results more accurate at all stages of the work. Additional information will help clarify the results obtained, test hypotheses and build models. Data enrichment is used in marketing research. It is a tool for more accurate work with the consumer.

Search engines create detailed portraits of users: age category, gender, approximate income, interests and sphere of employment. It is not so much the volume of information that is important, but the number of sources involved. As a result of this work, the Internet user sees advertising that corresponds to his interests. The interface also adapts to the user: the language, time zone and previous search queries are taken into account.

The ethics and licensing of data enrichment should be taken into account. In such cases, data is transferred within the framework of a single agreement. This is a matter of internal security policies and commercial objectives. Another scenario allows for the transfer of data to another organization, which is prescribed in the agreement. In this case, the enrichment logic is the same as if it were within the framework of a single organization.

If processing by agreement is only possible in an anonymized form, then enrichment at the individual level is impossible, since it requires unique identifiers. The normal scenario is used in academic research. This is the enrichment of aggregated data. For example, you can combine data on individuals at the level of a municipality or some organization, such as a school or employment center, and then enrich it at this level. In this case, the data is used in an anonymized form, so there is no violation of the agreement.

It is possible not to use unambiguous individual identifiers (name, contact information or document numbers), but to rely on indirect signs. In the case of

digital data, we talk about a digital trace: a combination of browser and operating system characteristics, device technical characteristics (resolution) and IP address. Using such a combination usually allows us to identify different actions of an individual accurately enough to combine them. In this case, there may be no violation of the law, but there are risks of violating the law.

Ethical requirements consist of the impossibility of using and publicly demonstrating the personal data of an individual, even if for some reason they were transferred to them. It is also clearly ethically impossible to use stolen and published data, including leaks from services, for research purposes. This is a question, among other things, of the personal responsibility and ethics of each individual researcher.

When publishing results and anonymized data, it is necessary to keep in mind that they can be used for enrichment. It would be best to immediately prescribe the conditions for their use and make it as difficult as possible to use the data to enrich other data. This may include restricting access to individual attributes and observations.

AI Ethics: A Systems Approach

IT ethics covers a wide range of principles, from honesty and fairness to respect for privacy and intellectual property. It emphasizes the importance of transparency in data processing and a responsible approach to the development and use of technologies. These principles are aimed at protecting the rights of users and preventing abuses in the field of information technology.

The principles of IT ethics include responsibility and accountability for decisions made and products created. In this context, special attention is paid not only to what is technologically possible, but also to what is morally acceptable and socially responsible. This entails the need for continuous assessment of the ethical implications of innovations, including potential impacts on the privacy, security and well-being of users. Thus, ethics in IT becomes not just an add-on

to technology, but a fundamental aspect shaping the future of technological development.

Ethics plays a key role in all stages of the development and implementation of new technologies and software. It helps shape development approaches that take into account the social, legal and moral implications of technological innovations, striving to create a fairer and safer digital world.

Ethical criteria in the development and implementation of new technologies also ensure that innovations take into account the diversity of needs and perspectives of different user groups. This includes ensuring that technologies are accessible and usable for people with different abilities and from different social and cultural backgrounds. This approach contributes to the development of products and services that are not only technologically advanced, but also promote social inclusion and respect for diversity. This increases the value and effectiveness of technologies, making them more acceptable and useful to a wider range of users.

Privacy and the protection of personal data are at the center of ethical discussions in IT. Given the volume of data collected and processed by companies, it is important to maintain strict security and privacy standards. This includes ensuring consent for data collection, protecting data from unauthorized access and use, and ensuring transparency about how data is used and processed.

The importance of protecting privacy and personal data in IT highlights the need to integrate ethical principles into the design and development of technology. Data protection should not be simply an add-on to existing systems, but an integrated part of the development process from the very beginning. This approach, known as "privacy by design", requires that privacy be considered at all stages of the data lifecycle, from collection to destruction, thereby ensuring that personal data is protected at every step.

The use of biometric data such as fingerprints, facial recognition, and other unique human characteristics raises particular ethical issues. It is important to

ensure that such sensitive data is not used without the consent of users and does not become a tool for violating their privacy.

Biometric data requires special attention to the issues of its storage and processing. It is important to ensure that the systems that process such data are highly secure and not subject to vulnerabilities that could lead to leakage or abuse. It is also important to consider the potential irreversibility of the consequences if biometric data is compromised, since, unlike passwords or credit card numbers, a person's biometric characteristics cannot be changed. This raises questions about liability and the need to develop compensation or protection mechanisms for users in the event of a breach of their biometric privacy.

The development and application of artificial intelligence and neural networks poses a complex ethical issue. It is important to ensure that algorithms are not biased or discriminatory. In addition, the potential consequences of automation, including the impact on employment and social relations, must be considered. In addition to the issue of bias, ethical issues related to artificial intelligence and neural networks also include the transparency and interpretability of algorithms. It is important that users and stakeholders understand how these systems work and what data is used to make decisions.

This requires designing AI and neural networks in a way that is not only efficient but also explainable. It is also important to consider issues of accountability for decisions made with the help of AI and determine who is responsible in case of errors or unintended consequences.

A comprehensive approach is needed to address ethical issues in IT. This includes developing and enforcing strict codes of ethics, conducting educational programs for professionals, engaging the public in discussing ethical standards, and collaborating with regulators to create effective legal and regulatory frameworks. Such an approach will help ensure that the IT industry develops responsibly and in the interests of all participants.

Effective problem solving in IT requires active involvement and feedback from end users. Understanding their perspectives and concerns will help shape

technologies that more closely meet their needs and ethical standards. It is also important to implement mechanisms for continuous monitoring and review of technologies to improve their security, privacy, and ethical compliance.

Computer Ethics

The formation of the research field of computer ethics is associated with the release of a special issue of the journal "Metaphilosophy" and the publication of the anthology "Ethical Issues in Computer Use", as well as the monograph by D. Johnson "Computer Ethics" (1985) for students of the Rensselaer Polytechnic Institute. The theoretical sections on computer ethics explain what consequentialism and deontology, utilitarianism and altruism, virtue ethics are.

The field of computer ethics research includes the quality of web resources, the ethical aspects of the behavior of subscribers in social networks, and possible access to gaming sites. Moral aspects of the functioning of the Internet are touched upon in the "Declaration of Responsibility" of computer technology specialists, in the "Code of Ethics and Professional Activity in Software Engineering", and finally. There is a "hacker ethic", called technomeritocratic by M. Castells. The formation of virtual ethics is a dynamic and relevant process.

The first attempts to formulate the basic principles of virtual ethics date back to the eighties of the twentieth century. In 1986, R. Mason limited the problematic field of ethics in the information age to four principles: privacy, accuracy, accessibility and property. Privacy includes secrecy and anonymity. Accuracy correlates with the requirements for storing and processing technical, social and other types of information. The principle of private property is designed to protect property rights to information and copyright.

A systematized, universal set of rules consisting of ten principles is often used. They prescribe:

Do not use a computer to harm people.

Do not interfere with or interfere with the work of other users of computer networks.

Do not use files that are not intended for free use.

Do not use a computer to steal.

Do not use a computer to spread false information.

Do not use stolen software.

Do not appropriate someone else's intellectual property.

Do not use computer equipment or network resources without permission or appropriate compensation.

Think about the possible social consequences of using programs or systems. Use the computer with self-restraint that shows consideration and respect for others. The information explosion that has occurred has shown the ambivalent nature of the Internet's capabilities.

There is a need to form a virtual ethics. It is designed to regulate the area of social relations with the help of a moral value system.

Data Privacy Ethics

This is a branch of ethics that deals with the moral and legal consequences of collecting, storing, sharing and using personal data. It is an evolving field that affects the interests and rights of individuals, organizations and society as a whole. Data privacy is a human right. According to the Universal Declaration of Human Rights, everyone has the right to privacy and the protection of their personal data. Data privacy ethics respects this right and ensures that people can control and consent to their own data, and that their data is not used for harmful or discriminatory purposes. Data privacy is a competitive advantage.

Companies that respect and protect their customers’ data can earn their trust and loyalty, and differentiate themselves from competitors. Data privacy ethics can also help businesses comply with relevant laws and regulations and avoid legal risks and reputational damage.

Data privacy ethics can promote a culture of transparency and accountability, and encourage the ethical use of data. It can prevent data from being misused or abused by bad actors, and protect the public from threats such as identity theft, cyberattacks, or surveillance.

Data privacy ethics also poses some challenges and trade-offs for both businesses and consumers. The balance between privacy and the usefulness of data is important. Data privacy often requires limiting or anonymizing data that is collected or shared, which may reduce its value or quality for analysis or decision making. Data privacy ethics can help find the right balance between protecting data and maximizing its usefulness for legitimate purposes.

Data privacy can sometimes limit or hinder the development and adoption of new data-driven technologies or services, such as artificial intelligence, machine learning, or cloud computing. Data privacy can sometimes limit or hinder the development and implementation of new data-driven technologies or services, such as artificial intelligence, machine learning, or cloud computing.

Data privacy ethics can help ensure that data innovations are carried out in a way that respects the rights and interests of data subjects and that the potential benefits outweigh the potential risks.

Data privacy can sometimes conflict with the need or desire to share data with others, such as partners, employees, or third parties. Data privacy ethics can help create appropriate conditions and safeguards for sharing data, such as obtaining consent, ensuring security, and ensuring accountability.

Data privacy ethics include data privacy principles. These are the core values and norms that define what data privacy means and why it is important. Examples of data privacy principles include: fairness, transparency, accountability, security, and minimization.

A data privacy policy contains specific rules and guidelines that govern the collection, storage, distribution, and use of data. Examples of data privacy policies include: data protection laws, data governance standards, data breach protocols, and data retention policies.

Data privacy practices include specific actions and behaviors that ensure and demonstrate data privacy. Examples of data privacy practices include: data auditing, data encryption, data anonymization, and data deletion.

By following the principles of data privacy ethics, businesses and consumers can balance business goals and privacy values and enjoy the benefits of data while respecting the rights and interests of others in the conversation.

Cognitive Technologies

The idea of cognition as applied to the properties of radio-electronic equipment (REE) was first expressed back in 1999, and later took the form of the concept of cognitive radio (CR). The essence of CR is that wireless subscriber devices (e.g. smartphones) and associated networks can be sufficiently autonomous and “intelligent” in choosing and using available radio resources and network communications. The "rules of conduct" of such devices depend on the user's need for certain services. At the same time, the REC must ensure optimal and interference-free use of radio resources.

Using probing, cognitive radio devices can identify temporarily free parts of the radio frequency spectrum that were previously allocated for use by other means. Cognitive REC temporarily occupy such free bands or radio channels for receiving and transmitting information without creating interference to radio electronic means in the selected range. The described properties of cognitive radio networks (Cognitive Radio Network, CRN) are manifested primarily due to the use of software control of networks and network elements.

To receive services in cognitive radio networks, the user can use a terminal based on the principle of software control of protocols and parameters of radio access interfaces - SDR (Software-Defined Radio). Such devices have wide technical capabilities for choosing various communication networks to receive the required services.

Subscriber SDR devices have the ability to operate in many wireless communication standards - GSM / GPRS / EDGE, UMTS, Wi-Fi, LTE - and use the television frequency range, as provided by the IEEE 802.22-2011 standard. It should be noted that the principles of SDR and the properties of cognition also apply to base station equipment and can be used in IoT devices.

Cognitive Internet of Things (CIoT) is a new concept of an infocommunication network in which things (physical or virtual) are interconnected and interact with minimal human intervention. Objects of such a network can form a certain idea of their state, the state of surrounding objects, can perceive knowledge about the environment, make logical conclusions from accumulated knowledge, adapt to external and internal conditions.

Let's consider the basic principles of the architecture of the cognitive Internet of Things. The CIoT concept assumes that Internet things have mandatory mechanisms of cooperation and "intelligence". Accordingly, the CIoT architecture includes such “intelligent” elements as cognitive nodes and cognitive elements that are capable of autonomously changing their technical characteristics in accordance with certain conditions.

The difference between nodes and elements is that so-called simple (non-cognitive) nodes can additionally be connected to a node. All these network elements are combined into autonomy domains, where they are closely interconnected, including in a certain territory.

Causal AI

Causal AI is focused on identifying cause-and-effect relationships that are needed to solve a given problem or question. It is an attempt to bring AI closer to the way humans think and beyond statistical predictions based on machine learning, as is done in existing neural networks. It is an effort to create technology that can reason and make choices like humans do.

And then it can be integrated into the human decision-making process. The goal is to move beyond predictions based on statistical correlations and move towards AI systems that can better predict possible consequences, and therefore act more effectively.

Machine learning technologies were aimed at predicting something, such as the next word in a text. Causal AI can also predict. But it can go one step further, allowing you to answer questions like: “What will be the effect of changing a certain input variable or parameter?” or “What is the most effective course of action in a situation?” Traditional neural network models cannot answer these questions. This opens up new possibilities for modeling situations, such as evaluating treatment methods.

Artificial intelligence must comply with legal and ethical requirements. It must be explainable. But neural network models are black boxes, and attempts to explain them have not yet succeeded.

Causal artificial intelligence aims to create neural network models that are convenient and transparent for humans. People will be able to carefully examine and change the assumptions underlying the models before they lead to any conclusions and predictions. Experts can use their unique knowledge of the area under study, can determine specific relationships and their form.

Causal artificial intelligence at this stage of its development is an expensive project. For training, it is necessary to organize a constant flow of data from different sources in order to create a relevant causal model. This means the need for comprehensive digitalization of the enterprise in any area where artificial intelligence is used.

The theoretical understanding of neural networks lags significantly behind practice, many new methods appear that work, however, why they work, how they work and what problems this entails, no one understands. Neural networks are vulnerable to various types of attacks. The complex mechanism of a neural network is easy to break. A special term Adversarial Machine Learning (AML) has appeared, which is translated as "adversarial machine learning".

This means a targeted impact on a neural network, which can cause errors in its behavior. The first publications date back to 2004. In 2013, engineers from Google AI, trying to understand how neural networks think, discovered a common property of the ML method.

They are easy to deceive with small disturbances. Neural networks turned out to be unstable to conscious influences and deception, as a result, it is possible to control the crowd through neural networks. This raises questions about the correctness and security of using neural networks to build recommender systems and other applications, since the recommender systems used by YouTube, Google and Yandex use neural networks. The use of neural networks to solve applied problems is limited to a hint system. At the same time, decision making is not completely delegated to neural networks.

Training modern models requires a lot of computing power and resources. Modern models have a huge number of parameters, and supercomputer complexes with powerful video cards are needed to train them. Large corporations have the necessary computing power. Global AI developers have started producing their own chips, as their prices have risen sharply. This direction is necessary for businesses to develop their infrastructure, for example, cloud providers.

These chips will differ from their usual counterparts. They are focused on AI, designed for narrow tasks and are more affordable. The trend should be divided into chips developed by hyperscalers (large cloud providers) and other companies. Hyperscalers produce chips for the tasks of executing and training models to sell them as part of their cloud services.

Classic LLMs (large language models) have tens or hundreds of billions of parameters and require serious resources for development and training. At the same time, they do not always cope well with highly specialized and applied tasks. Their main advantage is universality. Language models with several tens of billions of parameters and even with only several billion have been developed. These are SLM (small language models). However, they do not always cope well with highly specialized and applied tasks.

Their main advantage is versatility. Language models with several tens of billions of parameters and even with only several billion have been developed. These are SLM (small language models). They require less computing power and resources for development. With proper fine-tune (additional training), they can prove themselves in customer support or financial statement analysis. SLM training requires tens of times less computing power.

AI is changing the approach to robot programming. It allows robots to make decisions based on the analysis of data about the surrounding world and context recognition. In robotics, there has been a transition from the highly specialized use of AI algorithms to working with multimodal neural networks that combine video, text, audio and other information. Researchers have replaced robot programming in a sequence of actions with reasoning processes at an abstract language level. Such robots will be in demand in logistics and warehouses, in the manufacturing industry, in remote production, as well as in emergency situations, the nuclear industry and northern regions.

AI hallucinations

This is one of the most common problems with new generative neural networks. AI still cannot be trusted to independently make complex decisions on which a person's life depends. Often, auditing in social networks and other platforms is left entirely in the hands of bots, and this is where the danger of hallucinations lies.

Hallucinations can have various causes, for example, training AI systems on inaccurate or insufficient data. There may also be flaws in the algorithms that force AI to generalize data incorrectly, given that chatbots, for example, are aimed at generating stories without logical inconsistencies - this is how very coherent lies appear. Sometimes AI hallucinations are useful, just like human fantasies - for example, they open up a lot of space for creating entertaining con-

tent, including visual content. However, if the purpose of using them is to obtain reliable information, problems may arise.

A cascade of hallucinations is also potentially dangerous. This is when conclusions are made based on one false fact, which form the basis for the next decision. A chain arises in which it is difficult to get to the initial error.

One way to combat hallucinations is to focus AI only on verified data. Another way is to have people check the AI results and provide feedback. After several cycles, the number of errors decreases significantly. Another method is to make chatbots discuss the topic among themselves, and give an answer only after they come to a consensus.

Cleaning and carefully preparing the data used to train and tune AI models is one of the key steps in preventing hallucinations. This involves not only removing irrelevant or erroneous information, but also ensuring that the data is diverse and represents multiple perspectives. Taking a rigorous approach to training data improves its quality and provides an opportunity to test and identify problems, including biases that may contribute to hallucinations.

From the outset, it is important to plan the development of AI models with an emphasis on their interpretability and explainability. Ensemble models, which are one approach in the field of AI/ML, are well suited to achieving interpretability, explainability, and accuracy. This approach involves combining predictions from multiple models to form more accurate, comprehensive, and transparent results.

Rigorous testing should include not only testing the model on standard queries and handling common input formats, but also analyzing its behavior under extreme conditions and when handling complex queries.

Testing how an AI responds to a wide range of inputs allows you to predict how the model will behave in a variety of situations and provides an opportunity to improve the data and model architecture before end users encounter inaccuracies or delusional results.

If an AI model supports data in different formats, it is necessary to test with text and numeric data as well as audio and visual data. It is also recommended to use adversarial testing methods, the purpose of which is to deliberately mislead the model to find its vulnerabilities.

Most of these tests can be automated using appropriate tools, making the testing process easier and more efficient.

A key element in the process of improving AI models is to regularly collect feedback from end users, especially after the model has been implemented and is actively used. Users of AI models often provide valuable information about AI hallucinations and other anomalies in the model's performance that may not be noticed during the development process.

To make this process effective, it is important to create convenient and accessible feedback channels. This allows users to easily report any issues or anomalies they encounter while using the AI. The information gained in this way about real-world use cases of the model can be incredibly useful for AI developers and vendors. Using this data, developers can not only correct individual errors, but also identify general trends and patterns in the model's errors.

This allows them to improve the model's training data and its response to similar queries in future versions. For companies developing AI or using AI technologies, it is important to choose vendors to work with that adhere to high ethical standards and provide transparency in the processes of data collection, training, development, and deployment of AI models.

The ideal situation is when vendors can clearly articulate their approaches to achieving ethically sound results and create products that combine accuracy and scalability. Factors that may contribute to hallucinations. If the training dataset is limited or does not fully cover possible scenarios, the model may not respond appropriately to queries outside the scope of its training.

If the data used to train the AI contains bias, this may lead to erroneous or biased model output. Models that are overtrained on specific data may lose the ability to adequately respond to new, unexpected situations, especially if they

lack contextual information. Inappropriately chosen model parameters can lead to unpredictable AI behavior, especially in complex or non-standard situations. Ambiguous or overly general user queries can cause unpredictable or irrelevant responses from the AI. AI hallucinations can lead to incorrect decisions and diagnoses, especially in precision-critical fields such as medicine and healthcare. This can cause harm to patients and customers.

Hallucinations can lead to the generation of discriminatory or offensive results, which can damage the reputation of an organization and raise ethical and legal issues. If AI generates inaccurate data, it can lead to unreliable analytical results. Organizations can make decisions based on incorrect information, which can impact their business.

Hallucinations that reveal sensitive information or create offensive content can lead to legal issues. Ethical dilemmas can arise from the use of such models. AI that generates disinformation can contribute to the spread of false information and negatively affect public opinion. Hallucinations can lead to user frustration, loss of customers, and a decrease in audience.

The risk of generative artificial intelligence (AI) injecting fake packages into real code has been revealed. Major companies, Alibaba, Tencent, and Baidu, have included a non-existent package in their documentation. Bar Lanyado from the information security company Lasso Security created a non-existent library (package) for Python called huggingface-cli. Libraries are a set of ready-made functions, classes, and objects to solve developer problems.

He noticed that the generative artificial intelligence (AI) models repeatedly “hallucinated” (the researcher’s term) the library name when users asked for it, meaning they recommended it. To test how this would play out in the real world, Lanado posted a fake package to the Python Package Index (PyPI). An attacker could use the AI’s made-up name for a malicious package uploaded to a repository, in the hopes that others would download the malware.

Someone could ask the models for code suggestions, then write down the made-up packages that the AI systems repeatedly recommended. They could

then inject those dependencies so that other programmers using the same models and receiving the same suggestions would end up using those libraries, which could be poisoned with malware. Hackers could upload malicious packages with the same names to the appropriate registries, and from there, they just wait for people to download those packages.

The tendency of AI models to confidently cite non-existent court cases is well known, and has been a source of confusion for lawyers unaware of the trend. Generative AI models will do the same with software packages. Bar Lanado queried four AI models (GPT-3.5-Turbo, GPT-4, Gemini Pro aka Bard, and Cohere Command) on programming tasks in five different programming languages (Python, Node.js, Go, .Net, and Ruby), each with its own packaging system. Some of the names these chatbots extract persist across models.

And persistence - the repetition of a fake name - is key to turning an AI quirk into a functional attack. An attacker would want an AI model to repeat the names of hallucinated packages in its responses to users so that malware created under those names would be found and downloaded.

Lanyado randomly selected 20 hallucination questions with zero results and asked them 100 times to each model. His goal was to measure how often the name of a hallucinated package remains the same. His test results showed that the names persist often enough to be a functional attack vector, though not always, and in some packaging ecosystems more often than others. The packaging ecosystems in Go and .Net are built in a way that limits exploitation by denying attackers access to certain paths and names.

Vulcan Cyber researchers have unveiled a new malicious packet distribution technique they call “AI packet hallucination.” This technique is related to the fact that ChatGPT and other generative AI platforms sometimes respond to user queries with hallucinations of sources, links, blogs, and statistics. Large Language Models like ChatGPT can generate such hallucinations - URLs, links, and even entire code libraries and functions that do not actually exist.

ChatGPT even generates dubious patches for CVEs and can offer links to non-existent code libraries. Companies should never download and execute code they do not understand and have not reviewed - such as open-source GitHub repositories. When a program receives a complex query that it does not know the answer to, it begins to make up facts. Moreover, the model insists on its correctness if a person tries to correct it. For example, it can provide links to non-existent scientific studies.

The main reason for hallucinations is a lack of data. AI does not contain its own knowledge, but only generates the most probable answer from the loaded content. However, the laws of probability impose limitations. Not every result can be correct. Therefore, any answer of the neural network must be checked according to the general rules of fact-checking.

Verify all key information mentioned in the generated content using search engines: names, studies, geographical names. Monitor the authority of the sites where the information is published. Test the originality of the generated images. To do this, use image search in large systems like Google or Yandex, on well-known photo stocks. Pay attention to phrases that look like axioms.

They can be recognized by the words: “recognized”, “considered” and “everyone knows”. Check such axioms for authenticity or ask the neural network to specify superficial statements. Use several independent neural networks for the same task so that you can compare the results of their work. All generative AI models, from Google’s Gemini to Anthropic’s Claude to OpenAI’s latest GPT-4o, hallucinate. In other words, they make mistakes. Sometimes it’s funny, sometimes it’s not. But not all models do it equally.

And the lies they tell depend on what data sources they were trained on. AIs don’t hallucinate very often, with GPT-4o and OpenAI GPT-3.5 showing roughly the same results in terms of the percentage of questions they actually answered correctly. GPT-4o was slightly better. OpenAI’s models were the most truthful, followed by Mixtral 8x22B, Command R, and Sonar. Questions about celebrities and finance were the most difficult for the models, while geography

and computer science were the ones they answered best. When the source of the answer was not Wikipedia, all models were less truthful on average, especially GPT-3.5 and GPT-4o, suggesting that they all rely heavily on Wikipedia.

Even models that can search the web, like Perplexity's Command R and Sonar, were able to handle answers that weren't in Wikipedia. Model size didn't matter much. Small models like Anthropic's Claude 3 Haiku hallucinated about as often as larger, supposedly more capable models like Claude 3 Opus.

The relationship between AI and human hallucinations

Understanding this relationship can help us design more advanced AI systems that will ultimately reduce human error. People make things up. Sometimes they do it on purpose. Sometimes they do it through memory error. Such errors result when a person replaces a long argument with a shortcut that is born from the compression of the error. Often these shortcuts are born out of necessity.

The brain must use learned associations to fill in the gaps and quickly answer any question or difficulty. The brain guesses the correct answer based on limited knowledge. This phenomenon is called confabulation and is an example of human bias.

Biases can lead to incorrect judgments. There is the "automation bias." This is the tendency to favor information received from automated systems (such as ChatGPT) over information created by humans. It is believed that AI cannot take sides in an argument, that it is completely objective. This bias can lead to a mistake not being noticed. Another type of bias is called the halo effect. This is when the initial impression influences the idea of a phenomenon so strongly that further interactions with it do not change anything.

There is the fluency bias. People always prefer information presented in an easy to read and understand form. “Hallucination” in AI reflects erroneous attempts to predict, for example, the next word or sentence in a text. “Fluency bias” also comes into play. The AI tries to write as simply as possible.

Biases in AI can remain and are difficult to detect. Three methods have been developed to prevent LLM from hallucinating: search-augmented generation (RAG), reasoning, and iterative queries.

Positive effects of AI hallucinations

AI hallucination can simplify data visualization by discovering new connections and offering alternative views on complex information. This can be especially valuable in areas such as finance, where visualizing complex market trends and financial data can help make more nuanced decisions and analyze risks. AI hallucinations can also improve immersion in games and VR.

Using AI models to hallucinate and create virtual environments can help game developers and VR designers imagine new worlds that take the user experience to the next level. Hallucination can also add an element of surprise, unpredictability, and novelty to a gaming experience.

Inworld AI, a company that helps video game developers create interactive computer characters, has developed a “fourth wall” feature to take control of how characters respond to humans. These AI characters are given personality traits, emotions, memories, and ambitions, which can lead to unique behavior.

But co-founder and head of product Cailan Gibbs says that if they deviate too much from the script, it can ruin the immersion of the game. A bot in a Star Wars game should be able to come up with a personal story about its home planet, but it shouldn’t be able to falsely deny that Darth Vader is Luke Skywalker’s father. There’s a balance between hallucinations that expand the world and those that break it.

It is not so much the tolerance for hallucinations that is changing, but their definition. Creative individuals talk about them more in an anthropomorphic sense than as a machine producing lies, and this creates a problem: describing the false output of a language model as a hallucination anthropomorphizes AI technology. AI systems, despite their functionality, are not conscious.

They do not have their own perception of the world. Their outputs manipulate the user's perception, and it would be more correct to call them a mirage - something the user wants to believe, rather than a machine hallucination.

Hallucinations in humans: definition

In humans, delusions and hallucinations are symptoms of psychotic disorders, such as schizophrenia. However, they can also occur in personality disorders, various neurological diseases, the use of psychotropic substances, post-traumatic stress disorder, and other conditions of the body.

Hallucinations demonstrate a false perception of objects or events involving all the senses: sight, hearing, smell, touch or taste (without the actual presence of the object of perception). The main clinical sign of hallucinations is their appearance against the background of clear consciousness. In 1917, the hallucination syndrome was first described by the French psychiatrist Jean-Etienne Esquirol. He also established the difference between illusion and true hallucination. Hallucinations are associated with the experience of something that does not exist in reality. Illusions occur when a person misinterprets something in their environment. Psychiatrists distinguish several main types of hallucinations.

They can be elementary, simple and complex in content, true or false. Regardless of their type and causes, the images that arise are perceived by sick people as reality. Hallucinations arise gradually. For example, if a patient has auditory hallucinations, he first hears a sound, then monosyllabic words, then his name, and then global dialogues begin.

Preventing AI Hallucinations

Setting the temperature parameter to 0 can produce more accurate results. Temperature controls the randomness in the model’s response generation. A lower temperature means the model can select the most likely words and phrases

to produce more predictable and reliable results. This setting is especially valuable for tasks that require factual accuracy and consistency.

Using external data sources for validation can significantly reduce generative errors. It can reference this external data when generating responses, providing the model with relevant and verified information. This approach turns a purely generative task into a simpler retrieval or generalization task based on the provided data. Training models with domain-specific data improves their accuracy and reduces hallucinations.

This process exposes patterns and examples in the model that are relevant to a particular domain or topic. This way, you can align its output with the target domain. This fine-tuning allows the model to generate more contextually relevant and accurate responses. This is important in specialized applications such as medicine, law, or finance. The design of the cues plays a key role in mitigating hallucinations. Clear, context-specific cues guide the AI model more effectively. They can reduce the AI's misconceptions and ambiguities and guide the model to produce relevant and accurate answers. The model is less likely to produce irrelevant or incorrect results.

Retrieval Augmentation Generation (RAG) combines the generative capabilities of LLM with a vector database that acts as a knowledge base. When a query is entered, the model converts it into a semantic vector and retrieves documents with similar vectors. LLM then uses these documents and the original query to produce a more accurate and contextually relevant answer. RAG essentially provides LLM with a form of Long-Term Memory. This allows LLM to access and integrate external data.

Chain of thought cues help LLMers break down multi-step problems into more manageable steps. This improves their ability to solve complex logical problems. This method is enhanced by incorporating examples from a vector database, which provides additional context and examples for the LLM. The answers returned are accurate and include rationale, which is then stored in the vector database to improve future answers.

The iterative query process involves an AI agent that provides iterative interaction between the LLM and the vector database. The agent queries the database with a question, refines the search based on similar questions returned, and then summarizes the answers. If the summarized answer is not satisfactory, the process is repeated. This method, exemplified by Forward-Looking Generated Active Retrieval (FLARE), improves the quality of the final answer by gradually refining the query and answer over multiple iterations.

Integrating mitigation techniques can significantly improve the accuracy and reliability of AI answers. These strategies address the problem of AI hallucinations. The vast majority of machine learning engineers report experiencing issues with production models on a daily or weekly basis. This important statistic highlights the critical need for effective monitoring and control tools to ensure smooth operations. The constraints feature for Amazon Bedrock enables customers to implement safeguards based on their application needs and responsible AI policies. Constraints now include contextual plausibility checks and a new ApplyGuardrail API to help build robust generative AI applications using any base model (FM).

Customers leverage the inherent capabilities of base models to produce informed (trustworthy) answers based on a company’s input data. However, base models can mix different pieces of information, producing incorrect or new information, which impacts the reliability of applications. With contextual plausibility checks, constraints can now detect hallucinations in model responses for RAG and conversational applications. This protection helps detect and filter out factually incorrect responses based on the reference source that are irrelevant to the user's query. Customers can configure confidence thresholds to filter out responses with low confidence or relevance.

To enable the ability to protect applications using different underlying models, support for the ApplyGuardrail constraints API is implemented, which enables analysis of user input and model responses for any custom or third-party FM in addition to those already supported by Amazon Bedrock. The Ap-

plyGuardrail interface now enables centralized security and governance for all generative AI applications.

The constraints feature is a unique solution from a major cloud provider that simultaneously addresses security, privacy, and trustworthiness. Contextual trustworthiness and the ApplyGuardrail API are supported in all AWS regions where the Amazon Bedrock constraints feature is supported.

Existing solutions for resolving hallucinations generally require entering increasingly more detailed instructions so that the model can re-analyze the request using more specific data. This causes problems in cases where the user does not realize that a hallucination has occurred and that the data they are being given is incorrect. A more global solution used by some startups is to completely retrain the models using refined data.

This can be resource-intensive, and again, does not work for hallucinations that were not discovered by the developers during testing. Woodpecker offers a training-free method that corrects hallucinations based on model-generated text. The system performs AI correction after a thorough diagnosis, which includes, as the developers explain, a total of five stages: extracting the key concept, formulating questions, checking the system's visual knowledge, forming visual assertions, and correcting emerging hallucinations.

Each step of the pipeline is transparent and clear, which provides interpretability that is valuable for the development of the technology. The stages simply follow one another, checking and correcting any discrepancies between the content of the image and the text generated from it. First, the main objects mentioned in the text are identified.

Then Woodpecker asks questions about the extracted objects, such as their number and attributes. After that, it transforms the question-answer pairs into a visual base of its knowledge about a specific image, consisting of assertions at the object and attribute levels (what is in the picture, what color it is, what action is being performed).

Woodpecker compares this database with the answers it receives from the AI. It finds errors and inconsistencies. And, using textual edits, it modifies the hallucinations, adding missing parameters to them. This happens in formats that AI models can recognize them: with specific pixels where something was wrong, as well as the correct color and other relevant features.

Woodpecker uses three separate AI models, in addition to the MLLM in which it corrects hallucinations. These are the GPT-3.5 Turbo, Grounding DINO, and BLIP-2-FlanT5 models. Together, these AIs act as evaluators, identifying errors and instructing the "test" model how to generate output data in accordance with the updated information. Diffusion models create new data by iteratively introducing controlled random changes to the original data set.

They start with the original data and gradually reduce its similarity to the original by adding small changes (noise). This noise is carefully controlled to ensure that the generated data retains integrity and realism. After adding noise over several iterations, the diffusion model reverses the process. It gradually removes the noise, resulting in a new data sample that is similar to the original.

GAN models train two neural networks in a competitive manner. The first network, known as the generator, creates fake data samples by adding random noise to them. The second network, called the discriminator, tries to distinguish real data from the fake data created by the generator. As the training process progresses, the generator continually improves its ability to create realistic data, and the discriminator gets better at distinguishing real data from fake data.

This competitive process continues until the generator produces data so convincing that the discriminator can no longer distinguish it from real data. GAN models are widely used in tasks such as realistic image generation, style transfer, and data augmentation.

Variational autoencoders (VAEs) learn a compact representation of the data called the latent space. The latent space is a mathematical representation of the data. It can be thought of as a unique code that represents the data based on all of its attributes. For example, when learning faces, the latent space contains

numbers representing the shape of the eyes, nose, cheekbones, and ears. VAEs use two neural networks, an encoder and a decoder.

The encoder neural network maps the input data to a mean and variance for each dimension of the latent space. It generates a random sample from a Gaussian (normal) distribution.

References

1. Arslan, S., Savaser, S., Hallett, V., Balci, S. (2012). Cyberbullying Among Primary School Students in Turkey: Self-Reported Prevalence and Associations with Home and School Life // Cyberpsychology, Behavior, and Social Networking. Vol. 15. №10. P. 527–533.

2. Attrill, A. (2015). Cyberpsychology. Oxford, University Press. 304p.

3. Balakrishnan, V. (2015). Cyberbullying among young adults in Malaysia: The roles of gender, age and Internet frequency // Computers in Human Behavior. № 46. P. 149–157. doi:https://doi.org/10.1016/j.chb.2015.01.021

4. Beran, T.N., Rinaldi, C., Bickham, D.S., Rich, M. (2012). Evidence for the need to support adolescents dealing with harassment and cyber-harassment: Prevalence, progression, and impact // School Psychology International. Vol. 33. № 5. P. 562–576.

5. Boroon, L., Abedin, B., Erfani, E. (2021) The dark side of using online social networks: a review of individuals' negative experiences. Journal of Global Information Management (JGIM) 29 (6): 1–21. DOI: 10.4018/JGIM.20211101.oa34

6. Bostrom, N., Yudkowsky, E. (2018). The Ethics of Artificial Intelligence // Artificial Intelligence Safety and Security / ed. by R. V. Yampolskiy. New York : Routledge. Pp. 57–69.

7. Bozdag, E. (2013). Bias in Algorithmic Filtering and Personalization // Ethics and Information Technology. Vol. 15. Pp. 209–227.

8. Burrell, J. (2009). The Field Site as a Network: A Strategy for Locating Ethnographic Research // Field Methods. № 21(2). P. 181–199.

9. Carstensen, G. (2016). Sexual Harassment Reconsidered: The Forgotten Grey Zone // NORA – Nordic Journal of Feminist and Gender Research. Vol. 24. № 4. P. 267–280.

10. Cavezza, C., McEwan, T.E. (2014). Cyberstalking versus off-line stalking in a forensic sample // Psychology, Crime & Law. Vol. 20. № 10. P. 955–970. doi:10.1080/1068316X.2014.893334

11. Cocq, C. (2019). The Where, How and Who of Digital Ethnography // Folklore Fellows. № 53. P. 3–6.

12. Corcoran, L., McGuckin, C., Prentice, G. (2015). Cyberbullying or cyber aggression: A review of existing definitions of cyber-based peer-to-peer aggression // Societies. №5. Pp. 245–255. DOI: 10.3390/soc5020245

13. Dreßing, H., Bailer, J., Anders, A., Wagner, H., Gallas, C. (2014). Cyberstalking in a Large Sample of Social Network Users: Prevalence, Characteristics, and Impact Upon Victims // Cyberpsychology, Behavior, and Social Networking. Vol. 17. № 2. P. 61–67. doi:10.1089/cyber.2012.0231

14. El, Asam A., Samara, M. (2016). Cyberbullying and the law: A review of psychological and legal challenges // Computers in Human Behavior. № 65. P. 127–141.

15. Friedman, B., Nissenbaum, H. (1996). Bias in Computer Systems // ACM Transactions on Information Systems (TOIS). Vol. 14. No. 3. Pp. 330

16. Georgalidou, M., Katerina, T. F., Giakoumakis, G. (2020) Aggression in media-sharing websites in the context of Greek political/parliamentary discourse in the years of the economic crisis. Journal of Language Aggression and Conflict 8 (2): 321–350. DOI: https://doi.org/10.1075/jlac.00039.geo

17. Góralska, M. (2020). Anthropology from Home: Advice on Digital Ethnography for the Pandemic Times // Anthropology in Action. № 27 (1). P. 46–52.

18. Griezel, L., Finger, L.R., Bodkin-Andrews, G.H., Craven, R.G., Yeung, A.S. (2012). Uncovering the structure of gender and developmental differences in cyber bullying // The Journal of Educational Research. No.105(6).P.442–455.doi: 10.1080/00220671.2011.629692

19. Halder, D., Jaishankar, K. (2011). Cyber gender harassment and secondary victimization: A comparative analysis of the United States, the UK, and India // Victims & Offenders. Vol.6. №4. P. 386–398. doi:10.1080/15564886.2011.607402

20. Harary, F. (1959) A criterion for Unanimity in French's Theory of Social Power // Studies in Social Power. Michigan: Institute of Sociological Research. Pp. 168–182.

21. Hazelwood, S.D., Koon-Magnin, S. (2013). Cyber stalking and cyber harassment legislation in the United States: A qualitative analysis // International Journal of Cyber Criminology. Vol. 7. №2. P. 155–168.

22. Howell, S. (2017). Two or three things I love about ethnography // HAU: Journal of Ethnographic Theory. № 7 (1). P. 15–20.

23. Jones, L.M., Mitchell, K.J., Finkelhor, D. (2013). Online harassment in context: Trends from three youth internet safety surveys (2000, 2005, 2010) // Psychology of Violence. 2013. Vol. 3. № 1. P. 53–69.

24. Kalaitzaki, A. (2017). Cyberstalking victimization and perpetration among Greek college students // Identity, Sexuality, and Relationships among Emerging Adults in the Digital Age / Under ed. M.F. Wright. Hershey PA, USA: Information Science Reference. 369 p.

25. Kessel Schneider S., O'Donnell, L., Smith, E. (2015). Trends in Cyberbullying and School Bullying Victimization in a Regional Census of High School Students, 2006-2012 // Journal of School Health. Vol. 85. № 9. P. 611–620. doi:10.1111/josh.12290

26. Kowalski, R.M., Limber, S.P. (2013). Psychological, Physical, and Academic Correlates of Cyberbullying and Traditional Bullying // Journal of Adolescent Health.No.53.P.13–20.

27. Loiko, A. (2022). Barrier-free space of socio-cultural activities of digital ecosystems // Experience Industries. Socio-Cultural Research Technologies (EISCRT). – 1(1) – P. 198-212. DOI: 10.34680/EISCRT-2022-1(1)-198

28. Loiko, A.I. (2022). Cognitive Artifacts of the Metuniverse // Вестник Самарского государственного технического университета. Серия «Философия» - 2022 – Т.4 - № 4 – С. 45-52. . DOI: https://doi.org/10.17673/vsgtu-phil.2022.4.5

29. Loiko, A.I. (2021). Cross-cultural compositions for landscape contact zones of civilization connections / Сфера культуры. Том 2, № 2 P. 38-47 URL: https://journals.eco-vector.com/2713-301X/article/view/82770;
DOI: https://doi.org/10.48164/2713-301X_2021_4_38 ID: 82770

30. Loiko, A.I. (2023). Cyber security philosophy and methodology [Electronic Resource] : textbook on general education discipline "Philosophy and Methodology of Science" for students all forms of education / A. I. Loiko ; Belarusian National Technical University, Department of «Philosophical Teachings». – Minsk : BNTU, 2023. – Деп. в БНТУ 13.12.2023, № DEPBNTU-2023-172.URI https://rep.bntu.by/handle/data/138413

31. Loiko, A.I. (2023). Design philosophy: digital technology. – Minsk: BNTU. 85p. https://rep.bntu.by/handle/data/126475

32. Loiko, A. (2023). Digital anthropology. – Minsk: BNTU. 196p. https://rep.bntu.by/handle/data/124686

33. Loiko, A.I. (2023). Digital anthropology and cyborg philosophy: between humanism and transhumanism / THESAURUS–2023 –V.XII –pp.165

34. Loiko, A. (2023). Digital Ethics. – Minsk BNTU.86p. https://rep.bntu.by/handle/data/127399

35. Loiko, A.I. (2021). New Format of Dialogue Platforms based on Translateral Thinking / Вестник Удмуртского университета. Социология. Политология. Международные отношения – 2021 – Т.5. – Выпуск 3 – pp.374-380. DOI: https://doi.org/10.35634/2587-9030-2021-5-3-374-380

36. Loiko, A. (2022). New industria. Digital ecosystems and Smart Society. – Lambert Academic Publishing. 145p.

37. Loiko, A.I. (2022). Philosophy of cross-cultural communications / Современные тенденции кросс-культурных коммуникаций. – Краснодар: ФГБОУ ВО "КубГТУ", 2022. P.114-118.

38. Loiko, A.I. (2021). Philosophy of information. – Minsk: BNTU.313 p. https://rep.bntu.by/handle/data/106983

39. Loiko, A.I. (2022). Philosophy of Mind. – Minsk: BNTU.168 p. https://rep.bntu.by/handle/data/109343

40. Loiko, A.I. (2022). Philosophy of Digital Technology. – Minsk BNTU.210 p. https://rep.bntu.by/handle/data/109830

41. Loiko, A. (2022). Philosophy of cognitive technology. – Minsk: BNTU.145p. https://rep.bntu.by/handle/data/119056

42. Loiko, A. (2023). Philosophy of digital economy. – Minsk: BNTU.126p. https://rep.bntu.by/handle/data/126236

43. Loiko, A.I. (2023). Philosophy: digital humanities. – Minsk: BNTU.145p. https://rep.bntu.by/handle/data/129771

44. Loiko, A. I. (2023). Philosophy of cross cultural communication [Electronic Resource]: textbook on general education discipline "Philosophy and Methodology of Science" for students all specialties of full-time and part-time forms of education / A. I. Loiko ; Belarusian National Technical University, Department of «Philosophical Teachings». – Minsk : BNTU, 2023. – Деп. в БНТУ 18.09.2023, № DEPBNTU-2023-154.URI https://rep.bntu.by/handle/data/135380

45. Loiko, A. I. (2023). Post-non-classical modification of techno anthropology E. Kappa / Vestnik of Samara State Technical University. Series Philosophy. V.5 № 4 pp. 84-90. URL: https://journals.eco-vector.com/2658-7750/article/view/624465 DOI: https://doi.org/10.17673/vsgtu-phil.2023.4.12 ID: 624465

46. Loiko, A.I. (2022). Technology of digital ecosystems // Вестник Самарского государственного технического университета. Серия «Философия» – Т.4 - №1 – С.49-56. DOI: https://doi.org/10.17673/vsgtu-phil.2022.1.7

47. Macnish, K. (2012). Unblinking Eyes: The Ethics of Automating Surveillance // Ethics and Information Technology. Vol. 14(2). Pp. 151–167.

48. Marcus, G. (1995). Ethnography in/of the world system: the emergence of multi-sited fieldwork // Annual review of Anthropology. № 24. P. 95–117.

49. Martin, K. (2019). Ethical Implications and Accountability of Algorithms // Journal of Business Ethics. Vol. 160. Pp. 835–850.

50. Ménard, K.S., Pincus, A.L. (2011). Predicting Overt and Cyber Stalking Perpetration by Male and Female College Students // Journal of Interpersonal Violence. Vol 27. № 11. P. 2183–2207.

51. Mittelstadt, B. D., Allo, P., Taddeo, M., Wachter, S., Floridi, L. (2016). The Ethics of algorithms: Mapping the Debate // Big Data & Society. Vol. 3(2). 2053951716679679.

52. Müller, V. C., Bostrom, N. (2016). Future Progress in Artificial Intelligence: A Survey of Expert Opinion // Fundamental Issues of Artificial Intelligence / ed. by V. C. Müller. Berlin: Springer. Pp. 553–571.

53. Pereira, F., Matos, M. (2015). Cyber-Stalking Victimization: What Predicts Fear Among Portuguese Adolescents? // European Journal on Criminal Policy and Research. Vol. 22. № 2. P. 253–270. doi:10.1007/s10610-015-9285

54. Pereira, F., Spitzberg, B.H., Matos, M. (2016). Cyber-harassment victimization in Portugal: Prevalence, fear and help-seeking among adolescents // Computers in Human Behavior. № 62. P. 136–146.

55. Peterson, J., Densley, J. (2017). Cyber violence: What do we know and where do we go from here? // Aggression and Violent Behavior. № 34. P. 193–200. doi:10.1016/j.avb.2017.01.012

56. Raskauskas, J., Stoltz, A.D. (2007). Involvement in Traditional and Electronic Bullying Among Adolescents // Developmental Psychology.Vol.43.No.3.P.564–575.

57. Smit, D. (2015). Cyberbullying in South African and American schools: A legal comparative study // South African Journal of Education. Vol. 35. №. 2. P. 1–11.

58. Smith, P.K., Mahdavi, J., Carvalho, M., Fisher, S., Russel, S., Tippett, N. (2008). Cyber bullying: Its nature and impact in secondary school pupils // Journal of Child and Psychiatry.No.49.P.376–385.

59. Tjaden, P.G. (2014). Stalking and cyberstalking // The encyclopedia of criminology and criminal justice / under ed. G. Bruinsma, D. Weisburd. New Jersey, USA: Wiley-Blackwell. 2760 p.

60. Van der Aa, S. (2017). New Trends in the Criminalization of Stalking in the EU Member States // European Journal on Criminal Policy and Research. № 24. P. 315–333. doi:10.1007/s10610-017-9359-9

61. Walrave, M., Heirman, W. (2011). Cyberbullying: Predicting victimization and perpetration // Children & Society.No.25 (1).P.59–72.doi: 10.1111/j.1099- 0860.2009.00260.x

62. Watts, L.K., Wagner, J., Velasquez, B., Behrens, P.I. (2017). Cyberbullying in higher education: A literature review // Computers in Human Behavior. № 69. P. 268–274. doi:https://doi.org/10.1016/j.chb.2016.12.038

63. Williams, K., Cheung, C.K.T., Choi, W. (2000). Cyberostracism: Effects of being ignored over the Internet // Journal of Personality and Social Psychology.No.40.P.303–311.

Contents

INTRODUCTION 3
HARDWARE OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES 10
OPERATING SYSTEM 11
PROGRAMMING 13
PROGRAMMING LANGUAGES 15
SYSTEM OF UNIFIED COMPUTER NETWORKS 18
ARTIFICIAL INTELLIGENCE COMPUTER PROGRAM 20
KNOWLEDGE BASE 21
GENETIC ALGORITHMS 26
MACHINE LEARNING 28
PRACTICAL AI FUNCTIONS 28
ETHICS IN AI TECHNOLOGIES 31
ANTHROPOLOGY OF THE HUMAN-MACHINE ENVIRONMENT 32
DIGITAL ANTHROPOLOGY AND COMPUTATIONAL LINGUISTICS 38
DIGITAL TECHNOLOGIES FOR CORPORATE DIALOGUE 45
DIGITAL DIALOGUE TOOLS 53
SOCIAL DIGITAL COMMUNICATION 54
SUBJECT OF DIGITAL COMMUNICATION 57
DIGITAL COMMUNICATION ENVIRONMENT 57
SOCIAL NETWORK 59
CYBERNETIC TERRORISM 60
BLACK HAT AND HACKTIVISM 64
TECHNOLOGICAL COMPONENTS OF DIGITAL COMMUNICATION 65
SOCIAL TECHNOLOGIES OF HIDDEN AUTHORITARIANISM IN DIGITAL LIBERAL COMMUNICATION 67
INFORMATION SECURITY 71

NEGATIVE AND POSITIVE EFFECTS OF DIGITAL COMMUNICATIONS 73
DIGITAL COMMUNICATION REGULATORS 74
DIGITAL COMMUNICATIONS OF THE ENTERPRISE 77
MAN IN THE ENVIRONMENT OF DIGITAL COMMUNICATION 82
INSTITUTES OF DIGITAL COMMUNICATION: BLOGS 85
INSTITUTES OF DIGITAL COMMUNICATION: FORUMS 86
INSTITUTES OF DIGITAL COMMUNICATION: COMMUNITY 88
INSTITUTES FOR CONTROL AND PROTECTION OF DIGITAL COMMUNICATIONS: GATEKEEPING AND GATEKEEPER 89
SCIENTIFIC RESEARCH AND ACCESS TO THE DIGITAL FIELD 90
HOW DIGITAL COMMUNICATION INSTITUTIONS ARE FORMED: THE EXAMPLE OF YOUTUBE 92
DIGITAL ADVERTISING INSTITUTE 93
USABILITY AND UX DESIGN 96
INFORMATION BLOCKS: POST AND INSTAGRAM STORIES 103
DIGITAL COMMUNITIES 108
METHODS OF DIGITAL ETHNOGRAPHY 111
DIGITAL VIOLENCE 112
STALKER SOFTWARE 119
DIGITAL BLACKMAIL 125
HATERS 129
DIGITAL MARKET MANIPULATION 132
AI BIAS 134
DATA ETHICS 136
AI ETHICS: A SYSTEMS APPROACH 140
COMPUTER ETHICS 143
DATA PRIVACY ETHICS 144
COGNITIVE TECHNOLOGIES 146
CAUSAL AI 147

AI HALLUCINATIONS 150
THE RELATIONSHIP BETWEEN AI AND HUMAN HALLUCINATIONS 156
POSITIVE EFFECTS OF AI HALLUCINATIONS 157
HALLUCINATIONS IN HUMANS: DEFINITION 158
PREVENTING AI HALLUCINATIONS 158
REFERENCES 163
CONTENTS 163