CYBER SECURITY AND OTHER DETERMINANTS OF THE INTERNETIZATION OF LOCAL AND MUNICIPAL MAGAZINES

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Abstract

The main purpose of this article was to point out the growing importance of the issue of cybersecurity in the use of new Internet media in the development of electronic local and local government magazines. This article identifies the importance and impact of the development of new online media in the process of digitization of documents and the development of electronic, digital versions of local and self-government magazines. In the context of the conducted research, the following research thesis was formulated: The development of cybercrime related to the theft of sensitive data on the Internet defines the need for continuous improvement of cybersecurity techniques and instruments. Improving the cybersecurity in the use of new Internet media is an important factor in the development of electronic and online local and self-government magazines. New online media, including social media, have become one of the key factors in the current information and social globalization. The SARS-CoV-2 coronavirus pandemic significantly accelerated the processes of digitization of the economy and the Internetization of remote communication processes. The conclusions from the conducted research confirm the main research thesis. The analysis proves that there is a fundamental relationship between the improvement of cybersecurity techniques and the process of digitization and Internetization of the media, including press media. The article indicates the growing importance of cybersecurity in the use of new Internet media in the development of electronic local and local government magazines. The considerations and results of the analyses contained in the article confirm the thesis that the development of cybercriminal theft of sensitive data on the Internet forces the need for continuous improvement of cybersecurity techniques and instruments. Improvement of the cybersecurity in the use of new Internet media also concerns the development of electronic and online local and self-government magazines. The text shows the importance of the role of the Coronavirus pandemic, which occurred in March 2020, in accelerating the process of the Internetization of journals.

1. Introduction

The importance of information technology, the Internet and Industry 4.0 in the economy has been growing rapidly since the end of the 20th century. In addition, in 2020, the pandemic of the SARS-CoV-2 coronavirus (Covid-19) accelerated the processes of digitization and Internetization of many spheres of business activities of companies and institutions, as well as Internet-based remote communication. These processes have significantly accelerated since the spring of 2020 during the SARS-CoV-2 (Covid-19) coronavirus pandemic (Golczak, et al., 2021). Due to the aforementioned coronavirus pandemic, the development of digitization of the economy has greatly accelerated in many countries. Digitalization of the economy is now taking place simultaneously in many areas of economic processes and in the operation of many business entities and public, financial and other institutions. Today, in many industries and sectors, more and more companies are developing their business through the Internet, remotely providing their services and selling their products through e-commerce (Prokopowicz, 2017b). On the other hand, more and more public institutions are developing their offerings of information, consulting, assistance services, etc. via the Internet. Also, an increasing number of book publishers and magazine editors are developing their publishing activities in electronic form by publishing articles, books, magazines, etc. in digitized versions offered via the Internet.
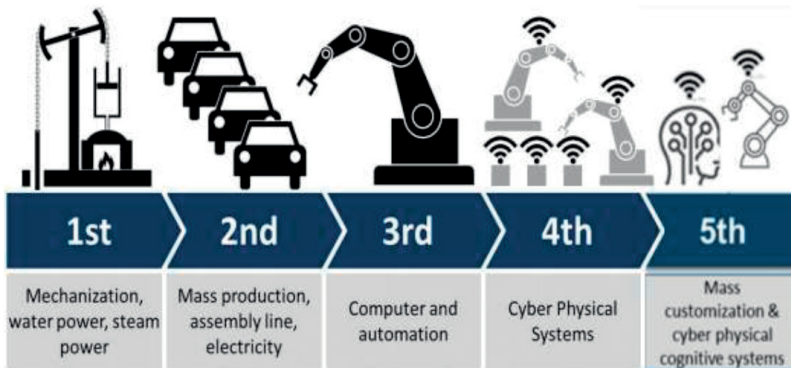

Figure 1. Industrial revolutions
Source: (Clim, 2019)

The rapid development of those ICT information technologies is an important factor in the current fourth technological revolution. The technological progress that is taking place is also an important factor in improving techniques and instruments of information systems security and adapting legal regulations for the protection of classified data to the new reality, in which the use of the Internet and new online media is generating new sources of risks in terms of the reliability of information appearing in these media and the developing disinformation.

Recently, the scale of these risks has been growing rapidly due to the use of artificial intelligence technologies by cyber criminals and individuals and institutions generating disinformation in online media, including primarily social media sites. The aforementioned issue of an increase scale of digitization and Internetization also applies to publishing activities, including, among others, the publication of local and municipal magazines.

The issue of cyber security, including the security of classified information, is increasingly recognized as an important factor in the development of online information services, including social media portals, e-commerce, e-logistics, e-government, e-banking, and translates into the trust of customers using e-services. Accordingly, improving the security of information published on the Internet, improving the process of cybercrime risk management and developing cyber security systems is becoming a key determinant of the quality of institutions' online operations (Matosek, Prokopowicz, 2017). Therefore, the smooth adaptation of regulations to the changing realities of the current technological revolution, including the provision of a high level of cyber security, should translate into faster development of e-services also in the development of online information services and online media. The rapid growth of Internet users is shown in the chart below.
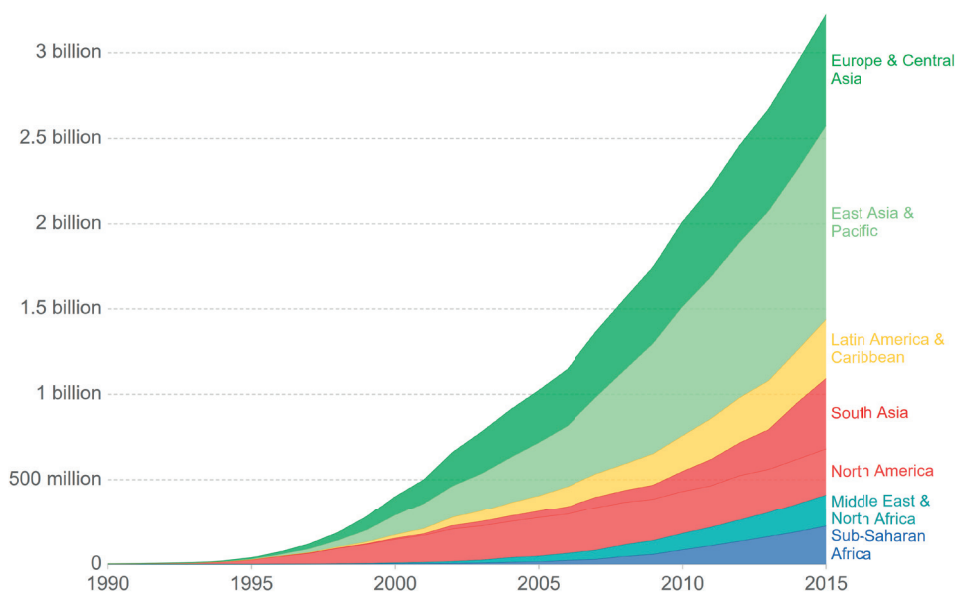

Figure 2. Internet users by Word region
Source: (*Internet Users by World Region*, 2017)

The SARS-CoV-2 (Covid-19) coronavirus pandemic accelerated the processes of the Internetization of economic activity and digitization of the economy in many countries. The increase in digitization also applies to the information media sector, including local and self-government press. Therefore, increasingly, journals

published in a printed form are replaced or supplemented with an electronic version published on the Internet. The above trends are also confirmed by an analytics carried out with the use of the Google Trends tool, which presents changes in the level of interest of Internet users in Poland with respect to magazines, newsletters, information portals and social networks that have taken place in the last dozen or so years (Gołębiowska, 2017a).

On the basis of the aforementioned Internet analytics carried out with the use of the Google Trends tool, it can be concluded that since 2009 the interest of Internet users in social networks has been increasing. On the other hand, since the level of interest of Internet users in the social networking sites has grown, the level of research for issues related to the term newspaper in the Google search engine has significantly decreased (Gołębiowska, 2010). The trends observed with Google Trends coincide with statistics that describe the shrinking markets of newspapers and printed magazines and the development of Internet news portals, including social networks (Gwoździewicz, Prokopowicz, 2019).

The results of the aforementioned analysis of interest of Internet users in Poland in magazines, newsletters, information portals and social networks, conducted on the basis of selected entries entered into the Google search engine in the period from January 1, 2004 to June 14, 2023, are presented in the chart below.
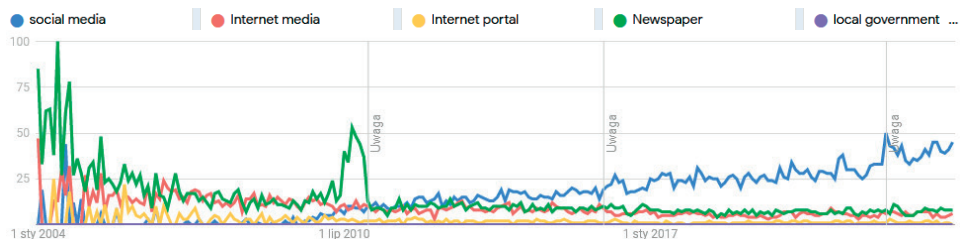

Figure 3. Analysis of the interest of Internet users in Poland in magazines, newsletters, information portals and social networks, based on selected search terms entered into the Google search engine in the period from January 1, 2004 to June 14, 2023

Source: (own compilation based on Google Trends analytics)

In view of the above, the media sector is undergoing rapid changes, which are determined by the progressive digitization and Internetization of various many aspects of the media, including the press media.

2. Development of new online media and online editions of the local and municipal press

Given the growing importance of online media, a process of transferring the printed press to the Internet has been underway in Poland for several years now. Successively and in parallel with this process, the importance of the Internet is

growing as an important and increasingly often main information medium that is also used by advertisers. These trends are confirmed by market research on the sales of advertising space in individual types of media carried out by various advertising companies. Such companies include the Starlink media house whose research results published since almost the beginning of the 21st century confirm the above theses. Due to long-term process of a successive increase in the importance of the Internet on the advertising space sales market, already in 2008 publishers of Internet news media recorded higher revenues from advertisements published on the Internet than publishers of the printed press. In the following year 2009, the online press outpaced traditional magazines in terms of advertising expenditure (Gołębiowska, 2015). On the other hand, in 2013, advertisers operating in Poland for the first time in history spent more funds on advertising campaigns conducted on the Internet than in the entire press printed in Poland combined. In the discussed period, i.e. in the years 2008–2013, the total print press advertising market in Poland decreased by almost half a billion zloty annually (Kaszuwara, Dwornik, 2019). These trends are presented in the chart below.
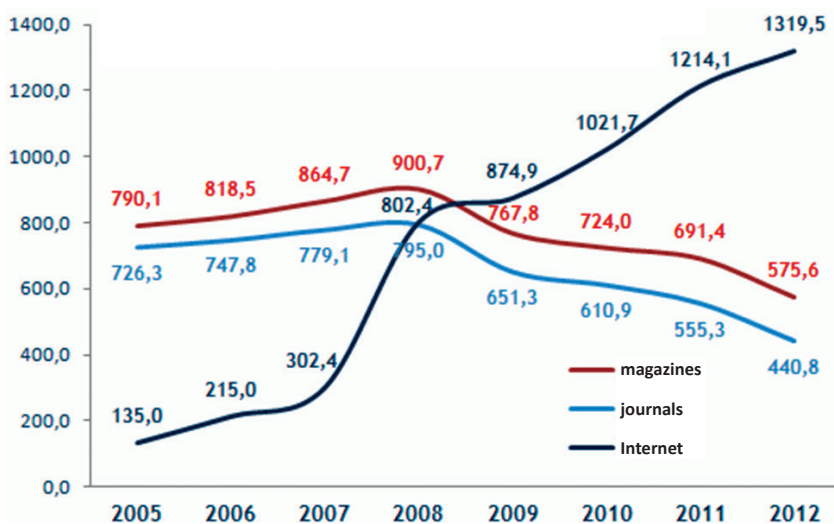

Figure 4. Change in the ratio of expenditure on advertising in the press and on the Internet (in PLN million)

Source: (Kaszuwara, Dwornik, 2019)

In view of the observed trends, as indicated by the results of research conducted by companies operating in the advertising sector, the habits and awareness of entrepreneurs regarding the currently dominant standards in the area of marketing activities, including advertising campaigns, are also changing. Currently, the majority of entrepreneurs setting up a business, when planning marketing activities and advertising campaigns, decide to spend most of the funds accumulated for these purposes in Internet marketing (Kępiński, et al., 2015).

Since 2008, i.e. from the onset of the global financial crisis, advertising revenues in the printed press have decreased. Since 2007, the number of copies counted in millions of printed journals has also dropped significantly. The strongest decline in this respect was recorded for the category of printed dailies. The declines in sales and advertising revenues recorded in this period also contributed to a significant decline in the number of traditionally published press titles. According to the data of the Press Distribution Control Union there were 61 national and regional dailies operating in 2007. In March 2013, however, this number dropped to 36 traditionally published press titles (Kaszuwara, Dwornik, 2019). These processes are caused by the growing popularity of Internet information portals, which are used by an increasing part of the society. The tendency to increase the importance of the Internet as an important or also main information medium started to be visible in a significant and growing part of the society as of the end of the 1990s. In recent years, due to the strong development of social networks, this tendency has significantly strengthened (Kos-Łabędowicz, 2015).

The source literature review shows that since the beginning of this century, most readers of traditionally published newspapers have changed their press sources of information to their Internet equivalents. Press readers have not stopped reading news media, but changed media information channels to those in which access to information is more convenient, cheaper or free, and the published information is more up-to-date. These criteria are met by Internet news portals used by an increasing number of readers of the traditionally published press. Analyses carried out by research institutions involved in analysing the development of the media market in Poland, such as Megapanel, Gemius or Polskie Badania Internetu, have confirmed the thesis of the growing importance of Internet news portals as an important or main information medium among Polish citizens (Gołębiowska, 2016). Moreover, these data show that in the period in which dailies lost almost half of their readers, the number of Internet users regularly visiting online news services increased twice (Kaszuwara, Dwornik, 2019).

In order to improve their operations, public institutions, including local government units as well as business entities should deploy new ICT and Internet information technologies (*Innowacje w sektorze publicznym* …, 2013). One of the fields in which certain new Internet media are being applied is marketing and the information services offered through the Internet. In the process of electronic publishing of local and municipal magazines, ICT information technologies and new Internet media are used (Orłowski, 2015). The above-mentioned new media also include social networking sites, where local government units, mainly municipalities and counties, promote their offer addressed at citizens and business entities, and present published issues of electronic local and municipal magazines or individual articles and information materials posted in them.

The growth of social networks as an important information medium is presented in the below chart, which shows the number of users of the leading social media outlets.
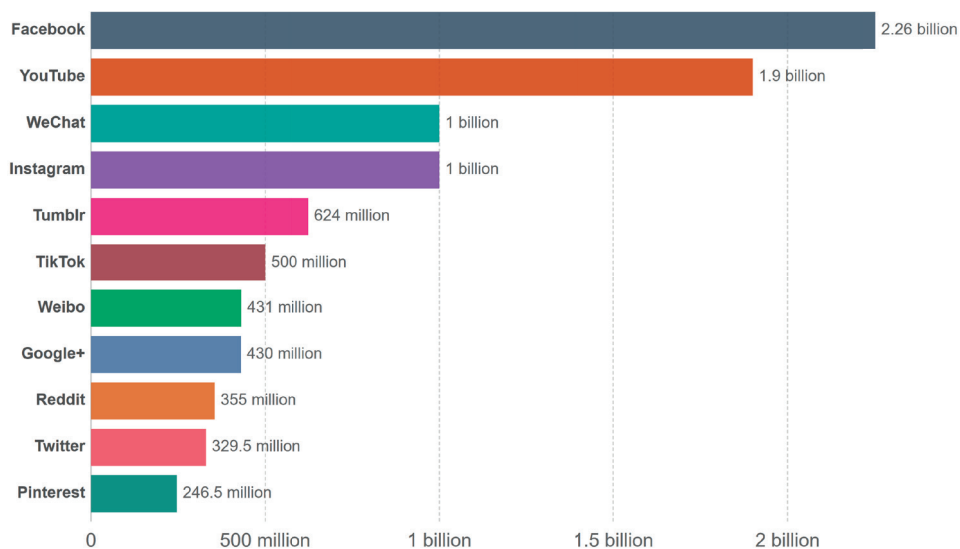
Figure 5. Number of people using social media platforms in 2018. Estimates correspond to monthly active users (MAUs). Facebook, for example, measures MAUs as users that have logged in during the past 30 days

Source: (*Monthly active users*, 2017)

Due to the development of the Internet, the scale of electronic publishing of the press, including the local and municipal press, keeps growing. Electronic local and local government press can be an important supplement to the information offer contained on the website of a particular municipality or district. Electronically published local and municipal press can describe current social, economic and cultural issues of interest to citizens. For example, the key problems described in this local and self-government press include economic issues, the situation on the local labour market, actions of local governments taken to improve the situation on the labour market and to activate entrepreneurship (Prokopowicz, 2016). In this way, the local government press can perform additional, particularly important socio-economic, and therefore public functions. Information published in the local and self-government press on, for example, actions taken by the municipality to activate entrepreneurship and innovation of citizens and entrepreneurs operating in the area of a specific local government unit can support these actions (Sarnowski, Prokopowicz, ed., 2016).

Local and municipal government press performs its special social mission. It fulfils its special role if the articles and information materials published provide verifiable data and information of particular relevance to citizens and business entities. Information published in the articles should present certain issues objectively and in such a way that citizens do not perceive these publications as an instrument serving as a propaganda medium for those that hold the positions of mayor, city president or mayor in a particular local government unit. The issue of

the importance of publishing local and municipal magazines electronically on the Internet is growing steadily year on year because the number of Internet users in society keeps growing rapidly. This has been presented in the chart below.
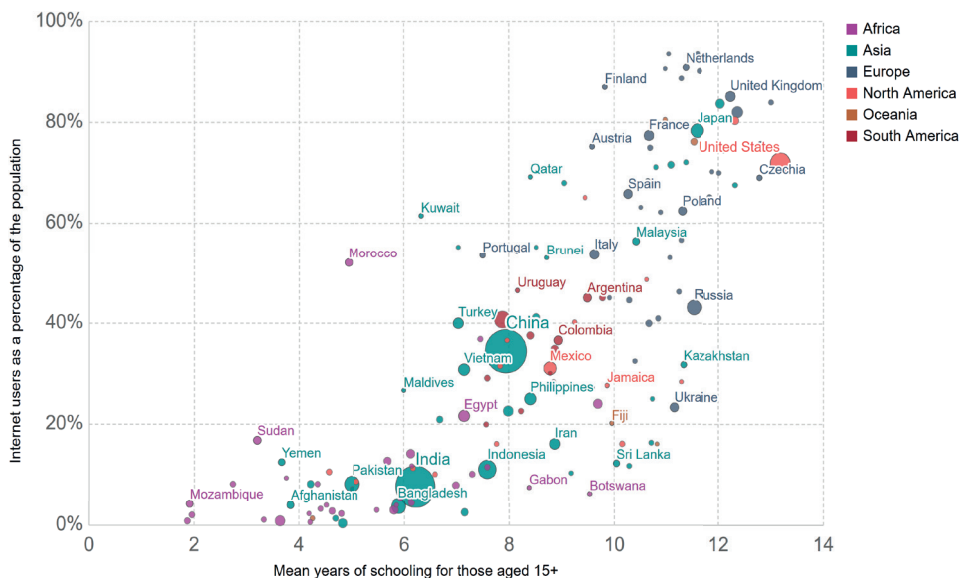

Figure 6. Correlation between Internet usage and mean years of schooling, 2010. Internet usage is defined as Internet users as a percentage of the population, and mean years of schooling is for those aged 15+

Source: (*Internet Users by World Region*, 2017)

The ongoing development of ICT information technology applications and Industry 4.0, including Big Data, cloud computing, Internet of Things technologies, among others, facilitates the development of online platforms for electronic editions of magazines. The aforementioned development of online platforms for electronic editions of magazines also takes into account the issue of devices used by Internet users to access the Internet. In recent years, mobile devices, including smartphones used by citizens to access the various information services available on the Internet, have been growing in importance. The chart below related to the development of Internet access technology from the level of various ICT information technology devices shows that in recent years there has been a significant increase in the share of Internet of Things technology devices and mobile devices, mainly smartphones used as devices to access the Internet and the use of various information services available via the Internet. Apart from information services, Internet users use their mobile devices increasingly frequently to make payments related to e-commerce purchases and make use of various new information services. In recent years, in terms of information services, Internet users have increasingly drawn on various

social media and specialized portals for the provision of specific information services, e.g., on geolocation in the field, means of public transportation, necessary formalities carried out by citizens with public institutions and offices.
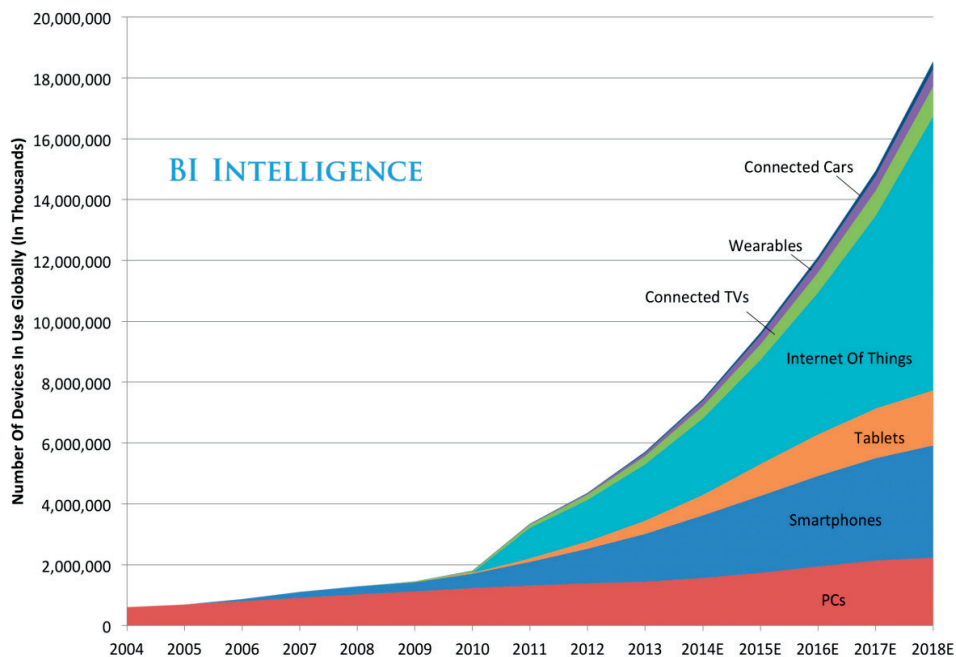

Figure 7. Development of Internet access technology from various ICT information technology devices

Source: (*The Internet of Everything…*, 2014)

The chart shows a significant increase in the types of devices used by Internet users to access Internet information services. Part of the population accesses the Internet from desktop computers, however, there is a rapidly growing number of mobile users who access the Internet mainly via smartphones. Recent developments in Internet technology have been determined, among other things, by the application of such technologies as machine learning, deep learning, artificial intelligence, the Internet of Things, Big Data database systems and other advanced information processing technologies typical of the current fourth technological revolution referred to as Industry 4.0 (*The Internet of Everything…*, 2014). The following figure presents most possible security breaches for the components of Industry 4.0.
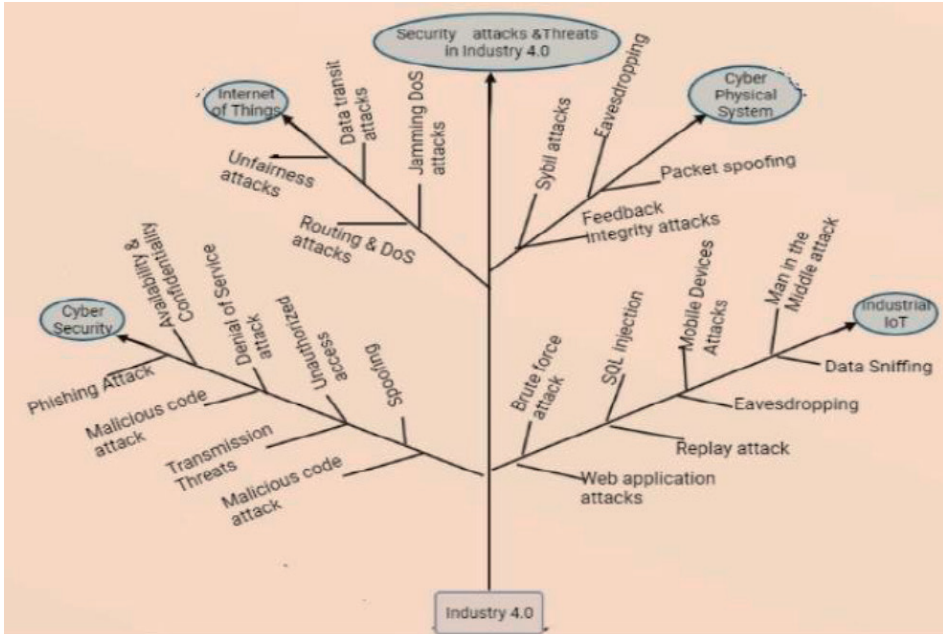
Figure 8. Most possible security breaches for the components of Industry 4.0

Source: (Ramaiah, Chithanuru, Padma, Ravi, 2022)

Among the most dynamically developing areas of information and communication technology, which determine further steps in the progress of online e-services, is the diffusion of standards for carrying out financial operations in the so-called cloud as well as with the use of large data sets collected on Big Data platforms (Chen, Zhang, 2014).

Figure 9. Diagram of the structure of the cloud computing system

Source: (Fan, Han, Liu, 2013)

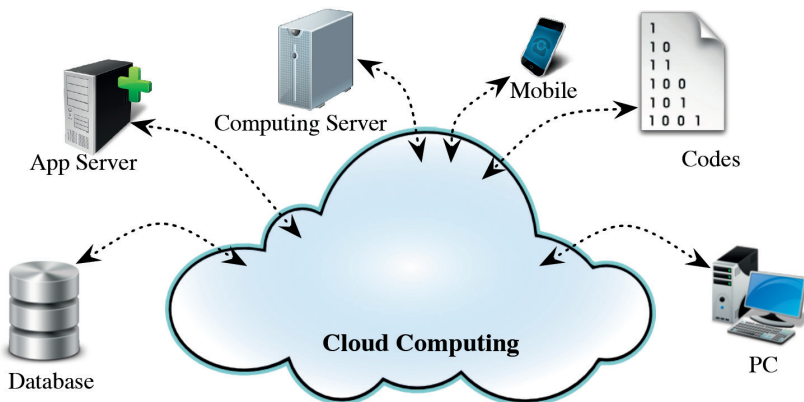In recent years, there has been a growing scale of applications of cloud computing, i.e. a service that enables the storage, archiving and use of stored data, which is accessed via the Internet, through computers in another location. This technology makes it possible to remotely use, via the Internet, computers equipped with microprocessors characterized by high computing power and large storage disk capacity, and thus optimize the expenditure on one's own IT equipment (Szpor, ed., 2013). The use of this cloud technology is also characterized by certain positive aspects, which can be described as enhanced convenience for the user (Prokopowicz, 2017c). This is due to the fact that data located in the cloud can be accessed from any device that may be connected to the Internet, so not only from a computer, but also from the level of a tablet, smartphone or any other device connected online with the Internet.

3. Key determinants of the development of online editions of the local and municipal press

As part of the process of information globalization driven mainly by the Internet, significant global changes have been taking place for some time in modern economies, including in national institutions and local government public sectors. Public sector institutions, including local government units, are also improving their activities in collecting, processing and sharing data via the Internet with other entities, including citizens and businesses. At the same time, processes are progressing to improve the security of data storage and information sharing on the Internet. The processes also increasingly apply to the publishing activities of editors of local government, local and other journals successively increasing the scale of digitization and Internetization of publishing activities.

One of the important determinants of information globalization is the increasing use of online information services by citizens. The following figure shows a map depicting the percentage of each country's population that uses the Internet. The map below shows that already 3 years before the coronavirus pandemic (Covid-19), the bulk of the globe's population was using the Internet. During recent years and especially during the pandemic, the percentage of citizens using the Internet has increased even further. Poland is one of the countries where a significant proportion of citizens use various online information services.
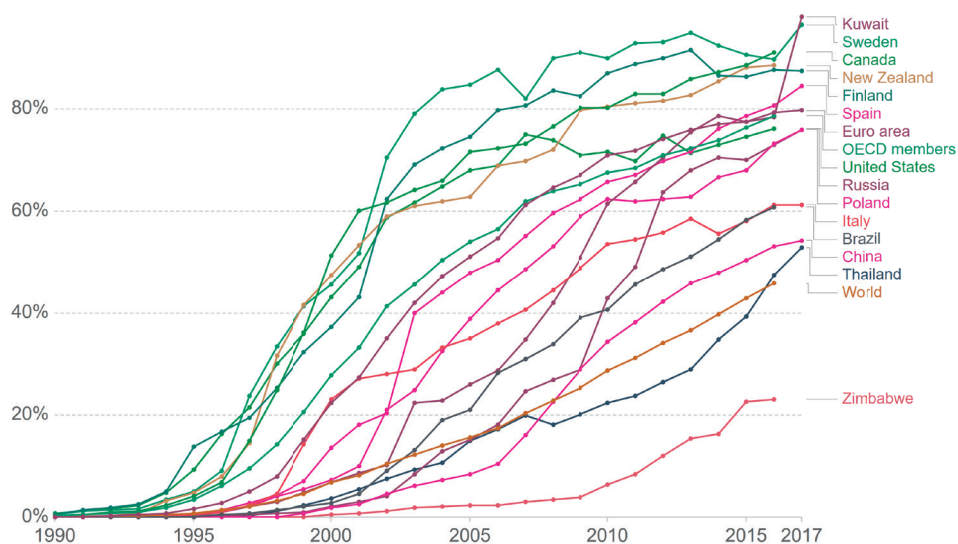
Figure 10. Share of the population using the Internet, 2017. All individuals who have used the Internet in the last 3 months are considered Internet users. The Internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV etc.

Source: (*Individuals using the Internet,* 2017)

The increase in the scale of digitization and Internetization of remote communication processes, economic processes, the functioning of public institutions determines the need to improve the security techniques of data storage and information sharing on the Internet. This issue also applies to public institutions, business entities and magazine publishers whose dynamic development is determined, among other things, by the issue of effective implementation of technological innovations in their operations.

The results of numerous studies confirm the increase noted in recent years in the importance of social networking sites as an essential, alternative or main information medium for a large part of Internet users. The Internet as a source of information is used by an increasing number of citizens of societies in various countries, including Poland (Gołębiowska, 2017). On the other hand, individual online information sources differ greatly in terms of the reliability of published information. In the category of online journals, there are big differences in this matter. The same is the case with Internet information portals run by various, more or less recognizable and recognized institutions and economic entities. The research carried out among Internet users, published in the IAB Poland Report "Disinformation in the Internet", shows that the lowest level of credibility of published content is characteristic of social networks, where intentionally or mistakenly created news containing false information, i.e. the so-called fake news, may be quickly spread by social network users thanks to viral marketing.

In addition, a significant part of those users, unaware of the falsehood contained in a specific post, comment, banner or news, clicks like and makes it available to other users. In this way, fake news containing false, unverified information can gain considerable popularity at a certain time on social networks (*To media społecznościowe…,* 2018). On the other extreme of the reliability of information contained in specific information media there are representatives of classic, traditional sources of information. In this respect, radio media and traditionally published magazines are leaders of reliable information. The issue of credibility of the published content is therefore one of the main factors that determine its survival in the era of Internet domination.

Internet information portals and social networking sites have become the main source of information for a large part of the society in recent years. New online media, including social media portals, are already having a great impact on shaping of the public opinion. The main determinants of this impact are as follows:

1. Activity of users of social media portals, the number of users, the scale of this activity, the share of specific social media portals in the entire market of information services available in new Internet media and in the context of the entirety of online and traditional media (Matosek, Prokopowicz, 2017).

2. Effectiveness of verification and anti-spam algorithms that limit the operation of automated applications, including robots used by some users of these portals and cybercriminals (Gwoździewicz, Prokopowicz, 2017b). The level of accuracy and perfection of those algorithms, which, while catching illegal activities, inconsistent with the Regulations of the possible scope of activity of the person using a given social media portal, should not limit the freedom of speech, i.e. the basic principle of democracy and free access to knowledge.

3. Possibilities of creating false, multiple duplicate accounts on social media portals in order to post many memes on these fake accounts, duplicated in thousands and millions of copies in order to create the so-called information noise on a specific topic. The issue of tools created for an effective, intelligent process of selecting new memes in order to catch and remove or block profiles on which the practices are inconsistent with the rules of the possible scope of activity of the user of a given social media portal, taking into account the principle of freedom of speech, preference for substantive, elementary principles of personal culture, etc. is essential.

4. The use of Big Data Analytics (Prokopowicz, 2017b) to verify changes in the level of awareness of Internet users, including users of social media portals, on specific topics. The information thus collected is then used to develop certain advertising campaigns. This analytics is already in use of technology companies running social media portals, companies from the information and marketing services sector, and a growing number of corporations, large companies operating in various sectors and branches of the economy (Sarnowski, Prokopowicz, 2015).

5. Efficiency, effectiveness of using marketing instruments available on social media portals, e.g. duplicating memes created according to the concept of Real-Time marketing as an important element of viral marketing. Another important issue is that of creating innovative solutions to activate users of social media portals to click, e.g. "Share", e.g. by creating video recordings in which an average user of a specific social media portal speaks privately to friends on a given topic, while being a directed advertising spot, which is then passed on and duplicated on millions of subsequent user accounts of this portal.

New Internet media, including social media in particular, keep developing dynamically thanks to their specificity that allows the participation of users of these portals in the process of co-creating viral marketing. This is a feature that distinguishes social media from other types of media. This stems from the fact that without incurring high financial expenditures, a citizen can conduct the activity of promoting certain content, promoting himself or herself or certain products, services, his activity and/or its effects. Thanks to this formula, social media marketing activities have developed so quickly. However, on the other hand, despite the constantly developing control systems of content entered by citizens, despite the involvement of modern Industry 4.0 technologies in the developed systems of verification of entered comments, posts, entries, banners, etc., these systems still remain imperfect, since in the content posted on popular social networks (such as Facebook, Instagram, TikTok, Tweeter, etc.) there is a lot of untrustworthy information, fake news, information not confirmed by scientific research, not verified by users of these websites, who often click "Share", "Like" etc. for specific comments, post banners, videos, etc. without their prior proper verification. In such a way social media portals have been used in recent years to influence public opinion, to shape general social awareness by various organizations, including informal organizations, acting unethically and unreliably in terms of information policy.

Popular social media have also proven helpful in promoting specific information on anti-pandemic safety in the current situation of the SARS-CoV-2 (Covid-19) coronavirus pandemic (Golczak, et al., 2021). Social media portals are becoming one of the main sources of information for a large part of the society. New online media, including social media, are not only used to communicate with friends, but are also used to promote specific products, services, missions, logos and the image of companies and people. In addition, group pages of fans of specific brands of companies, products and/or services, offers of service companies, residents of a specific city district, etc. are increasingly frequently created on social networks. On the other hand, social networking sites increasingly shape the general social awareness and public opinion on specific topics, including those that are key problems in the development of civilization. Social networks are increasingly influencing people's social relationships.

4. Increase in the risk of cybercrime and improving cybersecurity of data transfer on the Internet

In recent years, many countries have been diagnosed with attacks by cybercriminals using dangerous Trojans and other types of viruses, including new versions of Ransomware Trojans. These Trojans spread via e-mails that automatically distribute themselves from infected e-mail accounts and send infected e-mails to all e-mail contacts of a specific virus-infected e-mail box. The virus is very dangerous because after opening the fake e-mail, the virus installs itself deeply in the computer and encrypts access to the discs, blocking access to their contents (Gwoździewicz, Prokopowicz, 2017a). The key categories of information stolen by these Trojans include personal data of customers of certain types of enterprises and public and financial institutions.

In view of the above, ensuring legal protection of personal data in cyberspace is being increasingly recognized as an inseparable factor of security in the context of the development of information society. The security of classified information is increasingly recognized as a determinant of the effective development of the national economy. Therefore, central state institutions should also take into account the improvement of classified information security systems, including citizens' personal data (Gałach, et al., 2013). The main idea of improving these security systems should be to ensure that natural persons and the economic entities and institutions created by them should be provided with the highest possible level of guarantee of safe use of new technologies, e.g. when using electronic media services, making online purchases or sharing information with friends around the world. In this way, the trust of Internet media customers will grow, also in the matter of personal data protection in cyberspace, which will contribute to the faster development of e-services that is primarily of interest to international settlement institutions and banks (Grzywacz, 2016).

Improvement of cybersecurity systems requires constant technological updating of risk management systems for the security of data transfer of IT systems, communication and transaction Internet platforms and Internet media systems (Gołębiowska, 2017). The need to improve the risk identification system, develop effective solutions to enhance the security of electronic data storage and transfer systems, including personal data, was also emphasized at the conference "5 Bank Safety Forum", which took place in Warsaw on May 10, 2016 (*Forum Bezpieczeństwa Banków*, 2016).

During this conference, various factors that determine the increase in threats of hacker attacks on Internet media systems were emphasized. The advisor to the Minister of Digitization Anna Streżyńska, General Włodzimierz Nowak, indicated the following determinants of electronic risk and security issues, including Internet systems for the storage and transfer of classified data (Prokopowicz, 2017a):

1. In terms of the security of data stored in IT systems, the weakest link is usually its users.

2. It is necessary to improve the functioning of the national cybersecurity system, especially with respect to government administration institutions, which need to be protected 24 hours a day, 365 days a year, by creating an early warning system about threats, continuous training and rigorous compliance by employees with multi-level security procedures.

3. Improving personal data protection procedures in order to prevent users from applying practices that disregard security procedures, in order to eliminate situations during which IT system administrators in offices create overly simple access passwords to data, because this results in their easy breaking by hackers, in order to facilitate their work (Gąsiorowski, Podsiedlik, 2015).

4. It is necessary to activate a closer cooperation of end users with hardware and software suppliers, which will allow quick response and creation of effective solutions to improve the security of classified information, when a new type of attack appears, resulting in e.g. data loss (Gałach, et al., 2015).

5. IT system administrators should pay more attention to the resistance of their systems' back-ups to attacks by hackers and the need for constant data archiving. Permanent cooperation between administrators and IT service providers is necessary in order to effectively counteract the so-called "Intelligent DDoS attacks" being a hidden attack, dispersed in the Internet on banks' websites, through several telecoms, i.e. mobile phone service providers (Grzywak, Widenka, 2015).

6. The issue of shortening the response time to hacker attacks is important, because new methods and types of hacking are created every day, while the procedure of purchasing new software, e.g. for ministries, often takes up to three years from selection to installation (Kosiński, 2015). Therefore, public institutions should use the database and knowledge base of other entities, e.g. banks, IT companies, telecoms, CERTs, i.e. teams established to respond to events that violate security on the Internet and operating in various companies. A good example is the war room specially created to protect the implementation of the 500 Plus Programme, which was able to identify and provide the police and the prosecutor's office with information about the first hackers who sent out false links on the Internet to applications submitted by beneficiaries of the 500 Plus programme already after 12 hours from the launch of this Programme.

7. Adaptation of national standards and procedures for data security in institutions operating in Poland to the EU NIS directive and recommendations M and D of the Polish Financial Supervision Authority. The European Parliament's NIS (Network and Information Security) Directive aims to ensure a common high level of network and information security within the European Union. Poland has 2 years to implement the NIS directive, i.e. to develop instruments to ensure a high level of network and information security with full adjustment of security regulations and procedures to EU standards (Lakomy, 2015).

In recent years, the issue of hacking attacks on Internet users' e-mail boxes has been one of the key issues of cybercrime. Lately, numerous e-mail users have received strange e-mails of unknown origin, which are sent out as spam from other private e-mail accounts or other accounts with false information. Attachments containing false information are appended to many of these suspicious emails, usually distributed by cybercriminals and hackers (*Forum Bezpieczeństwa Banków*, 2016). The attachments are usually of the document type of WORD* .doc format, Acrobat Reader* .pdf format or other formats, and often contain Ransomware-type viruses. These are very dangerous viruses that encrypt access to the computer's disk. In addition, cybercriminals increasingly frequently use e-mail boxes established on the e-mail portal to send infected e-mails to other Internet users by generating fake e-mails so that they look as if a specific e-mail user would send e-mails prepared by cybercriminals to their friends. These types of cybercriminal techniques are becoming more common. Why do the dominant Internet technology companies that offer the e-mail service fail to improve the security systems of e-mail communication using e-mail boxes in order to significantly reduce the activity of cybercriminals harmful to citizens and Internet users? A good solution is to encrypt the transmitted data and establish strong passwords to log in to IT systems in the cloud. In addition, in Big Data database systems, technologies for collecting and processing data in the cloud, other techniques are also used to protect data against the activities of cybercriminals and hackers (Górka, ed., 2014).

Based on web analytics conducted using Google's Google Trends tool, it appears that Internet users' interest in the issue of ransomware viruses has been growing in recent years. Unlike cybercriminal techniques based on the phishing formula, which have been known since the 1990s, the interest of Internet users operating in Poland in the problem of ransomware viruses grows significantly only after 2010. The results of the aforementioned analysis of the interest of Internet users in Poland in cybercrime and cybersecurity issues, conducted on the basis of selected keywords typed into the Google search engine between January 1, 2004 and June 14, 2023, are presented in the chart below.
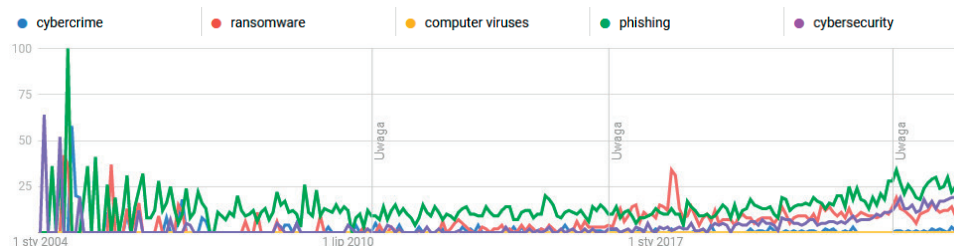

Figure 11. Analysis of the interest of Internet users in Poland in the issues of cybercrime and cybersecurity conducted on the basis of selected keywords typed into the Google search engine between January 1, 2004 and June 14, 2023

Source: own compilation based on Google Trends analytics

Despite the constantly improved security procedures in many institutions and business entities and the upgrading of IT systems by closing detected security gaps, the discussed scale of the cybercrime problem is not decreasing. This thesis is confirmed by recent results of analyses and tests conducted and presented in periodically published reports by technology company Trend Micro. Trend Micro analysts predicted a 25% increase in the number of new ransomware malware families in 2017 as compared to the previous year. The scale of this growth meant that on average cybercriminals created 15 new malware families per month. The analysis has shown that during the period under review, cybercriminals carried out their attacks mainly targeting larger companies and institutions, i.e. corporate entities from which they can extort a correspondingly higher ransom value (*Przewidywania dotyczące bezpieczeństwa…*, 2016).
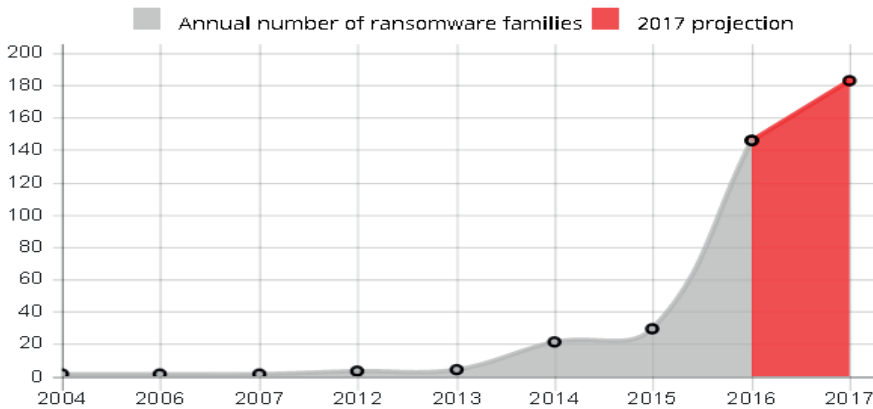

Figure 12. Counted annual growth of ransomware malware families, including forecast for 2017

Source: (*Przewidywania dotyczące bezpieczeństwa…*, 2016)

The importance of both Data Science and cybersecurity will be increasing in the coming years, as technologies of advanced computerized information processing and data teletransmission are developing on the Internet, and these issues are also related to the security of processing, data collection in the cloud, and data transmission on the Internet. Currently, the importance of information technologies etc. related to the technological revolution referred to as Industry 4.0 keeps growing. This revolution is determined by the development of the following advanced information processing technologies: Big Data database technologies, cloud computing, machine learning, Internet of Things, artificial intelligence, Business Intelligence and other advanced data processing technologies Data Mining.

Digitized full knowledge and scientific achievements create new categories of information security risk on the Internet by making knowledge bases available on the Internet. In this way, new concepts of Internet information security risk

management processes are developed. The improvement of computerized security instruments for large collections of information stored in Big Data database systems is one of the key aspects of information security risk management on the Internet. In the next few years, the issue of managing the risk of information security stored in Big Data database systems and knowledge bases made available on the Internet, information contained in online information portals and social media portals will become a key problem in analysing the development of cybercrime and improving cybersecurity instruments.

The research shows that the media sector belongs to those sectors in the national economy in which the possibilities of using ICT, Internet, Industry 4.0, including artificial intelligence, learning machines, Internet of Things, Business Intelligence, Big Data, Data Analytics, etc. are the greatest. Some of the ICT, Internet and Industry 4.0 information technologies have already been implemented for many years in sales systems, electronic and mobile media systems, data analytics, cybercrime risk management, etc. On the other hand, the use of broad opportunities offered by artificial intelligence in the field of the media is just beginning, but the potential for this use is huge. The following issues are among the key determinants of the development of electronic Internet media, the growth of digitization and Internetization of the media and the security of data transfer on the Internet (Chodorek, et al., 2007):

a) development of Internet technologies used in economic processes;
b) development of electronic Internet media, including mobile media developed on mobile devices, primarily smartphones;
c) improving techniques for the transfer of personal and sensitive data via the Internet. Internet data transfer security;
d) analysis of techniques used by cybercriminals and improvement of security systems and risk management processes of IT systems and data transfer on the Internet;
e) the use of blockchain technology and Industry 4.0 technology to improve cybersecurity systems.

Internet analytics conducted using the Google Trends tool show that Internet users' interest in issues of artificial intelligence and some other technologies typical of the current fourth technological revolution, Industry 4.0 and cybersecurity issues has been growing in recent years. It is interesting to note that at the beginning of the second decade of the current century, Internet users' searches for Cloud computing issues were declining and Big Data then began to increase noticeably. In addition, over the past few years, the interest of Internet users in issues related to artificial intelligence, deep learning and cyber security has been growing noticeably. The results of the aforementioned analysis of the interest of Internet users in Poland in the topics of selected Industry 4.0 technologies, including artificial intelligence, deep learning, Big Data, Cloud computing and cybersecurity, conducted on the basis of selected keywords typed into the Google search engine between January 1, 2010 and June 14, 2023, are shown in the chart below.
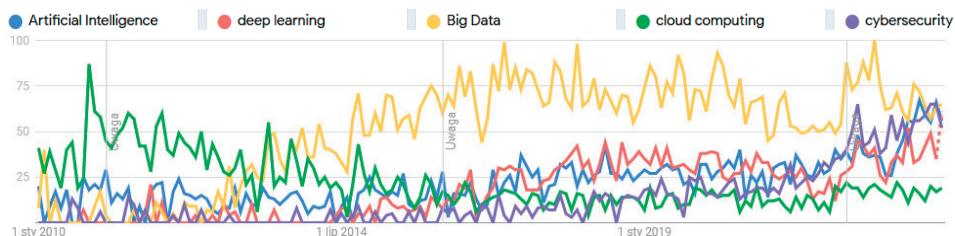
Figure 13. Analysis of the interest of Internet users in Poland in the topics of selected Industry 4.0 technologies, including artificial intelligence, deep learning, Big Data, Cloud computing, and cybersecurity conducted on the basis of selected keywords typed into the Google search engine between January 1, 2010 and June 14, 2023

Source: (own compilation based on Google Trends analytics)

As artificial intelligence develops, creating different variants and versions of it, the number of applications of this technology is growing rapidly. In addition, the number of applications of artificial intelligence in combination with robotics, with Big Data analytics, the Internet of Things, machine learning and other technologies typical of the current fourth technological revolution and Industry 4.0 is also growing. During the SARS-CoV-2 (Covid-19) coronavirus pandemic, applications of artificial intelligence were also developed in the field of modelling and forecasting the development of the pandemic, in medicine, in improving cyber-security techniques (Zhang, et al., 2021), improving remote communication techniques implemented via online video-conferencing platforms, improving computer games, managing complex economic processes, etc. In recent years, artificial intelligence technologies are proving to be helpful in perfecting cyber security techniques for data transfer (Shamiulla, 2019), including those realized through e-mail communication (Gibert, 2020).

The key application areas of artificial intelligence in the field of cyber security are shown in the figure below.
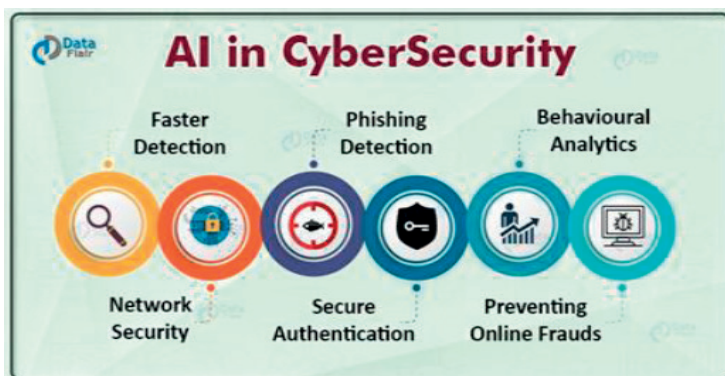

Figure 14. Applications of artificial intelligence in the field of cyber security

Source: (Srinivas, Vijay Sai, Saketh, Neelima, Alekhya, 2022)

Based on an analysis of 138 articles published in recent years in journals indexed in Web of Science and Scopus on the issues of Artificial Intelligence, Machine Learning, Deep Learning, Cyber Security, Industry 4.0, a bibliological study was conducted (De Azambuja, et al., 202). The figure below shows the representativeness of the identified keywords divided into seven clusters. An analysis of the representativeness of keywords found in publications was conducted. Keywords are defined by authors to attract readers, with general, intermediate or specific research terms. The larger circle reflects the representativeness of keywords in the cluster. Cluster 1 (blue) has the highest representativeness. Then cluster 2 (green) and cluster 3 (purple), and so on.
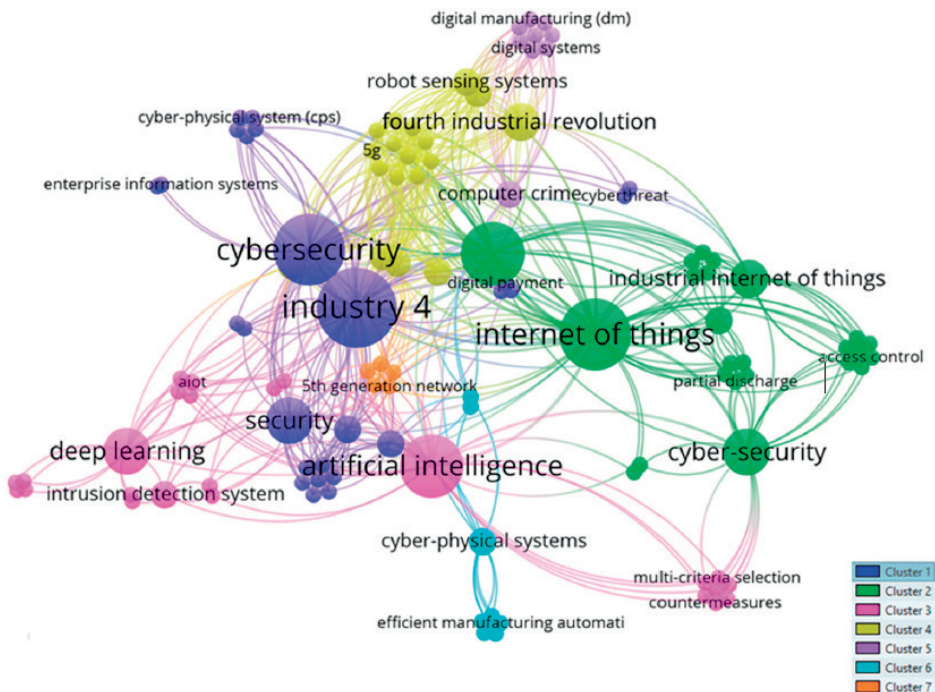

Figure 15. Keywords

Source: (De Azambuja, Plesker, Schützer, Anderl, Schleich, Almeida, 2023)

In view of the above, on the one hand, with the help of artificial intelligence, cybersecurity techniques (Buce, 2021) can be improved, and on the other hand, this technology can be increasingly used in journalism in the processing of available data on the Internet and writing texts for journalism, i.e. texts published in magazines. However, it is necessary to introduce appropriate legal regulations on copyright in the situation of creating a specific article through the use of artificial intelligence on the basis of other texts available on the Internet. It is also necessary to legally fix the issue of labelling works created by artificial intelligence,

and to introduce legal regulations to prevent the development of disinformation on the Internet generated by the use of various types of applications equipped with artificial intelligence technology,

5. Conclusions

Summarizing the above considerations, it was found that security systems for data transfer and processing, remote financial transactions, Internet media, e-logistics, e-administration, e-mail communication and social media etc. carried out on the Internet are constantly being improved in connection with the development of cybercrime on the Internet. In addition to Internet media, the information that is crucial for state security is primarily protected, contained in the internal IT systems of central state institutions. Cybercriminal attacks on online media systems and hacker attacks aimed at companies to extort a ransom for decryption of data encrypted by malicious software on disks, including cybercriminal ransomware attacks and hacker attacks from abroad on central institutions, ministries of key importance for the state security and other institutions of the public administration sector and enterprises of strategic branches of the national economy are more and more common.

The considerations in this article show that in recent years the importance and influence of new online media in the process of digitization of documents and in the processes of remote communication has been growing. Business entities and institutions increasingly use new Internet media to improve relations with the environment of potential customers and business partners. These processes also apply to the local press and lead to the development of electronic local and self-government magazines. The main purpose of this article was to indicate the growing importance of the issue of cybersecurity in the use of new Internet media in the development of electronic local and self-government magazines. This article indicated the importance and impact of the development of new online media in the process of digitization of documents and the development of electronic, digital versions of local and self-government magazines. In the context of the conducted research, the following research thesis was formulated: The development of cybercrime related to the theft of sensitive data on the Internet determines the need for continuous improvement of cybersecurity techniques and instruments. Improving the cybersecurity of the use of new Internet media is an important factor in the development of electronic and online local and self-government magazines. Based on the conducted research, the above research thesis has been confirmed.

New online media, including social media, have become one of the key factors in the current information and social globalization. The SARS-CoV-2 coronavirus pandemic significantly accelerated the processes of digitization of the economy and the Internetization of remote communication processes. The conclusions from the conducted research confirm the main research thesis. The analysis

has proven that there is a fundamental relationship between the improvement of cybersecurity techniques and the process of digitization and Internetization of the media, including press media. Improving the cybersecurity of the use of new Internet media concerns the development of electronic and online local and self-government magazines as well. The text shows the importance of the role of the coronavirus pandemic, which occurred in March 2020, in accelerating the process of the Internetization of journals. The coronavirus pandemic consolidated to a large extent the trends of shifting the publishing processes of local and self-government magazines from printed to online versions, which had been taking place since the beginning of the present 21st century. The necessity to improve cybersecurity systems and instruments is also a derivative of these processes.

Recently there has been a steady increase in the number of reported cases of cybercrimes (Polaczyk, 2016). Newer and newer techniques for unauthorized access by hackers to the online profiles of customers logging into certain online information services via a laptop or smartphone are also emerging. Therefore, ensuring legal protection of classified data including personal data in cyberspace should be a key aspect in the era of continuous development of ICT and the information society. Based on the considerations and an analysis carried out in this article, it is clear that owing to the development of ICT information technology and analytics using Industry 4.0 advanced data processing technologies, including Data Analytics, Data Science performed on large data sets collected on Big Data database system platforms, the importance of improving security systems for the information stored and analysed in these Big Data systems is also growing. In connection with the fact that lately the use of electronic media, new online media, devices equipped with permanent access to the mobile Internet, including especially smartphones so the importance of improving cyber security techniques and instruments is growing as well. Also growing in importance is the improvement of cyber-security techniques for collecting data and providing access to information published as part of the Internet-led publishing process of journals, including local and municipal journals published by local governments.

Research in recent years suggests that a technology that could help optimize remote communications and information transfer within a corporation is artificial intelligence. Artificial intelligence can help optimize the flow of information and data transfer within a corporation's intranet. In addition to this, Industry 4.0 technologies, including artificial intelligence, can help improve cyber-security techniques for data transfer, including that carried out through email communication (Abbas, et al., 2019).

Funding

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CYBERBEZPIECZEŃSTWO I INNE DETERMINANTY INTERNETYZACJI CZASOPISM LOKALNYCH I SAMORZĄDOWYCH

Abstrakt

Głównym celem artykułu było wskazanie rosnącego znaczenia problematyki cyberbezpieczeństwa wykorzystania nowych mediów internetowych w rozwoju elektronicznych czasopism lokalnych i samorządowych. W artykule wskazano na znaczenie i wpływ rozwoju nowych mediów internetowych w procesie digitalizacji dokumentów i tworzenia elektronicznych, cyfrowych wersji czasopism lokalnych i samorządowych. W kontekście przeprowadzonych badań sformułowano następującą tezę badawczą: Rozwój cyberprzestępczości związanej z kradzieżą wrażliwych danych w Internecie determinuje potrzebę ciągłego doskonalenia technik i instrumentów cyberbezpieczeństwa. Poprawa cyberbezpieczeństwa w zakresie wykorzystania nowych mediów internetowych jest istotnym czynnikiem rozwoju elektronicznych i internetowych pism samorządowych i lokalnych. Nowe media internetowe, w tym media społecznościowe, stały się jednym z kluczowych czynników obecnej globalizacji informacyjnej i społecznej. Pandemia koronawirusa SARS-CoV-2 znacznie przyspieszyła procesy cyfryzacji gospodarki i internetyzacji procesów komunikacji na odległość. Wnioski z przeprowadzonych badań potwierdzają główną tezę badawczą. Analiza dowodzi, że istnieje zasadnicza zależność pomiędzy doskonaleniem technik cyberbezpieczeństwa a procesem cyfryzacji i internetyzacji mediów, w tym mediów prasowych. Artykuł wskazuje na rosnące znaczenie problematyki cyberbezpieczeństwa wykorzystania nowych mediów internetowych w rozwoju elektronicznych pism lokalnych i samorządowych. Zawarte w artykule rozważania i wyniki analiz potwierdzają tezę, że rozwój cyberprzestępczej kradzieży wrażliwych danych w Internecie wymusza konieczność ciągłego doskonalenia technik i instrumentów cyberbezpieczeństwa. Poprawa cyberbezpieczeństwa w zakresie wykorzystania nowych mediów internetowych dotyczy również rozwoju elektronicznych i internetowych pism samorządowych i lokalnych. W tekście pokazano, jak ważną rolę w przyspieszeniu procesu internetyzacji czasopism odegrała pandemia koronawirusa, która miała miejsce w marcu 2020 r.