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Contents

Introduction

At the end of March, the Czech Statistical Office published its summary publication **"Information Society in Figures 2018"**, which brings the newest information on the development of **information and digital society** in the Czech Republic and other EU countries by means set of tables and figures outputs.

In this data publication you will find on its 170 pages, 86 tables and 260 graphs that contain the newest data mainly concerning the **internet usage by individuals and enterprises**, as well as by **public administration**, **education** or **healthcare**. It also includes data and information concerning the **telecommunication and internet infrastructure**. Each chapter is supplemented by brief guidance and commentaries to the figures. This includes the most interesting findings concerning the information society in the Czech Republic and other EU countries.

The complete version of *Information Society in Figures* **may be downloaded for free** here: https://www.czso.cz/csu/czso/information-society-in-figures

The publication is followed by this summarized text commentary "Development of the Information Society in the Czech Republic and Other EU Countries" you are reading right now. This text summary mainly reflects the data contents of the Information Society in Figures 2018, however, some of the information is elaborated further. The report places emphasis not only on the developmental point of view (in some cases the time series begin since the early 1990s), but also on attempts to capture the latest trends in a highly changing and innovative ICT environment. At the same time, there are international comparisons for selected indicators within the EU countries.

The data provided in this publication arises mainly from the **official yearly investigation of the Czech Statistical Office**, which is performed in accordance with the Regulation of the European Parliament and Council (ES) No. 808/2004 concerning Community statistics on the ICT usage among individuals and enterprises. The detailed result of this year's publication of the aforementioned investigation is available at the website of CZSO: https://www.czso.cz/csu/czso/vyuzivani_informacnich_technologii

The **international comparison** arises from data resources of Eurostat, the International Telecommunication Union (ITU), and the Organisation for Economic Cooperation and Development.

Furthermore, **administrative data sources** were used for the needs of the publication; these included for instance: Ministry of the Interior, Ministry of Education, Youth and Sports, Czech Financial Administration, Czech School Inspection, among others.

Over a long period of time, the CZSO has not only been monitoring the ICT usage in individual spheres of the society, but also the production of these technologies including the data related to investment, foreign trading, and qualified human resources in this field. This data has been processed in the publication named ***Information Economy in Figures***. Its up-to-date version is available under the following link: https://www.czso.cz/csu/czso/information_economy_in_figures

We believe that the statistics provided here will provide readers with valuable information. If you have any questions or comments about the published data, please do not hesitate to contact us. We also welcome any suggestions for improving our statistics.

Chapter A ICT Infrastructure

The key pillar necessary for primary development of the information society and digital economy these days is without a doubt a robust, reliable, and modern infrastructure, enabling the transfer of a huge amount of data necessary to provide services through fixed or mobile electronic networks. Telecommunications and Internet (ICT) infrastructure could be described as the basic building block of most information technologies and information society as a whole.

The Czech Statistical Office is aware of the ICT infrastructure's significance, and, on a regular basis, it processes main data concerning the development and status of this area. This chapter examines trends in the available services provided within fixed and mobile electronic communication networks measured mainly by number of voice (telephone) and internet/broadband (data) subscriptions and connections[1]. The initial focus is on telephony; after which it shifts to the internet infrastructure. Data used in this chapter are collected by the Czech Telecommunication Office from the telecommunication or internet service providers and should be distinguished from data based on ICT users' surveys.

A.1 Telecommunication infrastructure

Telecommunication infrastructure is the key pillar according to which the information and technological development of individual states has been evaluated in the past years. In the last millennium it was the fixed-telephone telecommunication service that was mainly used; since 2000 it has been the mobile telecommunication service, which has gradually become more popular.

Today many telecom companies offer service bundles via one single distribution method. This is also known as 'multiplay'. For instance, a company can now use the cable to supply television, internet and telephone services. Sometimes these services are offered in a single package through different distribution methods. Many Czech households nowadays obtain these multiple telecom services from a single provider.

Fixed telephone network penetration – Voice subscriptions via PSTN or VoIP[2]

Fixed telephone network, with its services, used to be a flagship of the entire communications sector. In the 20th century, fixed telephone line represented the basic infrastructure for the dissemination of speech and also featured the underlying technology platform for the development and spread of other technologies such as the internet. However, traditional fixed-line telephony has been declining in the Czech Republic since 2000, largely due to the rise of mobile service (fixed-mobile substitution) and to the increased use of IP telephony for fixed voice communication (VoIP technology).

- There has been a shift in the type of fixed-telephone connections used in the Czech Republic. The traditional PSTN and ISDN telephone network is losing ground, while the number of telephone connections via the internet (VoIP) was rising. In 2016, the Czech Republic had 917 thousand **VoIP connections**, compared to 462 thousand in 2010. The number of traditional fixed-telephone connections (PSTN lines) in 2016 was 832 thousand. Ten years before it was still 2.8 million. Packages that allow consumers to acquire multiple telecom services, such as TV, the internet and VoIP, in a single subscription have been gaining in popularity for some years.
- The number of **subscribers to voice services** provided by means of **public switched telephone network (PSTN)[3]** in the Czech Republic has been decreasing. Since 2001 when their number reached its maximum, the number decreased by 3 million to the above mentioned 832 thousand in 2016. As an

[1] A subscription (subscriber) to publicly accessible services of electronic communications (voice and data services in fixed and mobile communication networks) refers to natural (individual or household) or legal (enterprise, public organisation) person (entity), that has concluded a contract on the use of such services with a provider. Data presented here include solely services provided in the retail segment, i.e. services provided to end users.

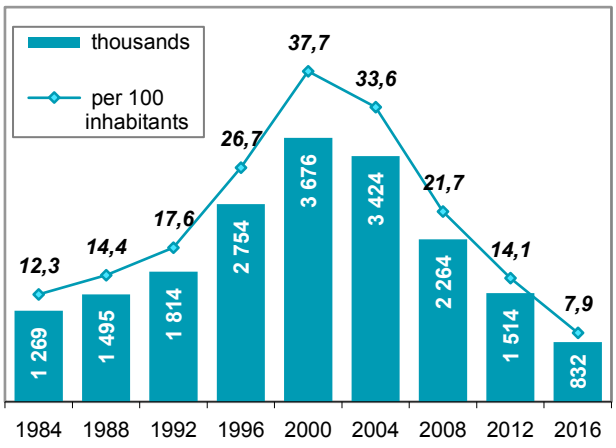
[2] Number of fixed-telephone voice subscriptions is measured as a number of active fixed traditional telephone lines/connections (PSTN) and number of voice subscriptions using VoIP technology.

[3] The PSTN (Public Switched Telephone Network) is a set of technical means defined by an active end point of the public switched telephone network and unambiguously determined by the telephone exchange ending. The number of fixed-voice subscriptions to PSTN lines is measured by number of active PSTN stations – formerly called main telephone stations – and are further classified as residential telephone lines and business telephone lines.

interesting fact can be mentioned that this number of main fixed telephone connections in 2016 is nearly equal to the number which was last recorded in 1972.

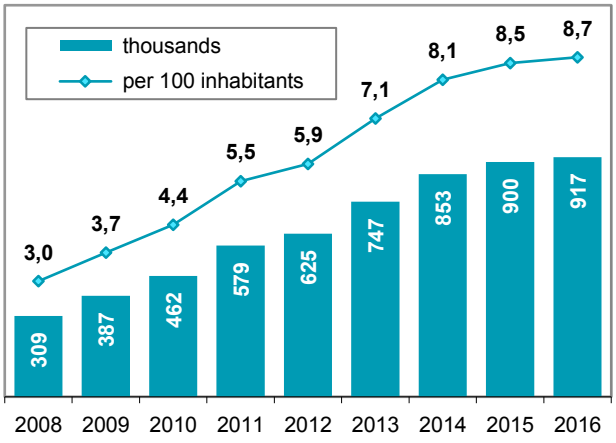
- In particular, the number of **"residential fixed telephone stations – consumer/citizen subscriptions"**, most frequently used at the turn of the millennium, is decreasing. Only in the past 15 years, has the number of subscriptions to the traditional fixed-telephone lines (PSTN) in Czech households decreased 6.5 times from the original 2.6 million in 2001, when mobile telephones started becoming popular with Czech households, to 400 thousand in 2016. In other words, whereas in 2001 a fixed telephone was owned by 75% of households, in 2016, it was only by 14% of them – along with Finland, the lowest share in all EU countries[4].
- In 2016, the number of **"business fixed telephone stations – business subscriptions"** using "traditional" fixed telephone lines (PSTN) was higher than the number of residential ones. Even in this case, however, there has been a significant decrease in recent years. For instance, in the years 1997 to 2008 their number was around 1 million. In 2016, the number decreased to 429 thousand business subscriptions.

Figure A1 Fixed-telephone voice subscriptions in the Czech Republic (only PSTN)



Source: Czech Telecommunication Office, 2018

Figure A2 Fixed-telephone voice subscriptions in the Czech Republic using VoIP



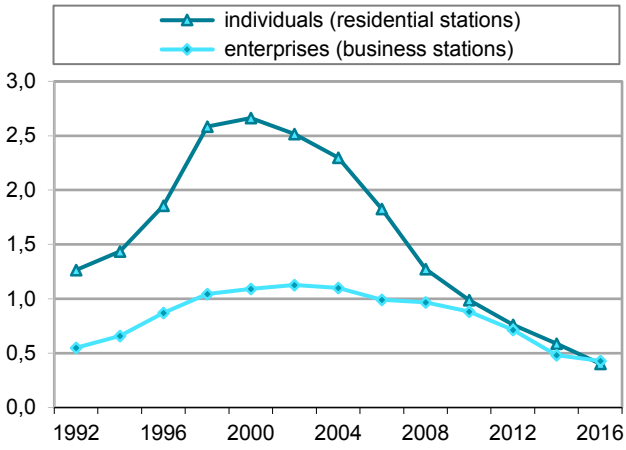
Source: Czech Telecommunication Office, 2018

- The decrease in usage of PSTN lines in the Czech Republic was partially compensated by means of **VoIP technology**[5]. In 2016, the number of subscribers to fixed-voice services by means of this IP technology was 917 thousand compared to 462 thousand in 2010. Over the last 6 years the number has nearly doubled, despite the fact that in recent years their number has not increased significantly.
- The main share in the aforementioned increase of VoIP technology for voice services in recent years, involves subscribers in the form of **enterprises** and other legal entities, whose number continues to grow as opposed to the number of **individuals (households)** using this technology for making telephone calls. In 2016, the number of enterprises that were subscribers to voice services via fixed network by means of VoIP technology already reached 619 thousand, i.e. nearly a fourfold number compared to the year 2010. As opposed to that, since 2013, when the number reached its maximum (383 thousand), the popularity of this technology in Czech households is decreasing. In 2016, this internet technology for access to voice (telephone) services was used by less than 300 thousand Czech households, i.e. the same number as in 2010.

[4] Further details on the number of households using fixed telephone lines are available in Chapter B.1.

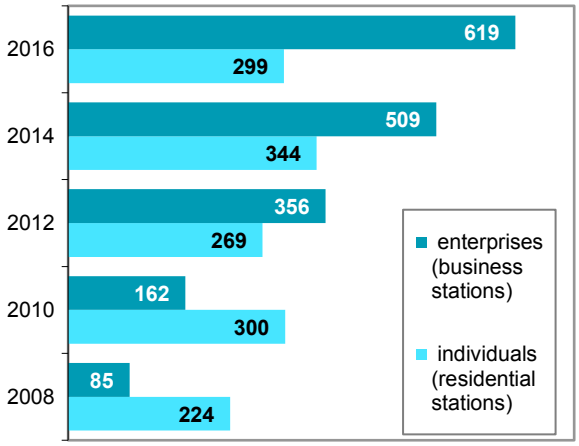
[5] The VoIP (Voice over Internet Protocol) service, also called IP telephony enables voice transmission over packet-switched data networks and signal transmission by means of Internet Protocol (IP) packets. Voice services by means of the VoIP technology are an alternative to voice services provided by means of the traditional public switched telephone network (PSTN). The number of fixed-voice subscriptions to VoIP corresponds to the number of active telephone numbers used by the subscribers.

Figure A3 Voice-fixed subscriptions using PSTN stations in the Czech Republic (mil.)



Source: Czech Telecommunication Office, 2018

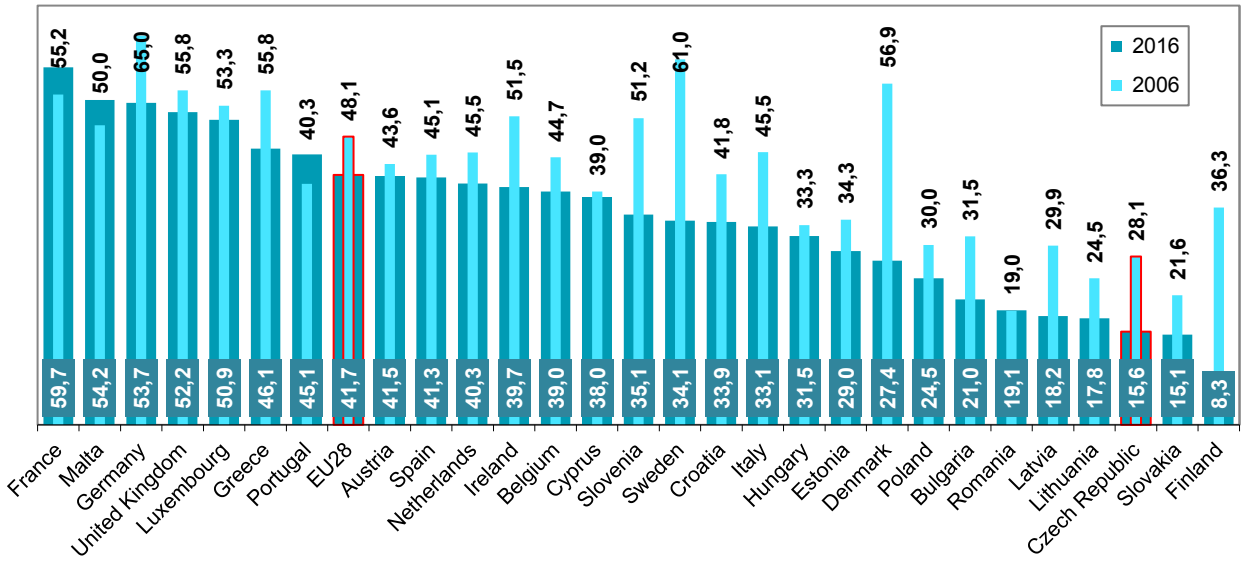
Figure A4 Voice fixed subcsriptions using VoIP stations in the Czech Republic (thous.)



Source: Czech Telecommunication Office, 2018

- The growing preponderance of mobile-cellular subscriptions over fixed-telephone subscriptions has been one of the most prominent trends in ICTs since the beginning of the century, with mobile networks establishing themselves as the consumer norm in today's communications markets. Whereas in 2001, a fixed telephone was represented in 75% of Czech households, at the end of 2016 the share was solely 14%. The decrease in usage of fixed telephone lines reflects the increase in mobile telephone ownership. Since 2004 the number of active SIM cards has exceeded the number of inhabitants of the Czech Republic.

Figure A5 Fixed-telephone voice subscriptions (both PSTN and VoIP) per 100 inhabitants in EU countries



Source: CZSO calculations based on International Telecommunication Union data, 2018

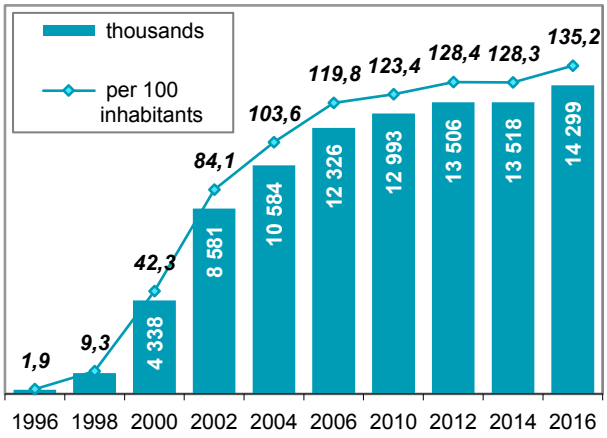
- This rapid increase in mobile telephone usage in the Czech Republic – for more details see the following chapter – did not deviate from the general trend experienced by telecommunication services in developed economies. However, the significant decrease in the number of fixed lines represents a specific issue in the international comparison. In **EU comparison**, the Czech Republic belongs to countries with the lowest number of subscribers to voice services within the fixed telephone network per **100 inhabitants**.
- In 2016, there were in the Czech Republic only 16 subscribers of **voice services per 100 inhabitants** via the fixed telephone network using PSTN lines or VoIP technologies. Lower values were recorded solely in Slovakia or Finland. However, we must add that by the end of the 90s, already before the commencement of mobile GSM networks, the countries of the so called Eastern Bloc lagged behind the countries of Western Europe with respect to equipment with fixed telephone lines.

Mobile telephone network penetration – Voice and M2M subscriptions[6]

A mobile telephone is a technology recording the highest increase in the number of subscribers in recent years. According to the International Telecommunication Union's estimates, at the end of 2016, 35 years after the first mobile network started being operated in Sweden and Norway, the number of mobile telephones used world-wide – the number of active SIM cards – exceeded the number of inhabitants of our planet. Since 2005, their number has increased nearly 3.5 times, i.e. from 2.2 to 7.5 billion in 2016. Whereas in developed countries the mobile telephone market is nearly saturated for several years now, in developing countries we have been still recording a significant increase in the number of users of this technology.

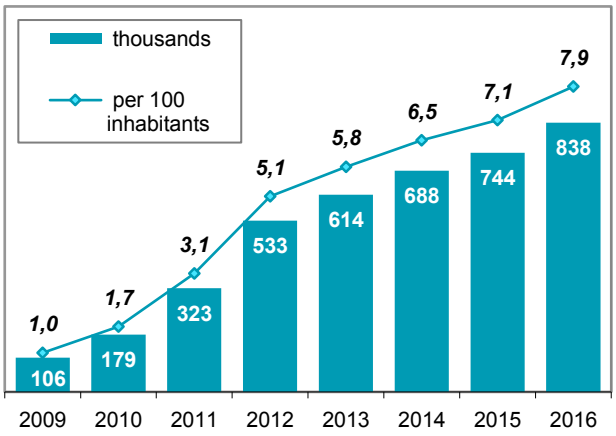
- The appearance of mobile telephones in the Czech Republic was first recorded in 1991 when *Eurotel* launched the first commercial NMT network. At the time, it was a relatively expensive solution with limited coverage. Its services were thus used by quite a low number of customers in the first few years. A real revolution took place five years later, when the first Global System for Mobile Communications (GSM) was launched in the Czech Republic. The later launch of the 3rd mobile operator in the year 2000 led to a decrease in prices and nothing obstructed the fast spread of mobile telephones in the Czech Republic.
- The aforementioned information became evident even in statistical reports. For instance, in 1996 the Czech Republic recorded a year-on-year increase in the **number of active SIM cards**[7] from 50 thousand to 200 thousand, and between 1999 and 2000 the number even increased from two million to more than four million. In addition, compared to a third in the year 2000, already in 2007 a mobile telephone was owned by 92% of Czech households.

Figure A6 Mobile telephone subscriptions in the Czech Republic – active SIM cards



Source: Czech Telecommunication Office, 2018

Figure A7 SIM cards used in the Czech Republic in M2M network



Source: Czech Telecommunication Office, 2018

- When mobile networks were at their beginnings, and when active SIM cards appeared practically solely in mobile telephones, and only a minimum people had several mobile telephones, the number of active SIM cards truly corresponded to the number of customers or mobile telephone users. Nevertheless, this assumption no longer applies. Despite the fact that at the end of 2016 the number of active SIM cards reached 135 pieces per 100 inhabitants, mobile telephones were used by 98% of inhabitants of the Czech Republic over the age of 16.
- The primary phase of mobile telephones spreading within GSM networks in the Czech Republic was connected mainly with **pre-paid** SIM cards. These cards are topped up with *credit* that the customer uses up in compliance with the operator's tariff of offered services. The alternative is **post-paid** cards, acquired

[6] Number of mobile telephone subscriptions is measured as a number of SIM cards. Both post-paid and active prepaid SIM cards that have been used during the last three months are included.

[7] The SIM card is a subscriber card that identifies a participant on a public mobile telephone network. SIM cards include both prepaid cards, when the customer does not enter into a contract with the provider, only prepares a certain amount from which the provider subtracts the payments for the services provided, as well as the tariff (post-paid) cards where the customers have a contract with the operator under which they pay for monthly billing services.

by customers by concluding a contract with the operator where the services are paid for at the end of an agreed period (typically a month). As late as in 2002, the number of active pre-paid cards was nearly twice as high as that of the tariff ones. Nevertheless, since 2008 they have been decreasing. As opposed to that, the number of mobile telephone users using post-paid tariffs, and the spreading of so called unlimited (flat) tariffs has been increasing.

- For the first time, in 2009 more than a half (54%) of all active SIM cards operated based on a monthly tariff. More and more customers now prefer concluding contracts, and these currently clearly prevail over pre-paid cards – at the end of 2016 their number increased to precisely two thirds.
- In 2016, two thirds (9.2 million) of the aforementioned 14.3 million actively used SIM cards were used by individuals and the remaining third (5.1 million) was used by legal entities and self-employed individuals – mainly enterprises.
- Mobile operator services are more frequently used for routine data communication between devices without a person's direct interference, for which **M2M SIM cards**[8] are used. In 2016, the Czech Republic recorded 838 thousand cards of this type compared to 179 thousand in 2010. In connection with the development of Internet of Things (IoT)[9], an increasing number of SIM cards used for M2M services is expected.
- According to the OECD data, the highest number of M2M SIM cards per 100 inhabitants in **EU countries** in 2017 was recorded in Scandinavian states, as well as in the Netherlands, France, and Estonia. Data on machine-to-machine (M2M) communications, such as for Internet-connected vehicles, show that Sweden remains the leader in the number of M2M SIM cards in use per 100 people, with the caveat that data is not yet fully comparable for all countries. Sweden counts 114 M2M SIM cards per 100 inhabitants in 2017 – a much higher level than most EU countries that provided this data. Overall, M2M/embedded mobile cellular subscriptions grew in all countries in the last year where the data was available.

Telephone traffic in fixed and mobile telephone networks

Another interesting point of view for the analysis of the telecommunication infrastructure is the development in these networks, which may be characterised by the number of realised calls and called minutes. The development in voice services provided within fixed networks in the Czech Republic is still being influenced by the development of mobile voice services, in particular. Further convergence is also a characteristic issue. In particular, this is evident by the offer of various forms of so called communication packages where within the scope of one package a user can operate a mobile telephone line as well as a fixed line together with fixed connection to the internet and the internet TV.

- The decrease in the number of traditional fixed-telephone voice subscribers using **PSTN** lines was in the Czech Republic characterized also by the decrease in **called minutes**[10] from these networks. Even in 2005 the number of called minutes from the PSTN stations reached 7.2 billion, i.e. approximately the equivalent to the called minutes from mobile telephones, ten years later it was only 1 billion minutes. Further 590 million called minutes within fixed network were conducted by using **VoIP** which have also been on the decrease in this respect since 2014.
- Whereas in 2006 there were on the average called **1 959 minutes** from one traditional fixed telephone line (PSTN) in the Czech Republic, ten years later it was approximately 40% less, i.e. 1 215 minutes. With respect to calls realised via VoIP technology, the average of 644 minutes was called by one user of this technology, which is 300 minutes less than five years ago.
- On the other hand, the voice operation within the **mobile network** has been very popular. In recent years, the number of calls has increased, as well as the number of called minutes, whose increase is

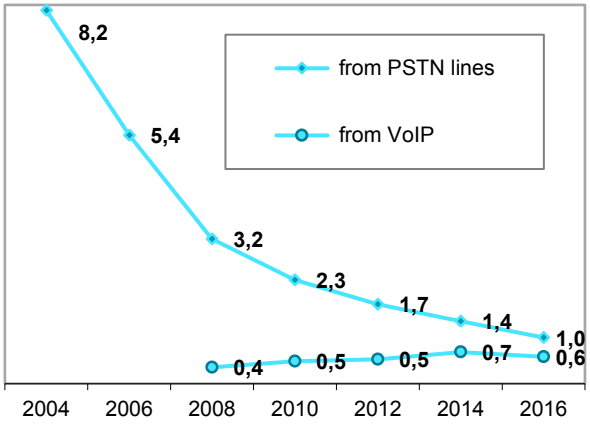
[8] M2M (Machine-to-machine) – SIM cards designed exclusively for wireless communication between machines, devices and IS without human intervention.

[9] The Internet of Things (IoT) covers devices (vehicles, home appliances and other devices) equipped with electronic, software, sensors, moving parts and network connectivity that allow them to connect and exchange data and be manageable even remotely, especially through wireless data and internet technologies, e.g. through a mobile phone.

[10] The telephone traffic originated in fixed or mobile telephone networks is measured by means of the number of actually called minutes (real minutes of calling) during the reference year, not the invoiced ones.

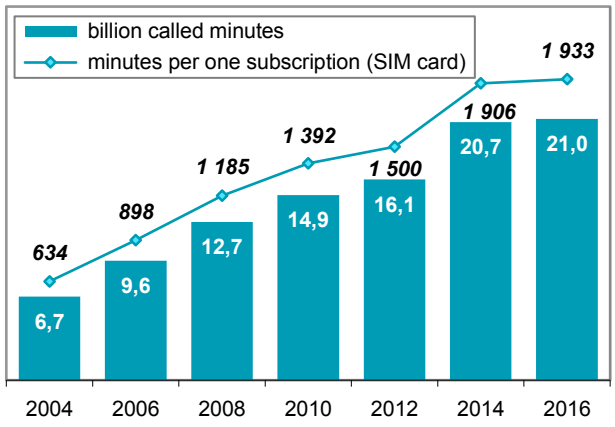
even more significant with respect to the number of calls. In 2016, a total of 20.9 billion minutes were called from the public mobile telephone network, i.e. twice more than ten years ago.

Figure A8 Total fixed telephone traffic in the Czech Republic (billion called minutes)



Source: Czech Telecommunication Office, 2018

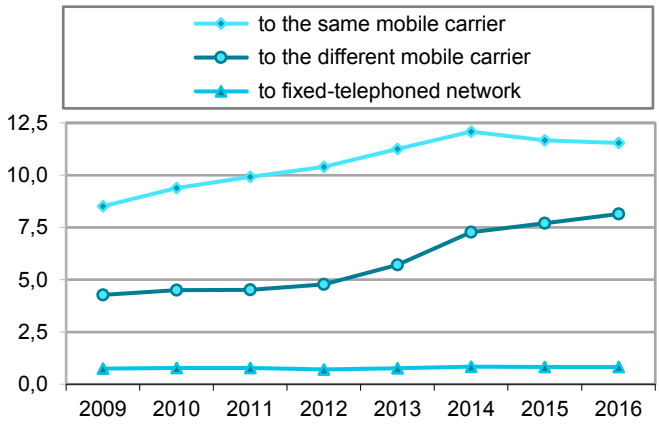
Figure A9 Mobile telephone traffic in the Czech Republic



Source: Czech Telecommunication Office, 2018

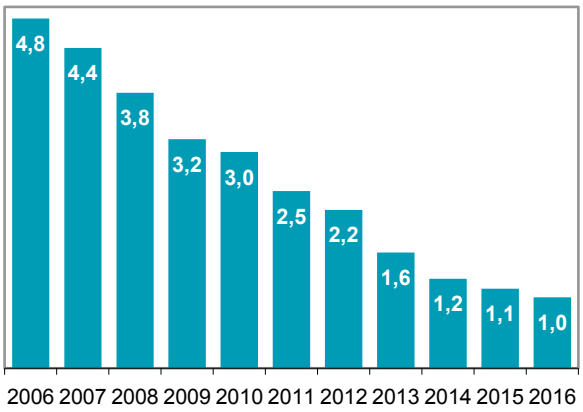
- In 2016, 55% (11.6 billion minutes) of called minutes from mobile telephones was due to calls made by **individuals** (citizens) as mobile-telephone subscribers compare to 9.4 billion called minutes (45%) by enterprises.
- **Outgoing calls** from mobile phones within the national network in 2016 were most frequently made to **their own mobile network** (11.5 billion minutes; 56%), fewer calls were made **to another operator's mobile networks** (8.1 billion minutes; 40%). Compared to this, the total length of outgoing calls from mobile telephones to fixed lines is at its minimum (826 billion minutes; 4%).
- A factor contributing to the increasingly common usage of mobile operator services is price lowering. In the past ten years, the average retail **price per called minute** decreased five times, i.e. from 4.84 CZK in 2016 to 0.98 CZK in 2016. However, when reading the results, it is necessary to consider that end customers also include enterprises with individual (usually more advantageous) tariffs.

Figure A10 Telephone traffic from mobile network in the Czech Republic (billion called minutes)



Source: Czech Telecommunication Office, 2018

Figure A11 The average retail price for one outgoing called minute in the mobile network in CZK



Source: Czech Telecommunication Office, 2018

- The downward trend of **the average price per minute** involves the decreasing average price for individual (resident) subscriptions as well as the decreasing average price for business subscriptions. According to the 2017 Annual Report of the Czech Telecommunication Office, the average aggregated consumer price in the mid-2017 concerning three mobile operators was 63.5% higher than the price for businesses –1.21 CZK per minute for individuals/non-entrepreneurs compared to 0.74 CZK per minute for entrepreneurs.

A.2 Internet infrastructure

Internet, as well as electricity, water or transport routes, is regarded as one of the basic infrastructure necessary for the full operation of the society in 21st century. The internet has become a critical infrastructure, supporting businesses, consumers/users and the public sector, and continues to experience remarkable growth. Therefore, it makes sense to statistically monitor its spreading within the society, despite the fact that, due to the dynamic development of this technology, it may not always be easy.

Broadband and the services provided over them support existing economic and social activities and hold potential for tremendous innovation. Access to broadband measured by number of broadband subscriptions[11], as a result, has become a more fundamental indicator of ICT performance and potential than access to voice telephony and other basic services. Broadband diffusion remains uneven across EU economies but continues to increase everywhere. Progress has been particularly swift in mobile broadband take-up.

Fixed broadband penetration – Subscriptions by technology and speed

The gradual development of internet contents requires a gradually faster connection that is reflected by the offer of individual technologies. According to ITU, the number of worldwide fixed broadband subscriptions doubled within just eight years – from 526 million in 2010 to 1 075 million in 2018. On a global scale, the dominant position of wireless connection used for internet access in the Czech Republic, from a fixed place, may be deemed as unique.

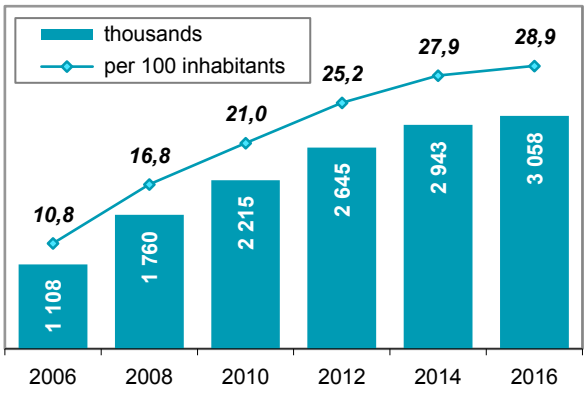
- For the first time in 2016, the total number of **fixed broadband subscriptions (connections)**[12] exceeded in the Czech Republic three million. At the end of 2016, there were 3.1 million subscribers to the fixed broadband internet access – including ones realised by means of fixed wireless connections and Wi-Fi technology[13], i.e. 2 million more than ten years ago and approximately a half a million more than five years ago. Despite this significant increase, it must be emphasized that in the past 3 years, the approximate number of fixed broadband subscribers has not changed much in the Czech Republic.

[11] Broadband subscriptions data are typically supplied to the EC, OECD and ITU by communications regulators that collect them directly from network operators according to common definitions. It is not currently possible for majority of countries – the Czech Republic being exception – to delineate business and consumer subscriptions and so both are counted; the data are presented in relation to the population of individuals.

[12] The number of fixed internet access subscriptions is measured based on the number of so-called access points (active connections) that provide a service for one of the below technologies employed for the internet access. In majority of cases the number corresponds to the number of agreements concluded for the services providing in the retail segment. Fixed broadband refers to the number of subscriptions to services with 256 kbps advertised speed or greater, provided using DSL, cable, fibre-to-the-home (FTTH), fibre-to-the-building (FTTB), satellite, terrestrial fixed wireless, or other fixed-wired technologies.

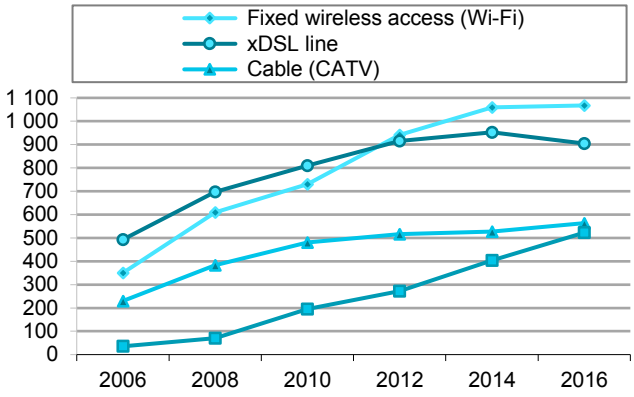
[13] Fixed wireless access (FWA) is the terrestrial internet connection by means of a radio system including non-licensed frequency (Wi-Fi). It is characteristic by placing of the end point device on a fixed location (house, apartment) – the so-called WLL (Wireless Local Loop).

Figure A12 Fixed broadband internet subscriptions in the Czech Republic



Source: Czech Telecommunication Office, 2018

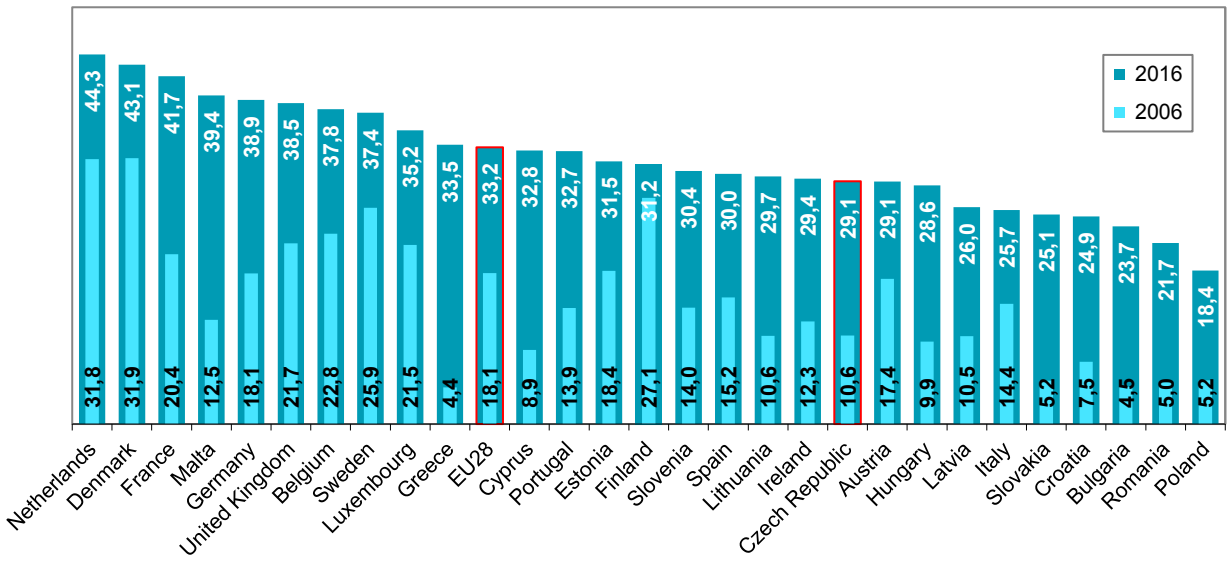
Figure A13 Fixed broadband internet subscriptions in the Czech Republic by technology (thous.)



Source: Czech Telecommunication Office, 2018

- At the end of 2016, there were in **EU countries** 170 million fixed high-speed internet connections (subscriptions) in total, i.e. approximately twice as many as ten years ago. Therefore, compared to 18 fixed broadband subscribers ten years ago, in 2016 there were 33 high-speed fixed internet subscribers per 100 EU inhabitants.
- Broadband **fixed penetration indicator** comprises the number of subscriptions to fixed wired or wireless broadband services, divided by the number of residents in each country. This fixed broadband penetration rate reached over 40% in France, Denmark and the Netherlands in 2016. The Czech Republic had 29 fixed broadband connections per 100 inhabitants compare to above mentioned number 33 for EU average. The Netherlands and Denmark have been the two countries with the highest number of broadband connections for some time. Take-up for fixed broadband has increased at a slower pace than for mobile, and in some countries this latter has been substituting fixed broadband rather than complementing it. The general trend, however, indicates significant improvement in available technologies.

Figure A14 Fixed broadband subscriptions per 100 inhabitants in EU countries



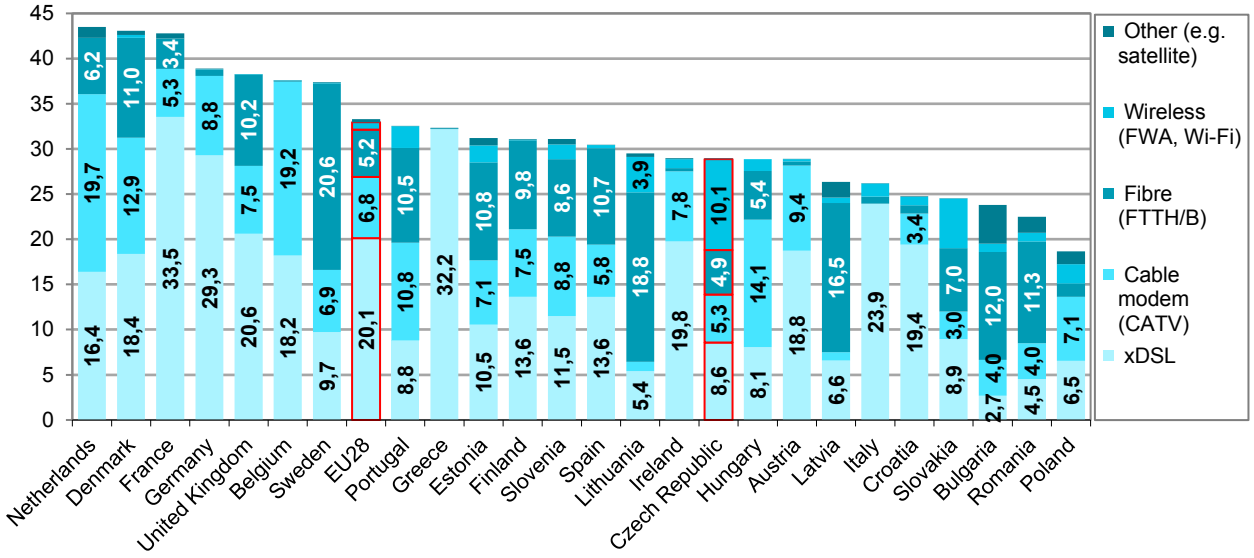
Source: CZSO calculations based on European Commission data, 2018

- On a long-term basis, the most popular fixed internet subscription in the Czech Republic is by means of above described **fixed terrestrial wireless access using Wi-Fi technology**. The share of this technology, with respect to the total number of subscribers (connectors/connections), to "fixed" internet is

around one third[14]. In 2016, this technology connected 1.07 million subscribers to the internet, with the majority being individual/consumer subscriptions (85% precisely) compare to 15% of business subscriptions. At the end of 2016, however, only a quarter of internet connections, by means of Wi-Fi networks, offered the maximum (advertised) speed of 30 Mb/s and higher.

- The share of **xDSL** technology in fixed high-speed internet has been gradually decreasing. In spite of this, it is the second most common means of fixed internet connection used in the Czech Republic, with its 904 thousand subscribers at the end of 2016, 72% of whom were individuals[15].
- Internet connection via telephone cables by means of xDSL technology represents the most popular means of fixed internet connection in half of EU countries. It is represented significantly in Greece, France, Italy, and Germany. In the Czech Republic, the share of this technology in fixed internet, decreased from 44% in 2006 – at that time it was the most frequent means of internet access – to 30% in 2016.
- Up until the year 2014, the majority of these connections in our country was realised via **ADSL lines**; since 2015, the more modern **VDSL lines** prevail. In 2016, there were 54 thousand active VDSL connections in the Czech Republic as opposed to 350 thousand realised by means of ADSL.

Figure A15 Fixed broadband subscriptions per 100 inhabitants in EU countries by technology; 2016



Source: CZSO calculations based on International Telecommunication Union data, 2018

- Internet access via **cable** (CATV) has recorded a slight increase in the Czech Republic. At the end of 2016 this means of internet access was used by 563 thousand subscribers; 95% of which were **individuals**. Out of **EU countries**, this technology is the most frequently used one in Belgium, the Netherlands, and Hungary where it represents nearly a 50% share of retail market of fixed internet access. Furthermore, Belgium and the Netherlands came close to 20 subscribers per 100 inhabitants in 2016.
- Within the individual technologies of fixed internet access, since 2009 the connection via **fibre broadband (FTTH/B)**[16] has recorded the greatest increase (fivefold) on the Czech market. At the end of 2016, this means of connection was used by 523 thousand subscribers, 91% of whom were

[14] Thanks to this technology, which is used as an alternative to other (traditional) means of internet connections (xDSL, connection via cable TV mains, etc.), the Czech Republic keeps a specific position among the EU countries on the market of fixed internet infrastructure. A significant factor in the use of high-speed services via Wi-Fi networks is, above all, a lower price while maintaining sufficient user quality of these services as well as their availability practically throughout the whole territory of the Czech Republic.

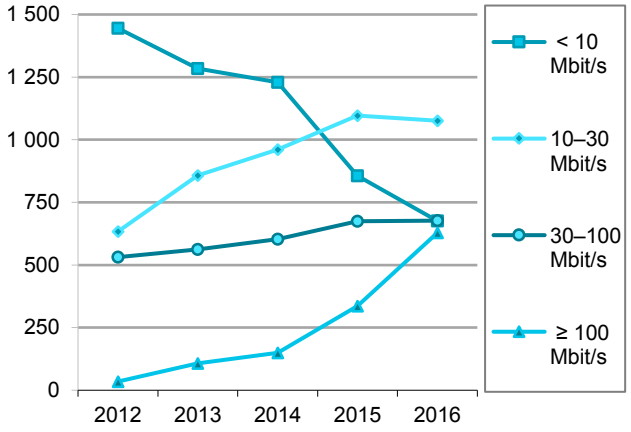
[15] In the past, this situation was primarily caused by the price, offered quality, and generally worse availability of ADSL technology in the Czech Republic as opposed to the majority of EU countries where ADSL technology most frequently belonged among the first affordable quality technology used for high-speed internet access.

[16] Fibre broadband refers to subscriptions using FTTH or FTTB where fibre reaches the subscriber's premises or terminates no more than 2 metres from an external wall. Excludes fibre-to-the-node/cabinet.

individuals. However, the development of FTTx access in the Czech Republic is still being realised mainly by local providers. **In international comparison**, optical networks are the most commonly used means of connection in the following EU countries – calculated by the number of subscribers per 100 inhabitants – Sweden, Latvia, and Lithuania.

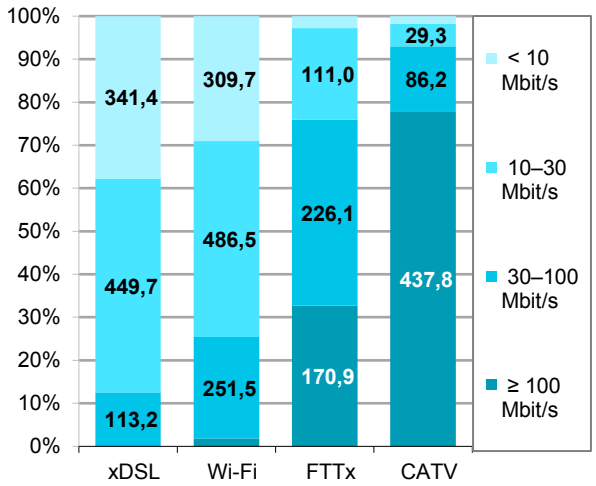
- Deploying fibre closer to the home has been an on-going process in most EU countries for many years. More recently, network operators have started to evaluate whether to bring fibre directly to a premise or to a nearby point and use existing or upgraded DSL and cable infrastructure. However, the majority of fixed broadband connections are in EU countries currently provided still mainly over DSL and cable modem technologies.
- Adequate network access speed[17] is essential to fully exploit existing services over the internet and to foster the diffusion of new ones. Czech broadband network is becoming increasingly faster. At the end of 2016, over 44% of subscribers in the Czech Republic accessed the internet via fixed network, by means of technology with **advertised speed over 30 Mb/s**, which is a significant increase compared to 21% in 2012. In the year 2016, 680 thousand citizens and enterprises (subscribers) could use the internet access within the fixed network, enabling the speed of 100 Mbit data per second, compared to 40 thousand in 2012.

Figure A16 Fixed broadband internet in the Czech Republic by speed (thous. of subscriptions)



Source: Czech Telecommunication Office, 2018

Figure A17 Fixed broadband internet connection in the Czech Republic by speed and used technology; 2016 (% and thous. of subscriptions)

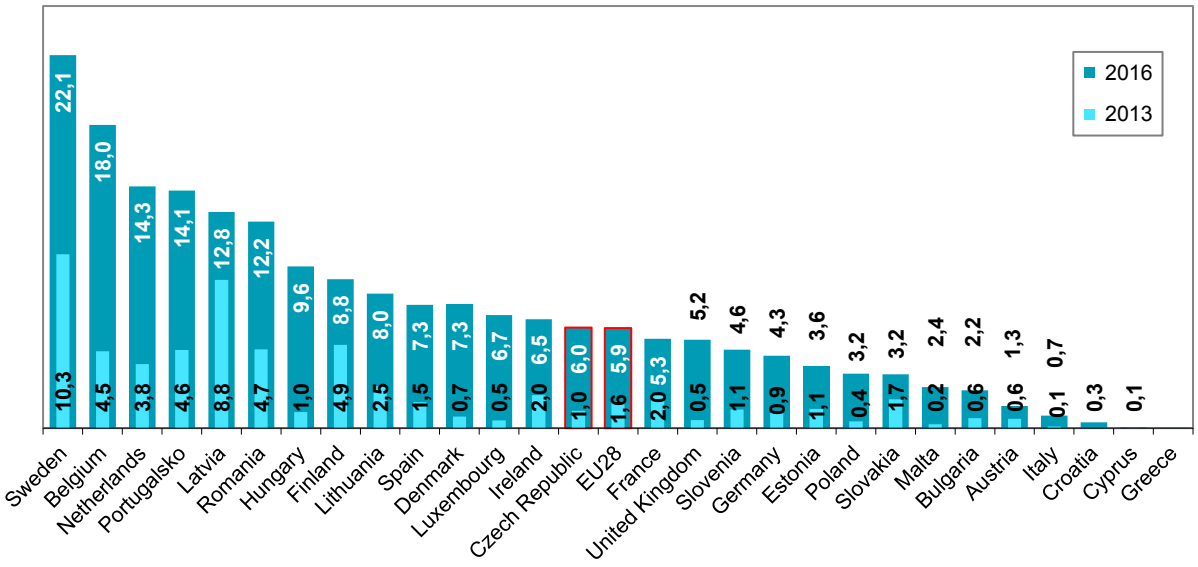


Source: Czech Telecommunication Office, 2018

[17] Internet speed is measured by the amount of data that can pass through the connection in a given amount of time. The most fundamental unit of digital data is the "bit" – which comprises a 0 or 1 in binary code. 1 000 bits is a kilobit, 1 000 kilobits is a megabit, and 1 000 megabits is a gigabit. Network speed is expressed in terms of how many of these are flowing through the connection each second to give – kilobits per second (Kbps), megabits per second (Mbps), and gigabits per second (Gbps). These data focus on download speed (i.e. the speed of data flowing from the internet to the user's device); nevertheless, the speed at which data moves in the opposite direction (upload speed) is also an important aspect of overall connection quality (as well as reliability). Measurement of broadband performance is affected by the potential gap between advertised and "actual" speeds delivered to customers.

- Distribution of fixed broadband subscriptions across speed tiers varies significantly across countries, due to a variety of factors (e.g. level of competition, population density in the market addressed, availability of back-haul, type of technology most widespread, etc.).
- When comparing the number of subscribers to fixed high-speed internet **with advertised speed of at least 100 Mb/s** per 100 inhabitants in EU countries between the years 2013 and 2016, a great increase in values is evident – whereas in 2013 the EU average amounted to 1.6 subscribers per 100 inhabitants, in 2016 the number was already 5.9 subscribers (i.e. a fourfold increase). Since 2015, the Czech Republic has recorded a significant increase in values; by the end of 2016 it exceeded the EU average with its 6 subscribers per 100 inhabitants. The best values have been recorded in Sweden, where there are 22.1 fixed broadband subscribers per 100 inhabitants with advertised speed of at least 100 Mb/s.

Figure A18 Fixed broadband subscriptions with advertised maximum download speed 100 Mbit/s and more per 100 inhabitants in EU countries



Source: CZSO calculations based on European Commission data, 2018

Mobile broadband penetration – Subscriptions by type of mobile connection

The function of the mobile phone has changed significantly. Up until a few years ago, the telephone was primarily used as a device for making telephone calls and sending/receiving text messages. Since the appearance of the smartphone many people use the telephone primarily for accessing the internet. As a result, mobile connections are now processing far more data traffic.

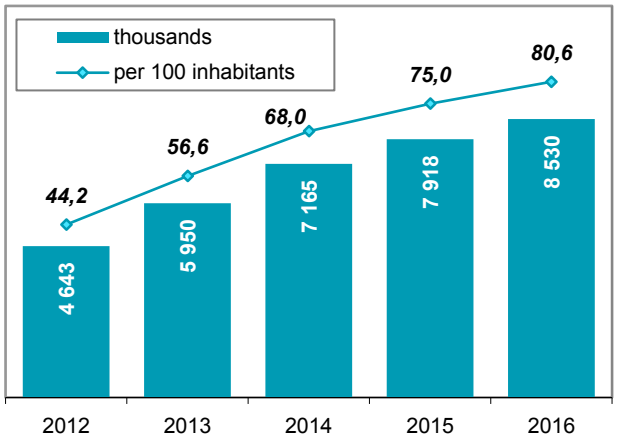
According to ITU, at the end of 2017, there were, throughout the world, approximately four times more active mobile broadband subscriptions than fixed broadband subscriptions. Growth in mobile broadband subscriptions has far outstripped fixed broadband growth since 2010, with worldwide subscriptions increasing from 825 million in 2010 to 4.6 million in 2017 and representing 82% of all broadband access paths in the world, making mobile broadband the most dynamic broadband market.

Mobile operators in the Czech Republic offered three basic types of internet access services i) "Internet on a Mobile Telephone" (used in mobile phones and smart phones), ii) "Mobile Internet", which is intended for portable devices (tablets, notebooks) with the use of a separate data SIM card, iii) and also services of high-speed internet access at a fixed location which are provided via SIM cards in mobile networks.

- The most frequent means of high-speed internet connection, in the Czech Republic, is nowadays via mobile networks – mobile broadband. At the end of 2016, there were recorded 8.5 million SIM or data cards serving for high-speed **mobile internet access** – in 2012 it was 4.6 million. As opposed to this, in 2016 the aforementioned 3 million subscriptions were used for fixed broadband connection.
- Up until the year 2011, the access to **mobile internet** in the Czech Republic was mainly realised as **temporary "ad-hoc" access** within the standard voice and data services. Since 2012, the prevailing

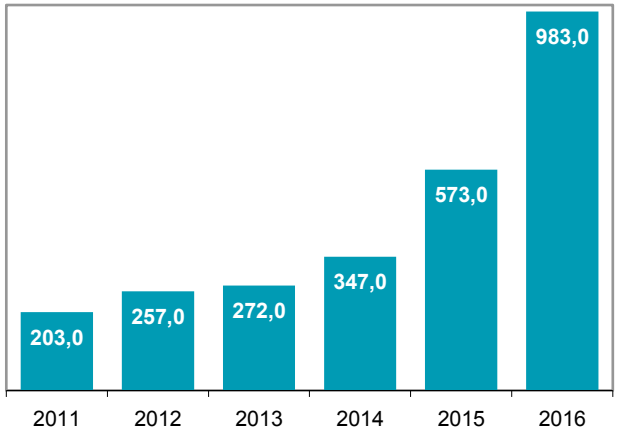
access provided within monthly tariffs has been the **permanent access**. In 2016 this option was used by 6.6 million subscribers as opposed to 1.9 million those using the ad-hoc access.

Figure A19 Mobile broadband subscriptions in the Czech Republic



Source: Czech Telecommunication Office, 2018

Figure A20 Average mobile data consumption per one active SIM card in the Czech Republic (in MB)

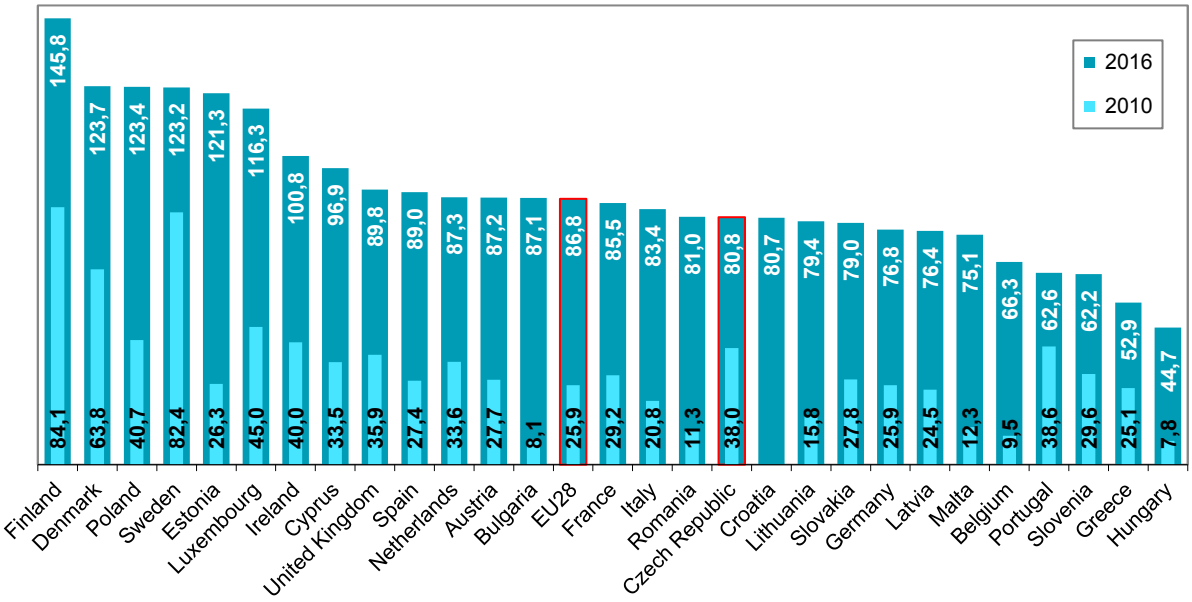


Source: Czech Telecommunication Office, 2018

- Mobile broadband is often combined with a mobile telephony subscription. Such **"standard" mobile subscriptions** (data and voice) are very well suited for smartphones. In 2016 it was used by 7.5 million subscribers in the Czech Republic of which 6.6 million were using permanent access. The number of subscribers (SIM cards) using internet in their mobile phones is growing gradually in the Czech Republic. This growth – by 250 per cent since 2010 – is attributable mainly to the expansion of LTE networks in the recent period as well as to the emergence of more attractive mobile data plans which took place (in particular within offers of network operators) recently.
- In addition, there are **dedicated mobile data connections**: mobile broadband (data only) subscriptions that do not comprise mobile telephony. These connections are well suited for *Mobile Internet*, for example on a laptop or tablet. In 2016, 11 percent (976 thousand) of the mobile broadband connections in the Czech Republic were a dedicated mobile data subscription using a stand-alone service and USB data cards/keys/modems integrated usually into portable computers or tablets.
- A growing trend can be observed in the number of dedicated data subscribers using the services of *Mobile Internet*. In comparison with the service of Internet on a Mobile Phone, however, a year-on-year growth is slower – from 542 thousand subscriptions in 2010 to above mentioned 976 thousand in 2016 (by 180 per cent).
- In most EU countries, mobile connectivity is undergoing major advancements through the deployment of Long Term Evolution (LTE) networks. Mobile broadband providers are advertising download speeds at levels increasingly closer to those of some fixed broadband offers. As a consequence, mobile connections are now processing far more data traffic.
- In the Czech Republic in 2016, the average mobile data traffic per one active SIM card was 983 megabytes compare to 203 megabytes five years ago. However, the volume of mobile data is still only a fraction of the volume that is routed exclusively across fixed connections. The mobile internet figures do not include data traffic routed via Wi-Fi. After all, Wi-Fi does not make use of the network for mobile data traffic.
- Relative to population, mobile broadband take-up appears to be much higher than for fixed broadband. In 2016, there were 80.6 mobile broadband connections (subscriptions) per 100 inhabitants in the Czech Republic, whereas the EU average in the same year was 86.8 subscriptions. In Finland this number was 146. This is the highest number among EU countries. Estonia, Denmark and Sweden also have a high mobile broadband penetration rates.
- In all countries, a majority of subscriptions are packages including both calls and data but data-only subscriptions have considerable market share in Finland and Estonia. Even if data for mobile broadband subscriptions have improved greatly in recent years, especially with regard to measurement of data only

and data and voice mobile data subscriptions, the international comparability of mobile communications statistics is still limited by the fact that not all countries are able to comply fully with the same definitions.

Figure A21 Mobile broadband subscriptions per 100 inhabitants in EU countries



Source: CZSO calculations based on European Commission data, 2018

- SIM cards for machine-to-machine (M2M) usage account for a growing segment of mobile data subscriptions. These are dedicated exclusively to communication between equipment at a distance and are not intended for interpersonal communications. Some of the functionality of M2M communications is built into navigation services for automobiles, access to the internet and emergency communications, among others. These devices connect millions of sensors and actuators, providing ever-greater amounts of “big data” to facilitate the monitoring of machines, environments and people’s health. However, there is not yet an official methodology to define the limits of M2M SIM cards. National telecom regulators in some EU countries have begun to release M2M SIM cards figures along with mobile and wireless broadband subscriptions. However, M2M use may still be mixed in with other subscriptions.

Chapter B Households and ICT

In recent years, we have witnessed some significant changes in the use of information and communication technologies (hereinafter referred to as the "ICT") not only in the Czech Republic, but also abroad. This mainly concerns the switch-over from non-portable devices, such as desktop computer or a fixed telephone line, to portable and mobile devices and connection. Whereas the percentage of households equipped with a computer in the Czech Republic has not been increasing dramatically any more, the percentage of households equipped with several ICT devices is still on the rise. Also, the character of usage of these digital devices has been changing from shared usage to individual.

On a long-term scale, the Czech Statistical Office has been recording these changes by means of a yearly harmonised survey in all EU countries on the usage of ICT in households[18]. The results from this survey, on the expansion of selected digital technologies to Czech and European households, provide interesting data, especially if monitoring the individual types of households. They confirm how great the difference may be between the households with or without children, households of younger generation compared to households of pensioners, and between the households of various income groups.

B.1 Households and telephone

With some exceptions, all households in the Czech Republic currently have access to a telephone[19]. Compared to the past, when mainly the fixed telephone line was used, nowadays all households prefer the usage of mobile phones. Whereas Czech households changed fixed telephone lines to mobile phones, both types of devices are to some extent still commonly used in some EU countries.

Households with a fixed telephone

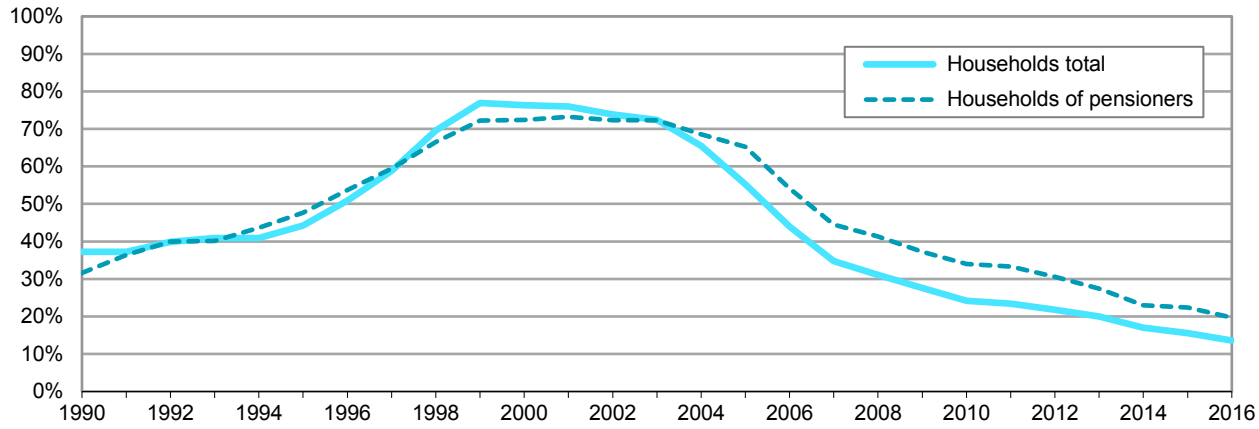
The way in which the Czech population is using telephony is changing rapidly. Fewer households have a fixed telephone connection. Telephone calls are more often routed via internet applications and the number of mobile subscriptions is growing. In addition, the function of the mobile telephone is changing. Many people are now using their smartphone for internet browsing and to communicate via internet applications, such as WhatsApp and social media. These changes have drastic consequences for the telecom market.

- Since 2000, the percentage of Czech households using **fixed telephone lines** has been decreasing. At the end of 2016, a fixed telephone was used by less than 14% of households, whereas in 2000 they were used by three quarters of Czech households.
- A fixed telephone is most frequently used in the households of **pensioners.** In 2016 a fixed telephone was still used by a fifth of these households. In the households of **"young"** families, the use of fixed telephone lines, in order to make phone calls, is rather exceptional. In 2016, a fixed telephone was used by 1.5% of households with a leading person aged up to 29.

[18] Since 2002, Czech Statistical Office monitors detailed data on the expansion of selected ICT in households by means of **Selective Survey on ICT usage in households (VŠIT).** The survey is carried out by means of a survey sample of approx. 5 thousand households and the results are compared to all private households in the Czech Republic. Since 2006, the survey is carried out yearly in the 2nd quarter of the monitored year in all EU countries as a mandatory survey stipulated by the Regulation (EC) No. 808/2004 of the European Parliament and of the Council concerning Community statistics on the information society. The foundation for the selection of surveyed topics, forms of individual concepts and questions is the yearly updated model survey carried out by Eurostat. The ascertained data from this survey serves primarily to the regular monitoring of performance of individual targets of Digital Agenda for Europe and also the public administration of the Czech Republic with respect to the development of information society and digital economics.
For more details see (*only in Czech*): https://www.czso.cz/csu/czso/domacnosti_a_jednotlivci

[19] Data concerning the equipment of households with a fixed telephone line and a mobile phone as of the end of the monitored year was collected from the **Statistical Report of Family Accounts of the CZSO** where the data is available with respect to individual types of households and various surveyed topics. Within the scope of this statistical report, this data was last monitored for the year 2016.

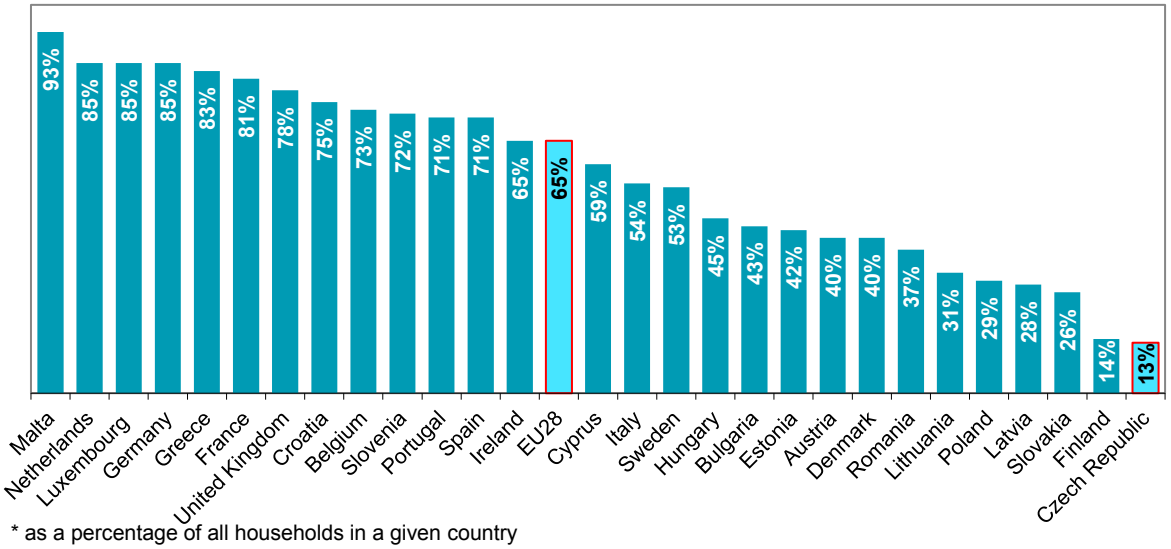
Figure B1 Share of households in the Czech Republic with a fixed telephone (%)



Source: Czech Statistical Office 2018, Household Budget Survey

- **Among the EU countries**, the least frequent usage of a fixed telephone line within households is in the Czech Republic. In 2015 – new data for international comparison is not available – only 13% of households claimed to be using a fixed telephone line for voice services. A similar percentage (14%) was recorded in Finland.
- Opposed to this, the **EU28 average** still reached a relatively high number (65%), which was due to the high percentage of households using a fixed telephone line within its largest countries: 85% in Germany, 81% in France, and 78% in Great Britain. However, the highest percentage overall was recorded in Malta (93%).

Figure B2 Share of households in EU countries with a fixed telephone in 2015 (%)*



* as a percentage of all households in a given country

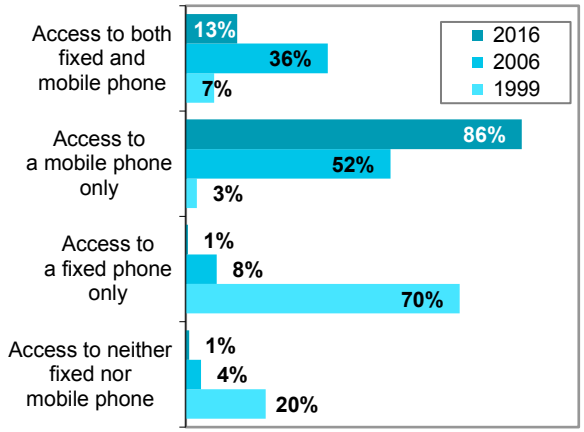
Source: European Commission 2017, Eurobarometer 438 E-Communications Survey

Households with a mobile telephone

- In the past few years, the most commonly used information technology in Czech households has been a **mobile phone**. In 2016 a mobile phone was owned nearly by all Czech households (99%), whereas in 2000 it was only a third.
- In 2016, the average **number of mobile phones** used in Czech households, was one device (0.99) per each household member over the age of 6; eleven years ago, it was only 0.64 of a device.
- The difference in household **equipment by mobile phones** is recorded within various income categories of households. While in 2016, households with the highest income (the fifth income quintile) had one

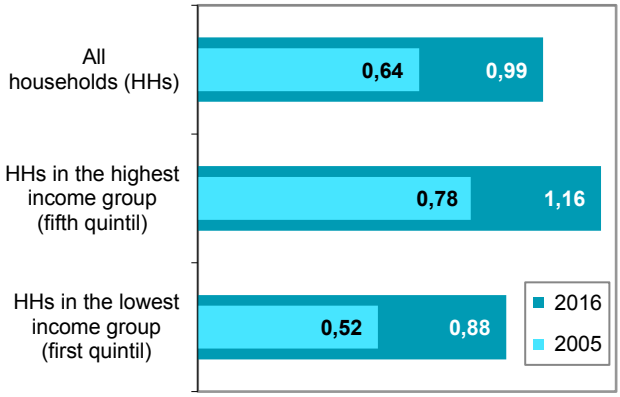
member over the age of 6 using 1.16 mobile phones, in households with the lowest income (the first income quintile) it was 0.88 of a mobile phone.

Figure B3 Households in the Czech Republic with access to a telephone (%)



Source: CZSO 2018, Household Budget Survey

Figure B4 Number of mobile phones used in Czech households per 1 member of household*



* per 1 member aged 6+ living in a given type of household

Source: CZSO 2018, Household Budget Survey

- The Czech Republic, together with Finland, belongs to the two EU countries with **only mobile phone access**, i.e. households do not have a fixed telephone, but only a mobile phone. In 2015 there were 84% of such households in the Czech Republic and in Finland the number was even higher – 87% – whereas the EU28 average in the same year was 33%.

Households telecommunication expenditures

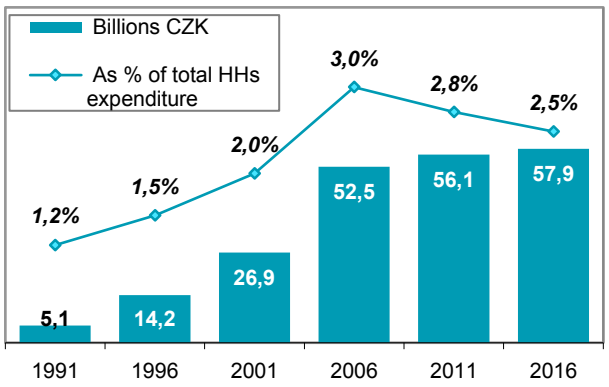
Along with the expansion of mobile phone usage between the years 1995 and 2005, the percentage of household expenditure on telecommunication services has also increased with respect to the total expenditure. Subsequently, despite further expansion of mobile phone usage, the increase slowed down significantly; in the Czech Republic as well as the EU it has even been decreasing in recent years. Despite this fact, however, Czech citizens spend a higher percentage of their total income on telecommunication services than the EU average.

- In 2016, the **total** expenditure of Czech households **on telecommunication services** amounted[20] to nearly 60 billion CZK. The share of this expenditure was 2.5% of total household expenditure – ten years ago (in 2006), it was 3%, and 20 years ago it was only 1.5%.
- In 2016, the amount spent on telecommunication services **per one household member**[21] was 4.7 thousand CZK; in households with the highest income (the fifth income quintile), the average amount spent was 6.3 thousand CZK, and in households with the lowest income (the first income quintile), the amount spent was 3.7 thousand CZK.

[20] Data on **total household expenditure for telecommunication services** (CZ-COICOP: 08.3) was obtained from the Czech Database of National Accounts using the national concept, which includes expenditure of residents in the Czech Republic and abroad spent on telecommunication services dedicated to direct satisfaction of needs and wishes of individuals. Expenditure for telecommunication services includes not only fixed line and mobile phone related services, but also payments for internet connection and bundled (packages) services. Further information: http://apl.czso.cz/pll/rocenka/rocenkavyber.spotr_dom?mylang=EN

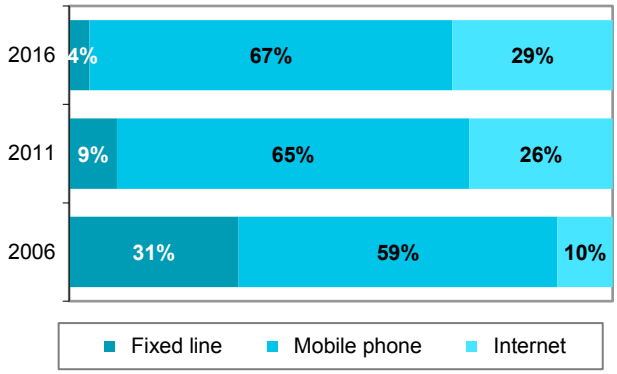
[21] Data on household consumption expenditures for telecommunications services – **annual averages in CZK per household member** – was obtained from Household Budget Surveys, where data is available in a wide range of classifications by type of household or type of telecommunication service. Further information: https://www.czso.cz/csu/czso/expenditures-and-consumption-of-households-included-in-the-household-budget-survey-2016

Figure B5 Household consumption expenditure for telecomm. services in the Czech Republic



Source: CZSO 2018, National Accounts

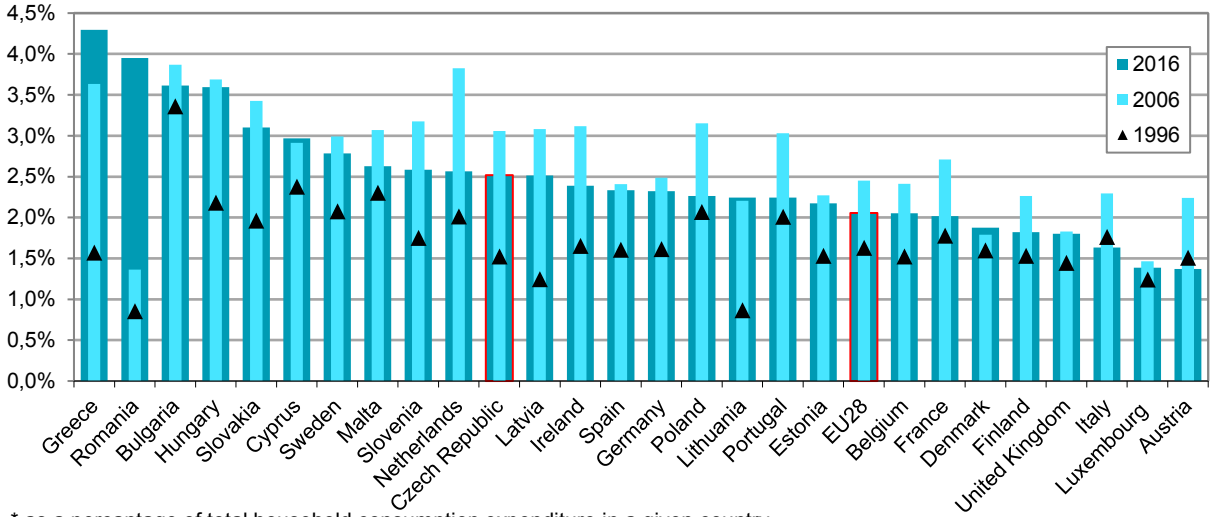
Figure B6 Telecommunication household consumption expenditure by type of services in the Czech Republic (%)



Source: CZSO 2018, Household Budget Survey

- Since the beginning of the new decade, there is a decrease in household consumption expenditures on telecommunication services per 1 household member from 5.0 thousand in 2010 to the aforementioned 4.7 thousand CZK in 2016.
- Despite the fact that the households with the lowest income spend, on average, approximately 2.5 thousand CZK less on telecommunication services per one household member than the households with the highest income, the percentage of this expenditure with respect to the **total consumption expenditure** is higher (4.4% vs. 3.2% in 2016).

Figure B7 Household expenditure for telecommunication services in EU countries (%)*



* as a percantage of total household consumption expenditure in a given country

Source: Eurostat 2018

- Most households spend money on the **operation of mobile phones** (67% of total household expenditure on telecommunication services – data for 2016). Another, yet less significant item, is expenditure on **internet connection** (29%), which has been increasing as time goes on.
- In comparison with the situation 10 years ago, Czech households spend a significantly lower amount on the operation of a fixed telephone. Whereas in 1995 nearly the whole amount spent by households on telecommunication services was used for the **operation of fixed telephone lines**, in 2010, it was only ten per cent, and in 2016, only 4%.
- Since 2002, the percentage of telecommunication services in total household expenditure in the Czech Republic is higher than the EU average. In 2016, the EU average amounted to 2.1%, compare to 2.5% in the Czech Republic. This expenditure is of **the highest percentage** in Greek households (4.3%), Romanian (4.0%), Bulgarian (3.6%), in Hungarian (3.6%), and Slovakian (3.1%), and **of the lowest** in Luxembourg and Austrian households (equal percentage of 1.4% in total household expenditure).

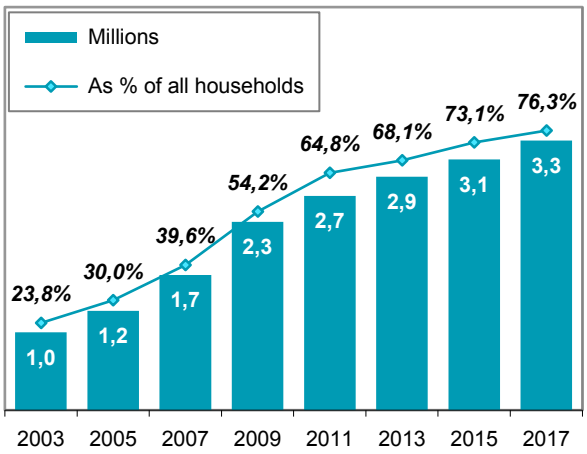
B.2 Households and computers

In the 1990s, it was not typical for Czech households to own a private computer, and at the beginning of the new millennium having a computer in one's household was rather rare. However, since 2005, the number of private computers is growing. A computer, as well as TV or other consumer electronics, are owned by nearly all households which have this equipment at home or are willing/able to use it.

Households with a computer – Main figures

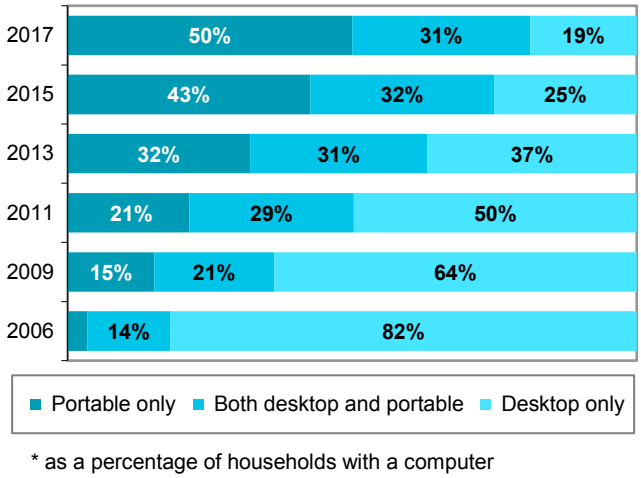
- Since 2005, the number of **households with a computer** has been increasing in the Czech Republic[22]. Only in the past ten years has the number nearly doubled, and in Q2 of 2017 there were 3.3 million, meaning 76% of all households.

Figure B8 Households in the Czech Republic with access to a computer at home



Source: CZSO 2018, Household ICT usage survey

Figure B9 Czech households with a computer by type of computer used at home (%)*



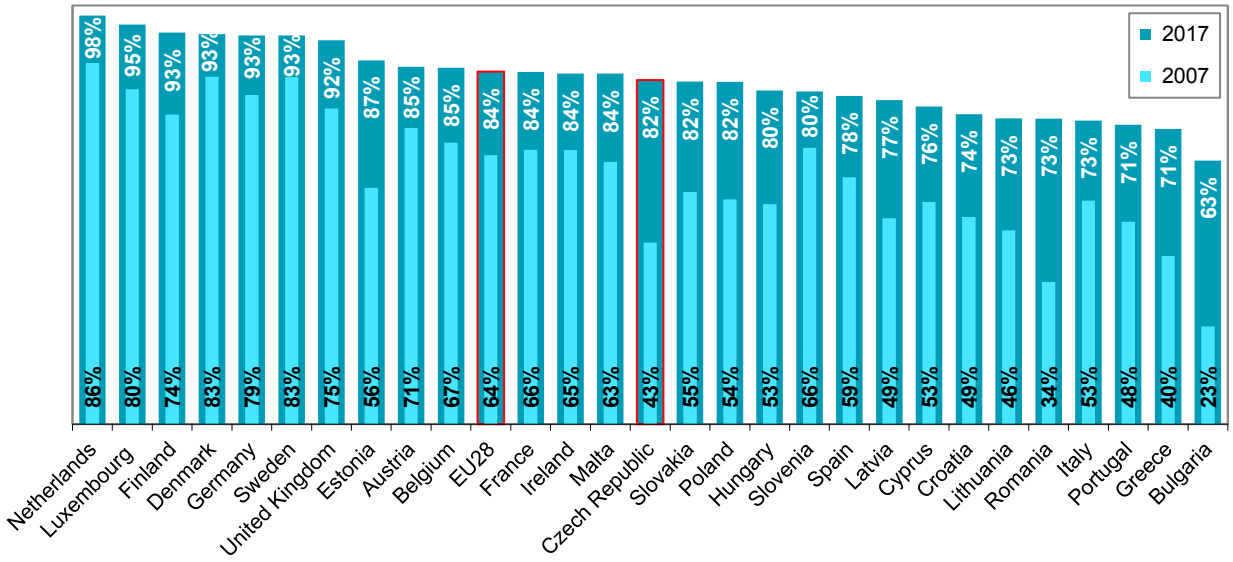
* as a percentage of households with a computer

Source: CZSO 2018, Household ICT usage survey

- Much better equipment with a computer is found in **households with children** and in **young households** (persons up to the age of 40 with no children). With respect to those categories, a computer may be found nearly in all such families – in 95% of cases. Opposed to this, just under a third of **pensioners** (persons over the age of 65) is equipped with a computer. Out of the million households having no computer in 2017, nearly two thirds were the households of pensioners.
- It may not come as a surprise that households with a **higher income** are more frequently equipped with computers than households with **lower income**. Whereas in 2017 no computer could be found in more than a half of all households with the lowest income (59%) – these mainly include the aforementioned households of pensioners, the same applied only to 1.5% of households with the highest income.
- In the past decade, the percentage of households equipped with a computer in the EU countries has increased from 64% in 2007 to 84% in 2017. Although we belong to EU countries where the past ten years have meant the greatest development in the equipment of households with computers, we still lag behind the aforementioned **European average**. In 2017 the number of Czech households with computer access was 82% (*data solely involving households with at least one person aged 16–74*), i.e. still two per cent less than the EU28 average.

[22] **Households with computer** involve all households, which at the time of the survey stated, that at least one of the household members had access to a personal computer at home. The household does not need to be in possession of the computer (it may be employer's computer, one borrowed from friends, etc.) yet this computer should be functional and located at home. A portable computer may not be permanently located at home; it may be in use at work or at school.

Figure B10 Households in EU countries with access to a computer at home (%)*



* as a percantage of all households in a given country where at least one member is younger than 75 years

Source: Eurostat, 2018

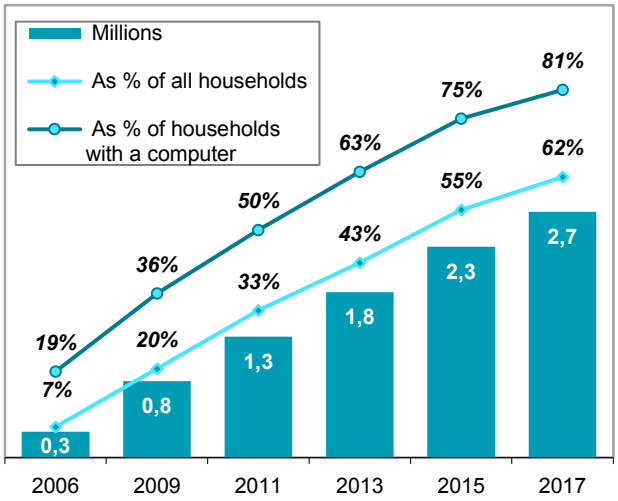
- Among the **EU countries**, computer usage is mostly expanded in the Netherlands, where 98% of households claim to have access to a computer. High equipment of households with computers – above 90% – is also found in Scandinavia, Luxembourg, Great Britain, and in Germany. Opposed to this, more than a third of Bulgarian households (37%) do not have any computers.

Type and number of computers used at home

In recent years, the size and mobility of computers used in our households has been changing significantly. Up to the year 2013, desktop computers were prevailing in Czech households; in 2014 portable computers became the prevailing ones (laptops or tablets). At the time when nearly all households wishing to have a computer had at least one of them at home, the data concerning the type, and alternatively the number of used computers, indicates to be a better measurement method of so called digital imbalance with respect to the equipment with this technology, rather than the number of households equipped with a computer in general.

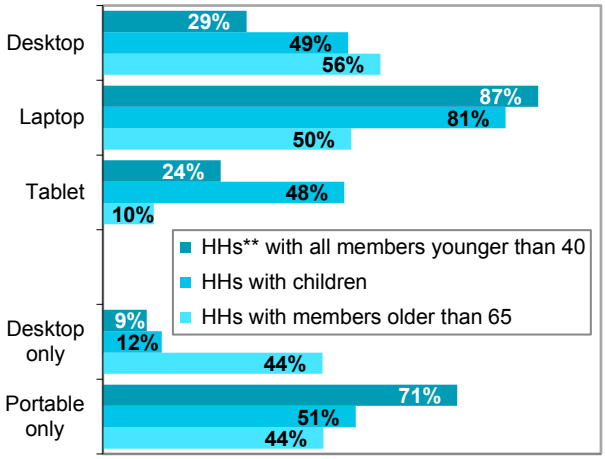
- Whereas in the past years the total number of Czech households equipped with a computer has not been increasing significantly, the percentage of households equipped with a **portable computer (laptop or tablet)** has been gradually increasing (62% of households in 2017). Ten years ago a portable computer was owned solely by a tenth of all households. Only in 2011, half of all "computerised" households in the Czech Republic were equipped with only a desktop computer, and a fifth had a portable computer. In 2017, this ratio was exactly the opposite.
- **Laptops** are mainly used in young families with no children (83%), and for three quarters of those it is the sole type of computer they have at home. Similarly, laptops are used by three quarters of families with children.
- In 2017, a **tablet** could be used in nearly a quarter of Czech households, mainly including **households with children**; tablets were used by 46% of such households. Opposed to this, only 3% of households of persons over the age of 65 used a tablet.
- Until the year 2013, the prevailing type in Czech households was the **desktop computer**, however, nowadays (Q2 of 2017), it is mainly used in the households of pensioners. The desktop version of a computer is owned by less than a half of all households of pensioners.

Figure B11 Households in the Czech Republic with a portable computer (laptop or tablet)



Source: CZSO 2018, Household ICT usage survey

Figure B12 Czech households with a computer by type of computer used at home; 2017 (%)*



* as a percentage of all HHs of a given type with a computer
** Households without children

Source: CZSO 2018, Household ICT usage survey

- Over the years, **the number of computers** used in Czech households has been increasing. Whereas in 2010 a mere fifth of all households (a third of households owning a computer) owned two or more computers, in 2016, two or more computers could be found in 38% of all households, i.e. 50% of households equipped with a computer. With respect to households with children it was 61% of them, and with respect to households with a high income, it was even 80%.

B.3 Households and the internet

The equipment of households with the internet contributes to digital literacy of inhabitants, and also serves as an important indicator of how people are willing to join the digital society, and whether they have sufficient funds to do so. In the Czech Republic, internet connection is currently owned by even more households than the percentage of households actually owning a computer. Despite this fact, we still lag behind the current average percentage of households with access to the internet within the EU. At the same time, the manner in which Czech citizens get connected to the internet also differs from the one used in western EU countries.

Households with the internet – Main figures

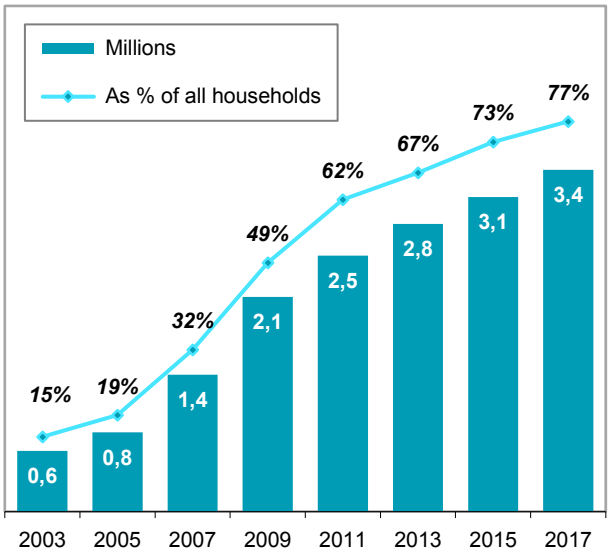
According to ITU estimation, worldwide, almost 60 per cent of households had internet access at home in 2018, up from less than 20 per cent in 2005. Fewer than half of households had a computer at home, highlighting that a substantial number of households accessed the internet (also) through other means, most importantly through mobile devices.

Age, education, financial situation and geographical location of households play a key role with respect to equipment with information technologies. In the Czech Republic, some of these differences are wiped off, along with the time, and it depends on whether the household members find ICT and internet useful or not, and whether they are willing to learn to work with it.

- *S*ince 2016, there are more households in the Czech Republic equipped with **internet access** rather than with a computer. In the Q2 of 2017 internet access[23] was already used by 77% of households (3.4 million). In the past ten years, the number of households with internet access has increased by two million – in 2007 internet access was used by a third of Czech households (1.4 million).

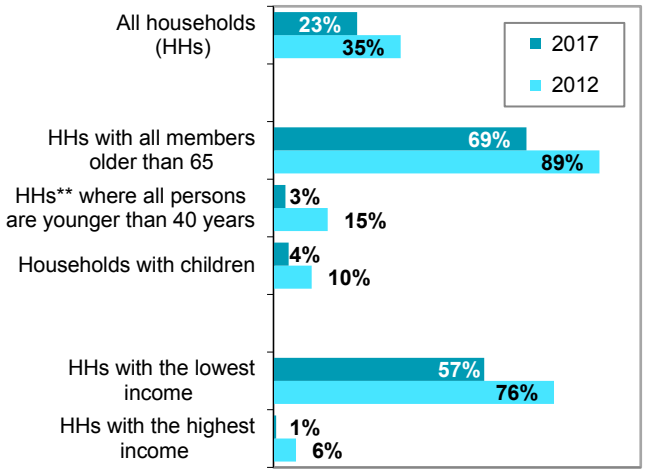
[23] **Households with the internet** include all households, which at the time of survey stated that at least one of the household members had an access to the internet at home. It does not matter what type is the device used (desktop computer, portable computer, mobile phone, digital TV, game deck, or other device), or the way of connection.

Figure B13 Households in the Czech Republic with access to the internet at home



Source: CZSO 2018, Household ICT usage survey

Figure B14 Households in the Czech Republic without access to the internet at home (%)*

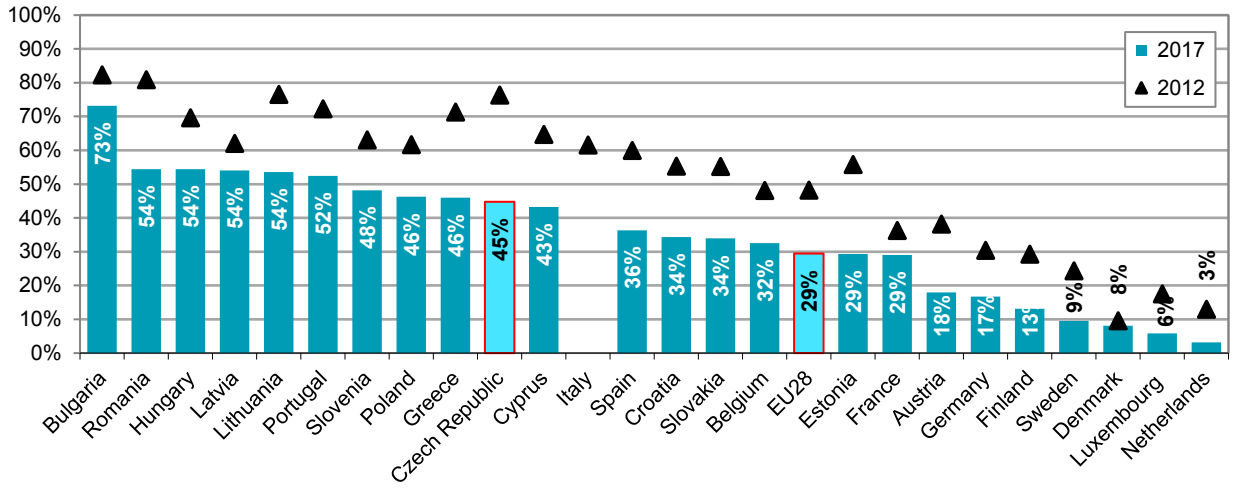


* as a percentage of all households of a given type
** HHs without children

Source: CZSO 2018, Household ICT usage survey

- Internet has become widely available to the general public, both in terms of accessibility as well as cost. A boundary was crossed in 2007, when for the first time **a majority (55%) of households in the EU28** had internet access. This proportion continued to increase, passing three quarters in 2012, and four fifths in 2014. By 2017, the share of EU28 households with internet access had risen to 87%, some 32 per cent higher than in 2007.
- Among the **EU countries**, internet access is mostly expanded in the Netherlands and in Luxembourg where only three households out of a hundred did not use it in 2017. High usage of internet access has also been recorded in Scandinavian countries, in Great Britain and in Germany. In these countries the percentage of households with internet access has reached above 90%. As opposed to this, internet access was "only" used in 71% of Greek households, and 67% of Bulgarian households. Over the last ten years, cross-country differences in internet access have narrowed markedly across EU countries
- To some extent, there is an **urban–rural divide within the EU28 in terms of internet access**. Whereas households in cities, as well as towns and suburbs, had comparatively high access rates — 90% in cities and 87% in towns and suburbs — internet access was somewhat lower in rural areas (82%). The divide between rural areas, and the two other types of areas, was particularly strong in Greece, Portugal, Bulgaria and Romania.
- One of the main reasons why the households of the Czech Republic lag behind in internet usage, among most of western and northern countries of the EU28, is the prevailing difference between income groups of households regarding their access to the internet. Whereas in 2017 a **quarter of the wealthiest Czech households** all had internet access, within the quarter of households with the lowest income, where mainly the households of pensioners belong, nearly a half had no internet connection (45%).
- Compared to this, in 2017, in Sweden, Denmark, Luxembourg, and the Netherlands, there was less than a tenth of households with the lowest income that had **no internet access**. On the other hand, in Bulgaria it was 73% of households in this first income quartile. Apart from Portugal, only the former socialist countries belong among the six EU countries, where the percentage of low-income households with internet access was in 2017 lower than 50%.

Figure B15 Low income households (first quartile) in EU countries without access to the internet at home (%)*

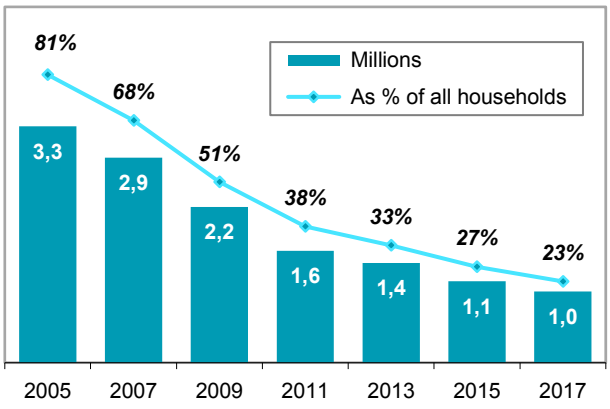


* as a percantage of all low income households in a given country where at least one member is younger than 75 years

Source: Eurostat 2018

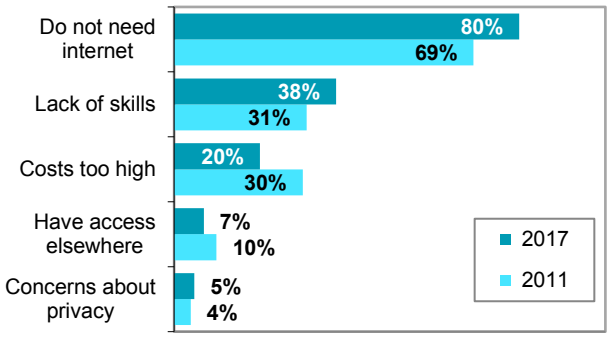
- In Q2 of 2017, there were a million (23%) households in the Czech Republic where **nobody was using internet at home**. Ten years ago there were more than two thirds (68%) of such households, which in real numbers meant nearly three million households with no internet access in 2007. These were most frequently the households of pensioners where the internet is still unavailable in more than two thirds (69%) of such households.

Figure B16 Households in the Czech Republic without access to the internet at home



Source: CZSO 2018, Household ICT usage survey

Figure B17 Main reasons for Czech households for not having access to the internet at home (%)*, **



* as a percentage of all households without the internet
** more reasons possible

Source: CZSO 2018, Household ICT usage survey

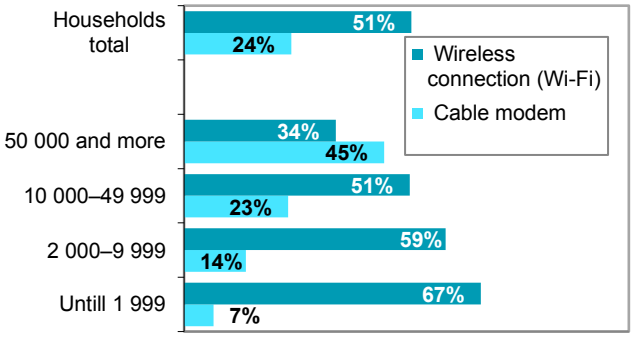
- However, we may observe that a computer or the internet can be found in nearly all households where its members wish or know how to use these technologies. Out of the aforementioned million households that had no internet access in 2017, 80% stated that this is due to a **lack of interest or no need to work with the internet**. Most frequently, this reason was provided by the households of persons over the age of 65 and there were 87% of those. The members of nearly 40% of households with no internet access acknowledged they **did not know how to operate it**[24]. In households with children, these two reasons were highly exceeded by the financial aspect (57.5% of households with children with no internet access).
- **In EU countries** among the 15% of households without internet access in 2017, on average, the two main reasons for not having access were that the internet was not considered to be useful (47%) and that the people were concerned about the lack of necessary skills (42%).

[24] In the question on the reasons why households do not have an internet connection at home, households may have multiple responses.

Type of connection used by households to access the internet at home

- As opposed to nearly all other EU countries, in order to get online, Czech households most frequently use primary external internet access[25] via **wireless connection** provided by local providers by means of Wi-Fi technology. In 2017, this technology was used approximately by a half of all households where internet was used by their members.
- Connection via **TV cable system (cable modem)** was the second most used one in 2017 – this means of connection was used by a quarter of Czech households with internet access. Internet connection via telephone lines by means of **xDSL** technology, most frequently used in the majority of households in many other EU countries, was used "only" in 15% of Czech households in 2016.
- In particular, the type of household internet connection has been changing with respect to the **municipality size** of the given household's residence, which is associated with the changeable availability of individual connection types in municipalities of various size groups.
- For instance, the aforementioned terrestrial wireless **connection via Wi-Fi** is most frequently used in households living in small municipalities of up to 2 thousand inhabitants – this type of connection was in 2017 used by two thirds of Czech households out of those that had internet connection as opposed to a third of households in the largest municipalities of over 50 thousand inhabitants.
- The internet connection via **cable modem** is most frequently used in households living in large cities with over 50 thousand inhabitants where in 2017 nearly a half (45%) of all Czech households with internet connection used this means compared to 7% of households in the smallest municipalities.

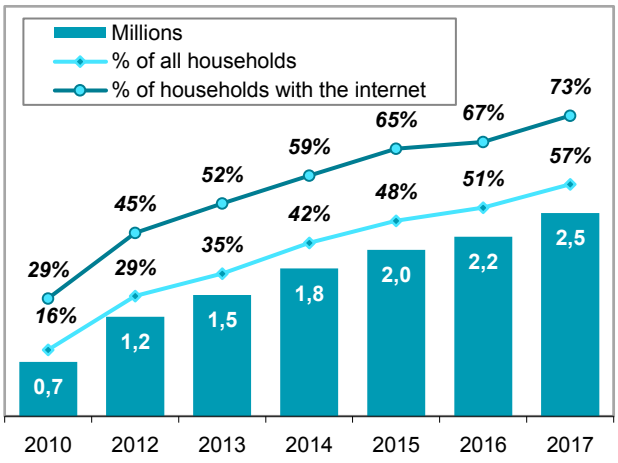
Figure B18 Type of connection used by Czech households to access internet at home by size of their municipalities (no. of inhabitants); 2017 (%)*



* as a percentage of all households with the internet in given municipalities size

Source: CZSO 2018, Household ICT usage survey

Figure B19 Households in the Czech Republic using a Wi-Fi router to within their home



Source: CZSO 2018, Household ICT usage survey

- Ensuring adequate access to the ICT infrastructures across all geographic areas is essential to ensuring that all citizens can benefit from the opportunities of digital transformation. The **rural-urban divide** in the Czech Republic encompasses access to broadband that is of sufficient quality. While the share of households with broadband access has been consistently increasing to near complete penetration rates, these gains have not been evenly shared across households.
- Along with the increase in Czech households using portable devices enabling internet connection (smart phones, laptops, tablets), the popularity of **so called "home-based" Wi-Fi**[26] is increasing, as it offers the wireless distribution of internet signal within a flat/house. In 2017, this technology was used by 2.5 million Czech households, i.e. 75% of those having the internet at home and even by 80% of households with children. In 2010, a **Wi-Fi router** was owned only by 16% of households.

[25] Types of connection to the internet involve only the types of connection provided by supplier. It does not specify if the connection is shared by multiple devices within one household.

[26] A Wi-Fi router is a device that enables internet distribution within the household, i.e. it enables connection of more devices at the same time and from different places within the reach of Wi-Fi network.

Chapter C Individuals and ICT

Not only internet access and access to other modern information and communication technologies (hereinafter referred to as the "ICT"), but primarily the motivation and ability of individuals to use efficiently the applications and services offered through these technologies is currently considered as one of the key factors of economic, social, and political development of society. However, the ICT brings a number of negative effects, such as loss of privacy, data security endangerment, cyber-harassment, overload of unsolicited information, addictiveness to these technologies, etc.

The chapter devoted to individuals provides the monitored development of spreading and using the modern ICT – primarily the use of computers and internet – among individuals since 2002, when the CZSO first realised its own survey on the usage of information technologies among individuals[27]. The results of this regularly carried-out survey enables not only monitoring of the fact the internet penetrates the everyday life of more and more people, but also the types of devices by means of which people get connected to the internet, and what the internet actually serves them for. This all is described with respect to sex, age, and highest attained education or economic activity.

C.1 Individuals and a computer

Similarly, to telephones, Czech citizens prefer the portable and mobile versions of computers compare to desktop ones. As early as in 2014, the number of laptops and tablets in Czech households exceeded the number of desktop computers. The increasing number of users of these devices indicates the trend of incoming mobility, where we no longer wish to have a device connectible to the internet only at a single fixed place, but accessible anywhere and at any time. The frequency of usage of these devices is also increasing and these devices are also gaining popularity with pensioners.

Computer users – Main figures

- Along with the increasing number of computers used in Czech households, the number of persons using the computer at home or elsewhere is also rising. In the past 10 years, the number of individuals over the age of 16 using computers in the Czech Republic – **computer users**[28] – have increased out of 51% in 2007 to 77% in 2017.
- Apart from the increasing number of persons using a computer, the **frequency of its usage** is also increasing. In 2007, a computer was used every day or almost every day by 61% of computer users; currently it is used this frequently by 80% of computer users.
- The fast growth of computer users in the Czech Republic is already over. However, this does not apply to all groups of citizens. In the past few years, the fastest growing number was the number of persons using a computer at the **age of retirement or early retirement**. In 2007, not even 8% of pensioners were using a computer; in 2017 this number increased to 36% of them.
- Data not just from the Czech Republic but also from other EU countries show that the percentage of individuals accessing **computer and internet from home** has increased considerably over time. Already in 2012, 96% of internet users used the internet at home in the Czech Republic, in comparison to 57% ten years ago. In 2002, the number of individuals using the internet at home (1 million) did not differ much from the number of individuals using the internet at work (800 thousand).

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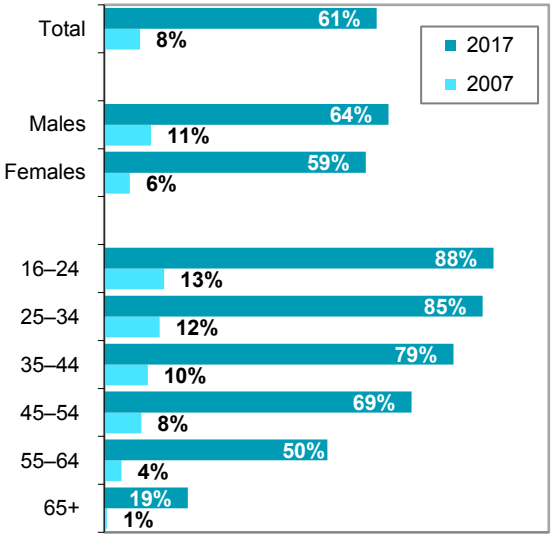
[27] The detailed information on the expansion and manner of usage of the selected ICT by individuals is monitored within the scope of ***Selective Survey on ICT usage in households (VŠIT).*** The survey is carried out by means of personal interviews with a survey sample of approx. 10 thousand individuals. The ascertained data is available to a wide range of demographic and social characteristics of persons living in the monitored households, such as sex, age, highest attained education, etc. Since 2006, the survey is carried out yearly in the 2nd quarter of the monitored year in all EU countries as a mandatory survey stipulated by the Regulation (EC) No. 808/2004 of the European Parliament and of the Council concerning Community statistics on the information society.
For more details see: https://www.czso.cz/csu/czso/domacnosti_a_jednotlivci

[28] **Individuals using a computer** are such individuals who have used a computer (desktop, laptop or tablet) at least once in the last three months anywhere (at home, work, school, etc.) and for any purpose (private or work).

Type of computers used by individuals

- In the past years, the popularity of portable computers, laptops and tablets, has been increasing. The popularity of these devices is mainly associated with the possibility of their usage practically anywhere including internet access, i.e. not only at home or at a workplace, but also on a train or in a café. In 2017, a **portable computer** (laptop or tablet) was used in the Czech Republic by 61% of individuals over the age of 16, comparing to 8% in 2007.

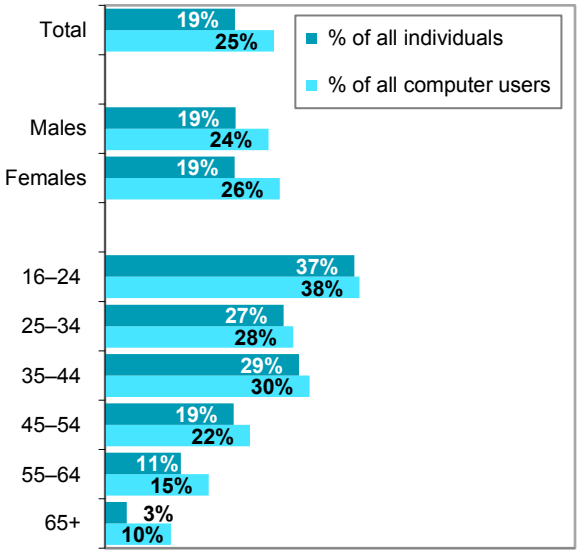
Figure C1 Individuals in the Czech Republic using portable computer – laptop or tablet (%)*



* as a percentage of all individuals in a given group

Source: CZSO 2018, Household ICT usage survey

Figure C2 Individuals in the Czech Republic using tablet; 2017 (%)



Source: CZSO 2018, Household ICT usage survey

- **Tablets**, which started being used in the Czech Republic only in the past few years, have been increasingly popular. Whereas in 2012 they were used only by 1% of inhabitants, in 2017 the number increased nearly to a fifth (19%) of inhabitants over the age of 16.
- The dominating group in the use of tablets are **students** – 5 years ago tablets were used by 2% of students, these days (Q2 of 2017) the number has increased to 40%. At the same time, tablets are frequently used by persons of parental age, who often purchase them, besides other things, for their children. Tablets are used by 29% of persons belonging to the age group 35–44. However, they are less frequently used by old age pensioners – not even by 4% (situation in 2017).
- Within the scope of the yearly CZSO survey, concerning the usage of information technologies in households and among individuals, **computer skills** are also monitored. The results arising from the questions, concerning the skills of individuals, are provided in *Chapter F "ICT in Education and Digital Skills"*.

C.2 Individuals and the internet

Generally, the development of the digital economy and society fundamentally depends on the use of digital technologies and related applications by individuals – including usage of the internet, which is one of the greatest phenomena of today's world. According to ITU more than half of the world's population is now online.

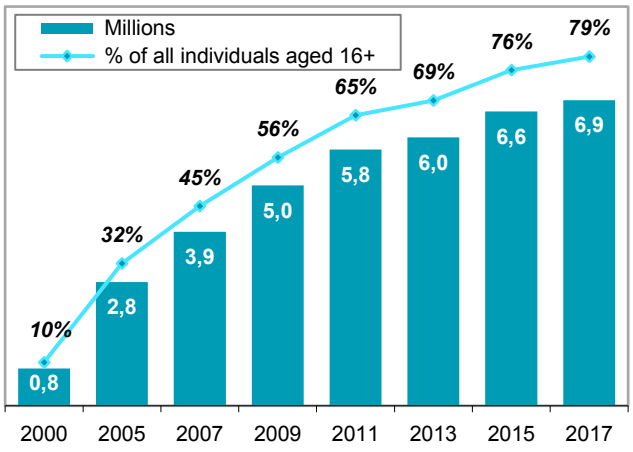
Internet users – Main figures

The internet and connected devices have become a crucial part of most individuals' everyday life in the Czech Republic. Nevertheless, there can be considerable differences in internet uptake between different groups in society, linked primarily to age and education, often intertwined with income levels.

ITU estimates that nearly 4 (3.9) billion people – for the first time more than half (51%) of the world's population – were using the internet in 2018, compared to 1 billion people (15%) in 2005. Internet access, however, still remains limited in the developing world, with only 45% of the population online at the end of 2018, compared with 81% in the developed world.

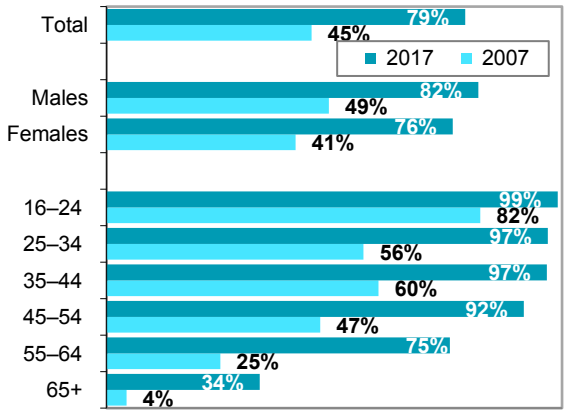
- According to the latest results from the year 2017, the internet in the Czech Republic has been used **at least once per lifetime** by 83% of persons over the age of 16 compare to 50% ten years ago.
- Nearly seven (6.9) million of persons over the age of 16 have used the internet **at least once in the last 3 months** in 2017. It means that nearly eight out of ten (79%) persons in the Czech Republic may be classified as so-called **internet users**[29]**.** This is a basic indicator used for international comparison in this area. Since 2005, when the internet was used nearly by a third of the population, the number of Czech internet users increased 2,5 times, in absolute figures by 4 million persons.

Figure C3 Individuals in the Czech Republic aged 16+ using the internet – internet users



Source: CZSO 2018, Household ICT usage survey

Figure C4 Internet users in the Czech Republic (%)*



* as a percentage of all individuals in a given group

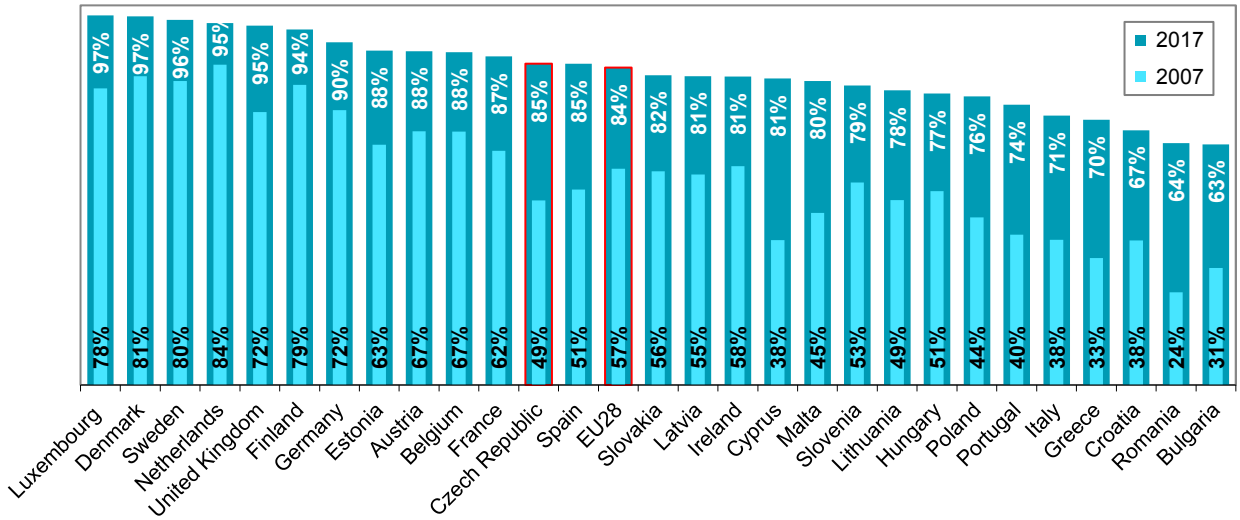
Source: CZSO 2018, Household ICT usage survey

- The increase in total numbers and shares of internet users, evident from aggregated data, certainly covers a different way of development **in individual socio-demographic groups**. Nevertheless, in all the monitored years we can observe certain regularities; the internet is used more frequently by the younger generation (recently even the middle generation), more frequently used by persons with a higher level of education, and more by men than women (especially concerning the older generation).
- In recent years, the popularity of the internet has also been increasing mainly within the **older generation**. For instance, the percentage of pensioners over the age of 65 using the internet has increased from 4% in 2007 to one third in 2017.

[29] **Internet users** are such individuals who have used the internet at least once in the last three months anywhere (at home, work, school, etc.) and for any purpose (private or work). The internet use shall mean any activity on the internet carried out in an active manner, for instance, browsing of websites, downloading of files, using emails, from any location (household, school, work, etc.) for any purpose (private, work, etc.) both on computers (including portable ones) and mobile phones, smartphones, game decks, etc.

- It is expected that the number of internet users among pensioners (older generation) will be increasing significantly also in coming years. Nowadays, retirement age is reached by people who are accustomed to using the internet automatically within their working life, as well as private life. In 2017, the internet was used by three quarters of persons in the **age group 55 to 64 years old**.
- Individuals with higher levels of **educational attainment** are more likely to use the internet. This may partly be because they are more likely to have experience of internet use through their studies and subsequent careers, but could also be related to being more likely to have sufficient disposable income to afford fixed and mobile connectivity. In 2017, the proportion of individuals aged 25+ with tertiary education using the internet was in the Czech Republic already 95% compare to 35% for individuals with only basic (primary or lower secondary) level of education.
- In the younger and middle generation (aged 16–54 years), ICT usage in the Czech Republic was in 2017 more or less comparable **between genders and education levels**, while in the group of 55 to 74 years-old there was still a noticeable difference in shares between male and female internet users (65% men in comparison to 57% women) as well as between high and less educated (92% of individuals aged 55 to 74 with university degree in comparison to 24% only with lower secondary education). However, along with the increasing number of persons using the internet over time, these differences have been also gradually decreasing.
- For many **people in the EU**, using the internet has become a common activity. On average about 84% of 16–74 year-olds in EU countries were internet users – meaning they had been online at least once during the last 3 months prior to the 2017 survey – compared with less than 60% in 2007.
- Internet usage varies **across EU countries and among social groups**. In 2017, 90% and more of the adult population were accessing the internet in Germany, United Kingdom, Luxembourg, the Netherlands and the Nordic countries, but less than 75% in Portugal, Italy, Greece, Croatia, Romania and Bulgaria.
- These differences are wider for **older generations**. Over 80% of 55–74 year-olds in Denmark, Luxembourg, the Netherlands, Sweden and United Kingdom reported using the internet in 2017 against less than 40% in Bulgaria, Croatia, Greece and Romania. Therefore, the gap between internet uptake among the elderly and the younger population generally remained high in the lagging countries compared to the leaders.

Figure C5 Individuals in EU countries aged 16–74 using the internet – internet users (%)*



* as a percentage of all individuals aged 16 to 74 in a given country

Source: Eurostat 2018

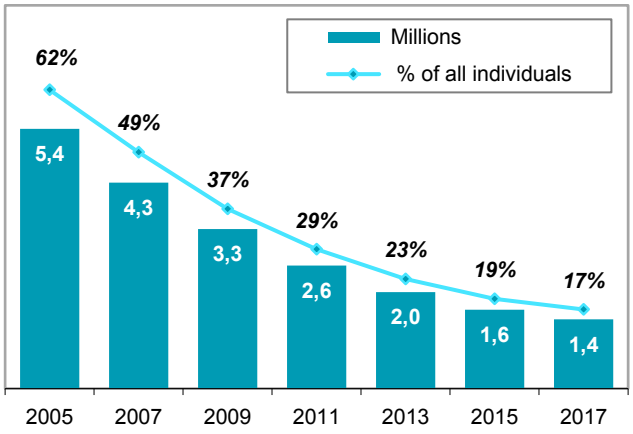
- The proportion of individuals aged 25 to 64 year with **tertiary education** using the internet in 2017 was above 95% in all EU countries except Croatia (89%) and Italy (93%). There are wider differences across EU countries in the share of people with **lower levels of education** who use the internet. In 2017 the share of internet users among individuals aged 25 to 64 years old with low education ranges from over 75% in Denmark, Estonia, Finland, Germany, Luxembourg, the Netherlands, Sweden and United Kingdom to less than 50% in Bulgaria, Croatia, Greece, Hungary Lithuania, Poland, Romania and Slovakia.

Non-internet users

In most countries, internet uptake by young people is nearly universal, but there are wide differences for older generations (notably seniors), which shapes the overall ranking of countries. The role of education appears to be much more relevant for determining internet usage for these groups than for young people. Older people, particularly those with less education, are thus a potential focus of strategies trying to reduce the digital divide.

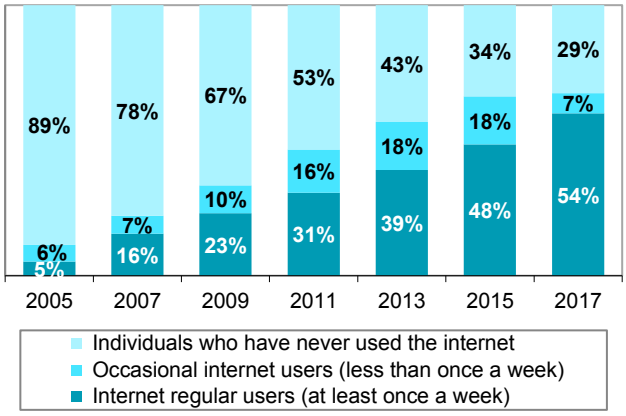
- In 2017, 17% of adults (16+) in the Czech Republic (1.4 million persons), **had never used the internet**. However, the number of such persons has been decreasing year by year. Ten years ago, there were three times more individuals that claimed that they never used the internet – nearly half of adults' population.
- The group of persons, who have never used the internet includes more frequently persons **over the age of 65** (more than a half in 2017 or even 94% in 2007), and people with low education (56%). These days we can hardly find people without any experience with the internet among students, young and middle generation, individuals with tertiary education or women on maternity/parental leave.

Figure C6 Individuals in the Czech Republic aged 16+ who have never used the internet



Source: CZSO 2018, Household ICT usage survey

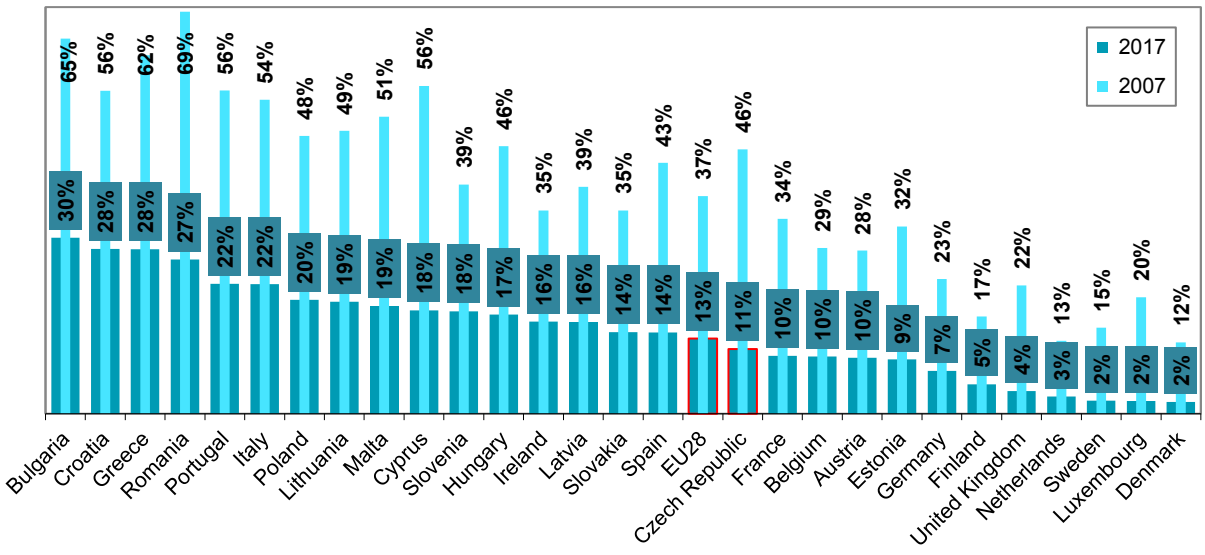
Figure C7 Individuals in the Czech Republic aged 55 to 74 by usage of the internet (%)



Source: CZSO 2018, Household ICT usage survey

- The proportion of the EU28's population that has never used the internet was 13% in 2017, with this share falling to almost one third of its level in 2007, when it stood at 37%. As of the beginning of 2017, the share of ***non-internet users*** among individuals aged 16 to 74 years old in individual EU countries ranges from over 25% in Bulgaria, Croatia, Greece and Romania to less than 5% in Finland, United Kingdom, the Netherlands, Sweden, Luxembourg and Denmark.

Figure C8 Individuals in EU countries aged 16–74 who have never used the internet (%)*



* as a percentage of all individuals aged 16 to 74 in a given country

Source: Eurostat 2018

Regular and daily internet users

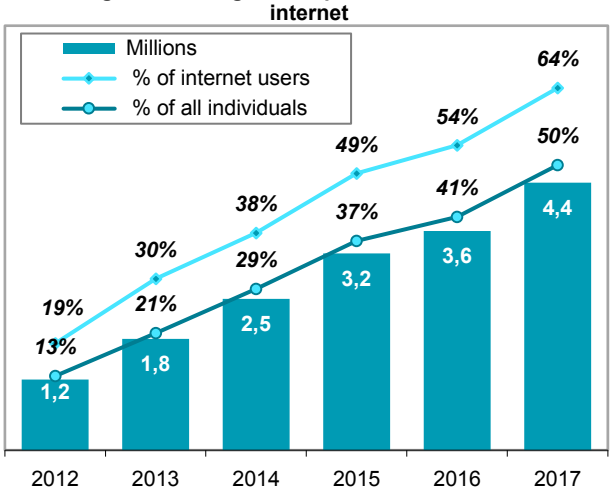
- In 2017, most internet users (95%) said that they accessed the internet regularly during these 3 months: 85% of them were online every day and a further 10% at least once per week, but not daily. It means that 80 percent of all internet users in the Czech Republic accessed the internet virtually every day. This is significantly higher than the proportion of **daily internet users** in 2007. Share of all individuals aged 16+ using **internet regularly** (at least once a week) in the last ten years nearly doubled in the Czech Republic, from 38% in 2007 to 84% in 2017.
- **Frequent (daily) use** of the internet grew by 20 p.p. between 2010 and 2017 in the EU28, from 53% to 77%, showing that not only is the proportion of the population going regularly online increasing, but that it is increasingly becoming a daily activity.
- As was mentioned above, on average, four out of five internet users aged 16+ was in 2017 going online every day in the Czech Republic. But, as nearly all young people (97%), **up to the age of 24**, go online every day, in the case of persons over the age of 65, only a fifth goes online every day (57% of internet users aged 65 years and over).
- In 2017, the proportion of **daily internet users**, among all internet users (those who had used the internet within the previous three months), averaged 87% in the EU28, and ranged across the EU Member States, from 73% in Romania, up to more than 90% in eight Member States, peaking at 96% in Italy. Ten years ago (in 2007), the share of daily internet users among all internet users was equal to 66%, on average in EU countries.
- In 2017, on average, three quarters among all internet users **aged 65 to 74 years old** in EU countries were online daily in EU countries. This proportion of internet users ranges from over 80% in Italy, Denmark, Luxembourg, the Netherlands, Sweden and United Kingdom to less than 60% in Austria, Bulgaria, the Czech Republic and Romania.

Mobile phone internet users – Main figures

Mobile devices provide simpler and faster access of individuals to a large amount of information practically, from anywhere and at any time. Currently, many people use the internet outside their home and workplace. Also, due to this fact, the ICT has been gaining a significant role within society, and for many people in the Czech Republic, as well as in other EU countries, the internet has become a part of their everyday life.

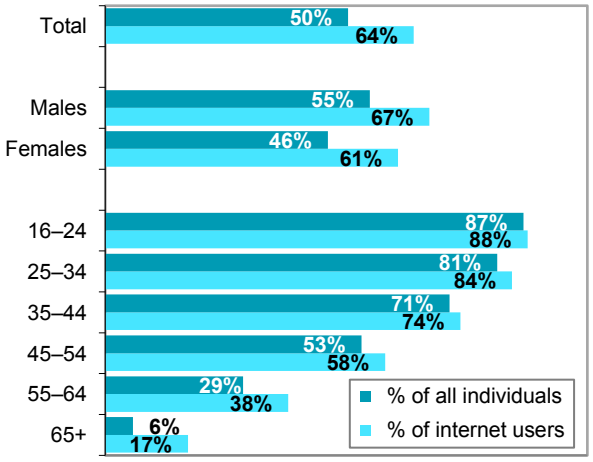
- In 2017, for the first time more than a half of Czech adults claimed to be using **the internet on their mobile phones**, i.e. nearly two thirds of internet users. The corresponding figures for 2012 was only 13 percent of all individuals aged 16+ or one fifth of internet users aged 16+.

Figure C9 Individuals in the Czech Republic aged 16+ using mobile phone to access the internet



Source: CZSO 2018, Household ICT usage survey

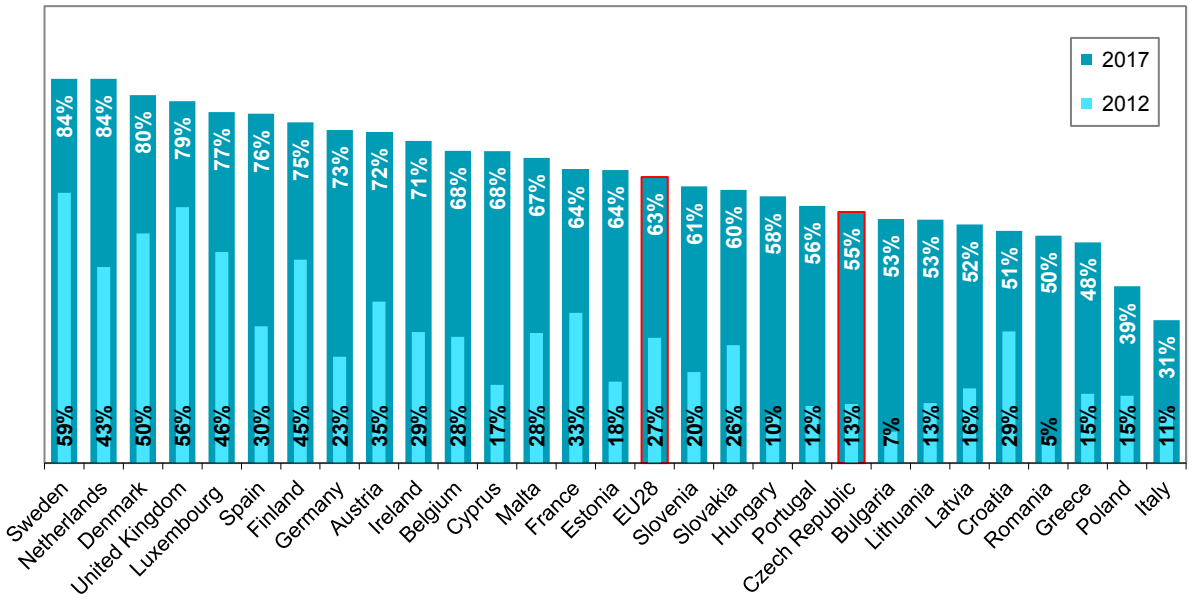
Figure C10 Individuals in the Czech Republic accessing the internet via a mobile phone; 2017



Source: CZSO 2018, Household ICT usage survey

- The internet is in the Czech Republic accessed through mobile phones typically **by young people** but recently also by middle generation. In 2017 it was used this way nearly by nine out of ten persons aged 16 to 24 but also by e.g. 71% of individuals aged 35 to 44. The internet is often accessed via mobile phones also by **women on maternity or parental leave** (approx. three quarters) or individuals with **higher level of education**, e.g. on average 71% of individuals aged 25+ with tertiary education claimed that were using internet on their mobile phone in 2017.
- Even if **internet users aged 55 to 64** made significantly less use of mobile devices, their proportion, however, has grown significantly in the last two years from 14 percent in 2015 to 29 percent in 2017.
- Despite the fact that the number of persons who go online via a mobile phone in the Czech Republic, has been increasing year by year, compared to the values of the majority of the **EU28 countries**, the internet is not used by means of mobile phones very much. In 2017, the internet was accessed by mobile phones in the Czech Republic by 55% of persons aged 16–74; the EU28 average was higher by 8 p.p.

Figure C11 Individuals in EU countries aged 16–74 using internet on a mobile phone (%)*



* as a percentage of all individuals aged 16 to 74 in a given country

Source: Eurostat 2018

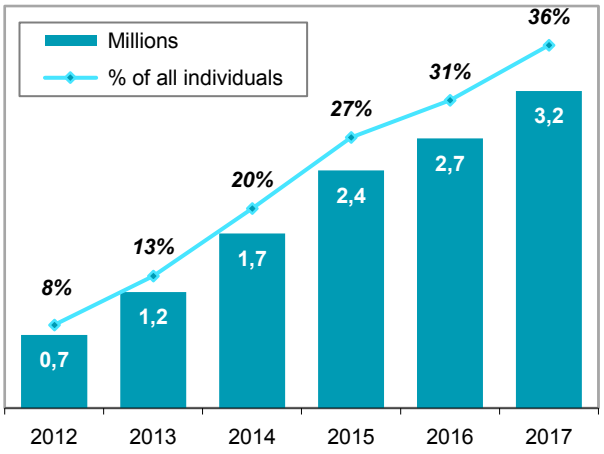
- The highest percentage of persons using the internet via mobile phones can be found in Sweden and in the Netherlands – 84% in 2017. Apart from Italy and Poland, the internet via a mobile phone is used less frequently also in Croatia and Greece. In the Czech Republic only people younger than 34, university graduates or women on maternity/parental leave, reach the EU average, with respect to the use of the internet via a mobile phone.

Type of connection used by mobile phone internet users

The wider distribution of wireless internet connection via Wi-Fi technology in public places, such as libraries, restaurants, trains, etc., which is usually provided free of charge, as well as the aforementioned wider distribution of Wi-Fi routers for the distribution of internet in households, has been used by more and more individuals in the Czech Republic for internet access via mobile phones.

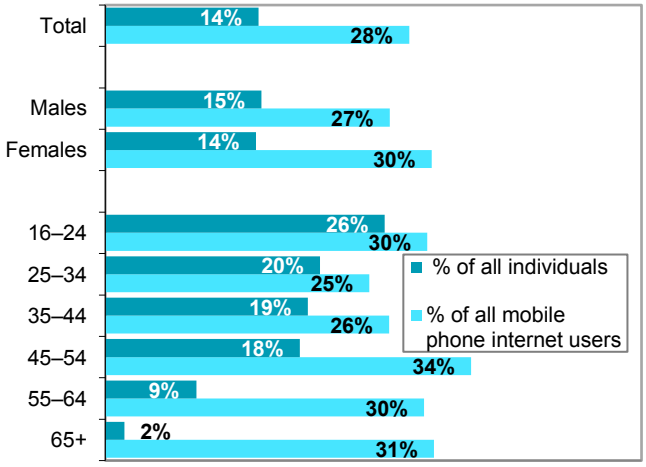
- **Free wireless internet connection (Wi-Fi)** via a mobile phone (whether at home or elsewhere) was used at least once in 2017 by four million (46%) persons over the age of 16, i.e. 92% of those who use the internet on their mobile phones.

Figure C12 Individuals in the Czech Rep. aged 16+ using the internet on a mobile phone via mobile phone network



Source: CZSO 2018, Household ICT usage survey

Figure C13 Individuals using the internet on a mobile phone only via wireless (Wi-Fi) network; 2017 (%)



Source: CZSO 2018, Household ICT usage survey

- In 2017, the 28% of mobile phone internet users aged 16+ were using only **free wireless network (Wi-Fi)** for accessing internet on their mobile phones, in the Czech Republic. When women use the internet on their mobile phones, they tend to use it as a means of connection more frequently than men.
- Mobile-phone internet users can also go online by means of **paid data from mobile phone operators**. This provides the possibility of connection from any place covered by the signal. In 2017, 36% of persons over the age of 16 (72% of which access the internet on their mobile phones) claimed to be using a data tariff to access the internet within their mobile network operators. Due to the decreasing prices of data tariffs provided by mobile phone operators, the number of mobile phone users, who get online via these networks, has been increasing year by year. In the past 5 years, this number has increased nearly five times in the Czech Republic.

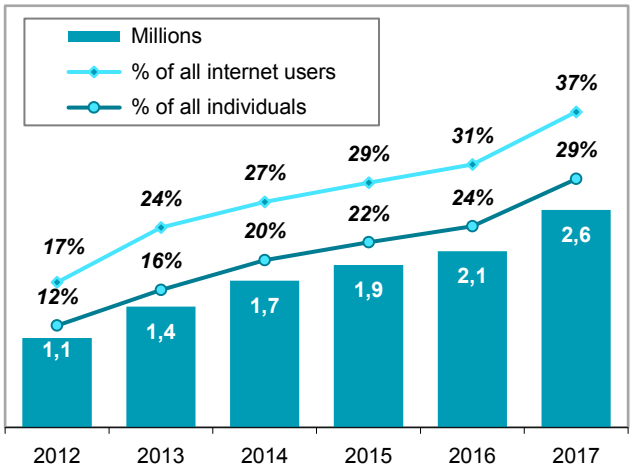
Use of the internet on portable computers away from home

Whereas at times when the internet was a novelty, and could solely be accessed through a desktop computer, nowadays there is a wide range of other devices, that enable internet access, and the range is still expanding.

- With respect to portable computers, their users in the Czech Republic get online mainly by means of **laptops** (52% of the total number of inhabitants over the age of 16). In the same year, the internet was accessed via **tablets** by 17% of persons over the age of 16. The usage of all these portable devices with the intention of going online is on the upward trend.

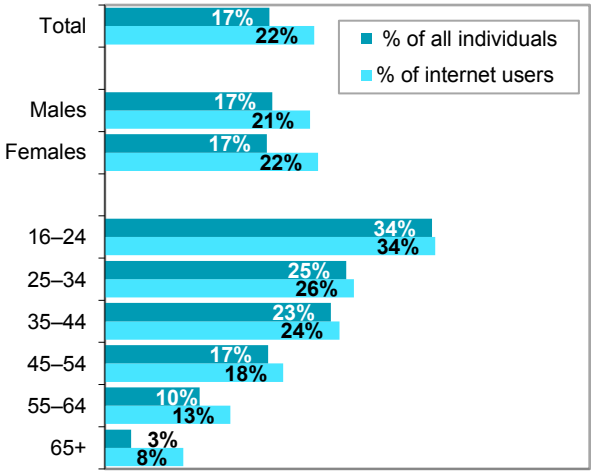
- Provided that a household has internet access, and its own laptop or tablet, we may assume that someone from the given family also uses this laptop or tablet in order to get online. Nevertheless, certainly not everyone uses the **mobile function** of his or her portable device – someone prefers to leave the laptop on the table at home or at work, and tablets often serve only as entertainment for children.
- There is also a large group of people, who do not use laptops or tablets as a replacement of the desktop computer or to be carried within their flats; these persons purchase these devices in order to be able to carry them outside their home or office. In 2017, almost 30% of individuals in the Czech Republic claimed to have used **their laptops or tablets outside their home or office** (e.g. in a café, on a train or in a hotel) and gotten connected to the internet from there – five years ago it was only 12% of individuals.

Figure C14 Individuals in the Czech Rep. aged 16+ using internet on a portable PC away from home or work



Source: CZSO 2018, Household ICT usage survey

Figure C15 Individuals in the Czech Republic using the internet on tablet; 2017 (%)



Source: CZSO 2018, Household ICT usage survey

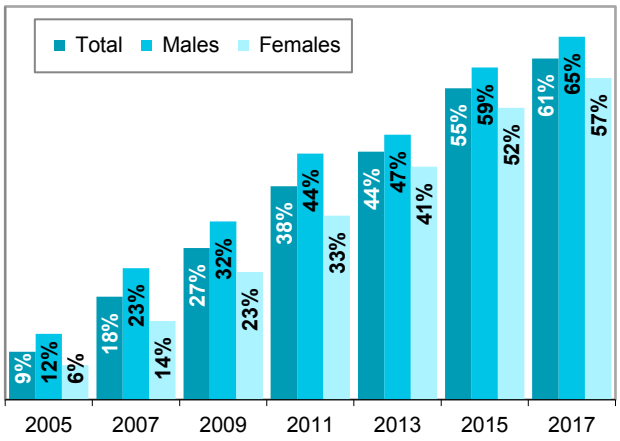
- Whereas mobile phone usage with the purpose of getting connected to the internet is **decreasing rapidly, along with the users' age**, it is the opposite way with desktop computers. Older people can also be characterised by the fact that they mostly access the internet from one device, most frequently from a desktop computer.

Internet users among elderly people

The rapid appearance of information technologies, and especially of the internet in the past 20 years, has brought in a phenomenon which we call the "digital divide"; meaning the increasing differences between people with and without internet access, or their abilities and willingness to use the internet. One of the groups of inhabitants that has been the most affected by this are people of older age, i.e. pensioners, above all.

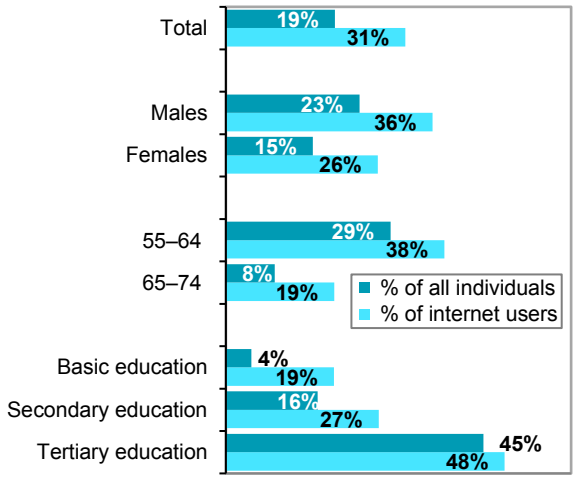
- In 2017, 60.7% of Czech citizens **aged 55–74** claimed to have used the internet at least once in the past three months, i.e. they were classified as so called "internet users". Regular internet users are added to this age group every year. As opposed to this, the number of those, who have never used it is decreasing. Whereas in 2017 the internet was used regularly by the absolute majority of people belonging to this age group, and a mere third of this age group had never used it, in 2012, i.e. five years ago, this ratio was the opposite (43% had never used the internet while 36% had been using it on a regular basis).

Figure C16 Internet users in the Czech Republic aged 55–74 (%)



Source: CZSO 2018, Household ICT usage survey

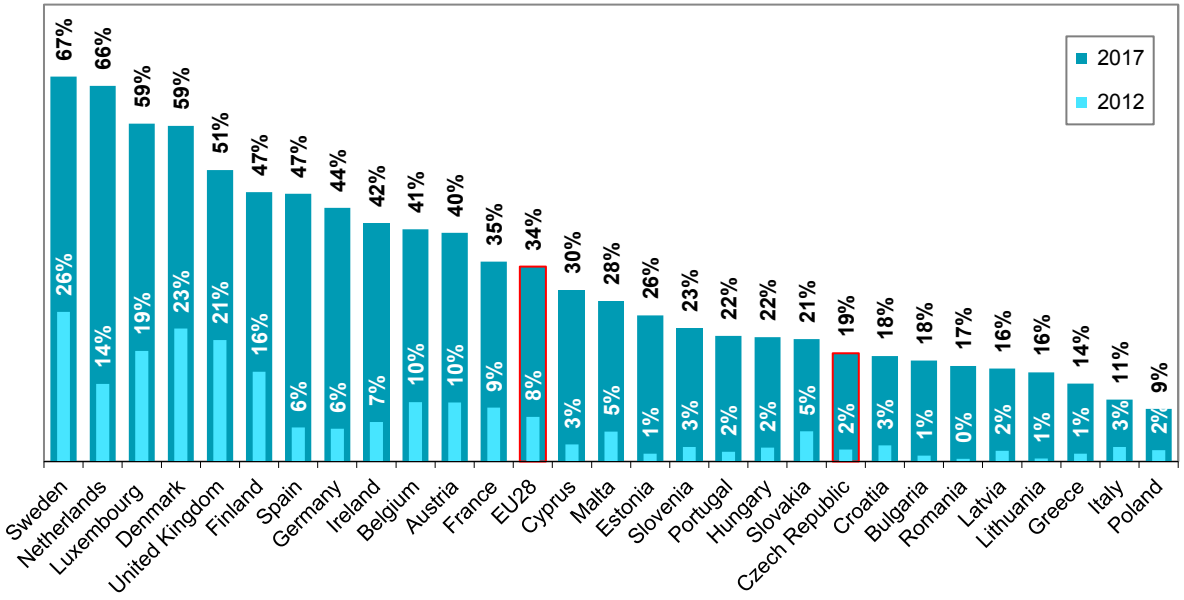
Figure C17 Individuals in the Czech Republic aged 55–74 using the internet on a mobile phone; 2017



Source: CZSO 2018, Household ICT usage survey

- Within the age group of 55–74, **women** gradually start catching up with men with respect to internet usage, although even here the difference is bigger than in younger age groups. This strongly depends on whether the persons belonging to this age group still work, and on the level of their highest attained education – e.g. 92% of **tertiary graduates** use the internet as opposed to less than a quarter of persons with **lower secondary education in this age group**.
- Provided that three quarters of persons belonging to the age group **55–64** used the internet, the percentage of persons who are ten years older **(aged 65–74)** is only 45%, and for the **75+** age group, it is only 15%.
- We may assume that **persons over the age of 65** use the internet not out of necessity, but rather that the internet serves them as a hobby or a voluntary activity. Despite the fact that there are countless initiatives attempting to educate the older generation in the field of computer and internet literacy, and that the internet could be of great help to the elderly, for most of them the internet is probably seen as an unnecessary burden. Getting familiarised with the internet, and overcoming the natural mistrust towards technology, is difficult for them.
- Out of four main devices most frequently used for internet access, i.e. desktop computer, laptop, mobile phone, and tablet, internet users – pensioners – definitely use the **desktop computers** most frequently so far (still) in the Czech Republic. Whereas laptop and mobile phone usage, in order to get connected to the internet, is decreasing rapidly along with the users' age, it is the other way around with desktop computers.

Figure C18 Individuals in EU countries aged 55–74 years using the internet on mobile phone (%)*



* as a percentage all individuals aged 55 to 74 in a given country

Source: Eurostat 2018

- Only in 2007 the percentage of persons aged 55–74 using the internet was in the Czech Republic 10 p.p. lower than the **EU28 average.** Czech pensioners aged 65–74, could not be compared to the European average concerning internet usage at all due to the fact that the average number of European internet users aged 65–74 was twice as high as that of the Czech Republic. However, in recent years, Czech pensioners have nearly caught up with the head start of their European peers. With respect to the internet usage by individuals aged 55–74 in 2017, the Czech Republic, similarly to Spain, found itself **just below the EU28 average**.
- Nevertheless, the principal difference arises with the view of devices, as a means of which the persons aged 55–74 go online. On average, up to a third of European citizens belonging to this age group use their **mobile phones**, in the Czech Republic it was only 19% of persons belonging to this age group. The internet is most frequently used by persons aged 55–74 in Luxembourg, Sweden, the Netherlands and Denmark; the same applies to mobile internet.

C.3 Internet activities – Purpose of internet use by individuals

The number of people regularly using the internet is augmenting, as is the number of activities carried out online. The internet has changed human behaviour and lifestyle of citizens in many ways. Over the last few years, a range of online activities gained in popularity. Nowadays, we spend a considerable part of our time online for various reasons, whether at work, school or university, at home or on the move. We often depend on our digital devices to stay in touch with our families and friends, to get directions to shops, hotels and restaurants or to check our bank accounts. On the other hand, social media platforms and other online fora also provide a space for negative social interactions given the comparatively lower barrier to participation than in the case for real life interactions.

The variety of uses show that the share of the population using the internet does not fully reflect the extent to which people use the internet for important daily tasks and also does not capture the sophistication with which people navigated the internet. Whereas internet usage in general is affected mainly by age, income or education, activities carried out on the internet are also affected by the cultural context, infrastructure, and availability of individual services and applications online.

Internet use for communication

Nowadays, communication, primarily through emails, which have been one of the most significant activities carried out on the internet for many years, has many competitors. Not only in the form of other platforms

designed for communication, such as social or professional networks. Communication has changed dramatically with the introduction of the mobile phone and the rise of opportunities to share pictures and videos at no charge using internet applications such as Skype, WhatsApp, Viber, Instagram or Facebook. The internet in the connection with smartphones have fundamentally changed the way people interact with each other.

- Since the very beginning of internet usage, the internet has served nearly all users as a means of communication. In 2017, for instance, 73% of all Czech citizens aged 16+ communicated via **electronic mail**. This means that sending and receiving emails is a matter of course nearly for everyone, who uses the internet. Out of internet users, only 7% of individuals do not use emails, this mainly includes the elderly, and persons with lower education level.
- Besides email communication, other internet applications which can serve as **messengers** (such as WhatsApp, Facebook messenger, Viber, etc.) have also increased in importance. These applications are also frequently used on mobile phones or tablets. In 2017, they were used by 31% of the Czech population, regardless of the device on which they were used. The operation of these applications is often faster than writing emails, and it also serves as an alternative method to text messages. The advantage of these applications is also that they are often free of charge. The highest percentage of persons using the aforementioned applications can be found within the 16–24 age group (63%). However, even the percentage of the next age group (25–34) is over 50%. Along with the increasing age, the percentage of people using these applications is continuing to decrease.
- Another means of internet communication is **making calls**. Telephone communication via internet applications, such as Skype or WhatsApp, was used in 2017 by a third of Czech inhabitants, i.e. 42% of internet users. This percentage has been decreasing in recent years. Telephone communication via the internet using these applications has also become less attractive due to the cheaper telephone calls made via mobile phones, including telephone communication via roaming within the EU. Since 2012, when the percentage of persons using telephone communication via the internet in the Czech Republic has been the historical highest (37%), the number decreased to the aforementioned 33% in 2017.

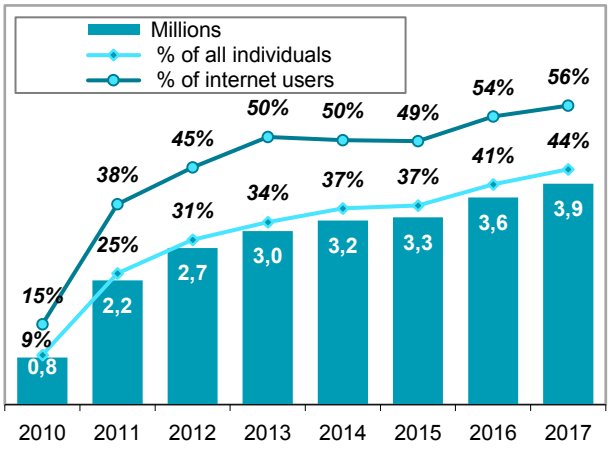
Participating in online social networks

In recent years, large expansion has been recorded with respect to social network activities, primarily with younger generations. Social networks most frequently serve for the sharing information, for communication, and promotion. On a global scale, they are considered to be a significant instrument outside of communication, as well. Social media can enable individuals to maintain existing social relationships and also to build new ones. Evidence on the impact of online social networks on real-life social connections and mental health is mixed. It is likely, however, that not all segments of society benefit from online social networks to the same extent. For example, the elderly could benefit greatly from online networks but may lack the appropriate skills.

- In 2017, a **social network**[30] profile was owned nearly by 4 million (44%) of individuals over the age of 16 in the Czech Republic, as opposed to one million (10%) in 2010. Above all, the younger generation is the most active on social networks, and, for instance, out of all students aged 16+ only 5% do not have a profile on a social network. In contrast, the popularity of the elderly concerning social networks is nowhere near as high. The highest increase in the percentage of social network users was recorded between the years 2009 and 2012, when it increased from 5% to 31%. Since then, the growth has slowed down and it shows an average increase by 2.6%.

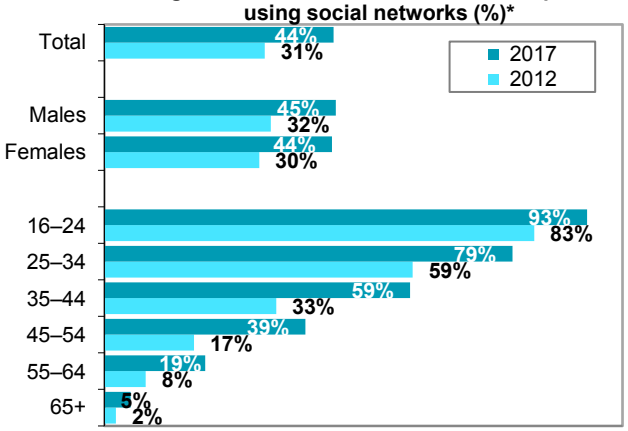
[30] **Social networking** can be distinguished from other communication and content activities by the aspect of creating a profile on certain websites. Being a member of a social network (e.g. Facebook, Twitter or Instagram) with selected other members who share interests and activities is an essential characteristic of a social network. A person is called a user of social networks if he/she has a profile on a social network and had used the network at least once in the last 3 months before the interview.

Figure C19 Individuals in the Czech Republic aged 16+ using social networks



Source: CZSO 2018, Household ICT usage survey

Figure C20 Individuals in the Czech Republic using social networks (%)*

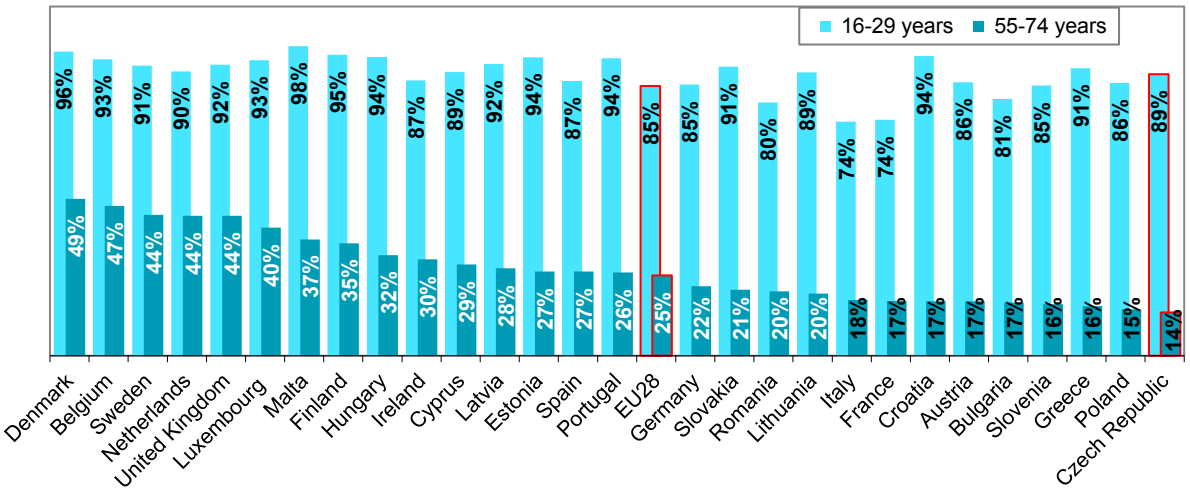


* as a percentage of all individuals in a given group

Source: CZSO 2018, Household ICT usage survey

- Despite the fact that it may seem that the usage of social networks in the Czech Republic has highly expanded, with respect to the **international comparison**, the Czech Republic, with its 48% of individuals aged 16–74 in 2017, is found below the EU average (54%). With respect to the age group 55–74, our position in international comparison is even worse; in this case we are the very last ones on the scale.

Figure C21 Individuals in EU countries using social networks by age; 2017 (%)*



* as a percentage of all individuals in a given age group and in a given country

Source: Eurostat 2018

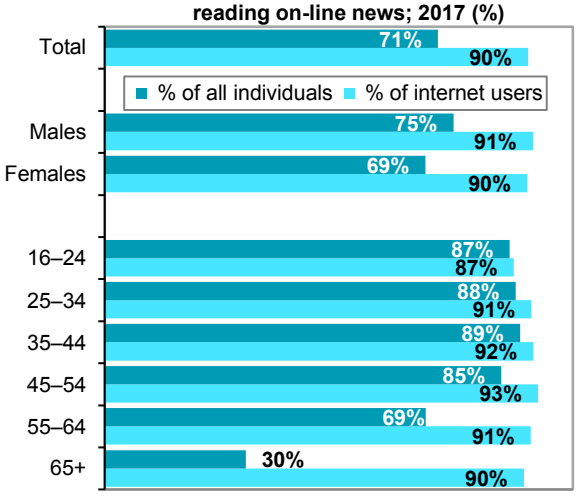
- Besides social networks, there are also professional networks (e.g. LinkedIn), where electronic CVs may be created, and supplemented by references from co-workers and superiors. On the network, companies may, for instance, present their announcements concerning conferences. Thus, a professional network not only serves individuals seeking employment, but also companies seeking suitable candidates for jobs. In 2017, **professional networks** were used by 4% of adults in the Czech Republic. This mainly includes university graduates (11.5%). With respect to age, the highest percentage of users is in the age group 16–44. With respect to economic activities, the relatively highest percentage of users is found among students (7%), who on one hand do not have as much work experience as older individuals, but on the other hand are used to this mean of job seeking.

Internet use for entertainment

Aside from online communication and information seeking, the overwhelming majority of internet users use it for entertainment. This is due to the fact that the internet offers a whole range of free-time and entertainment activities used by today's digital society. Entertainment through the internet (in total or divided to various types) is mainly welcomed by students.

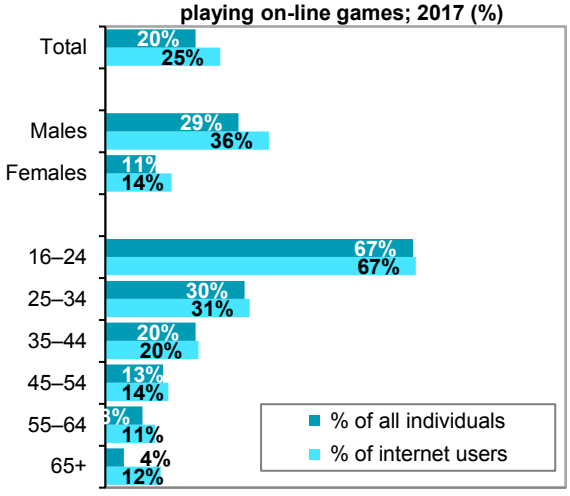
- Apart from online communication, probably the most popular example of a free-time activity concerning the internet is **reading online news**, including internet newspapers and magazines. In 2017, on average, this activity was enjoyed by 71% of Czech individuals (91% of internet users) aged 16 years and over. Among the pensioners, it means every third person. Provided we narrow the set only to pensioners using the internet, the percentage rises at once to 90%, which explains the popularity of this free-time activity type among the older generation.

Figure C22 Individuals in the Czech Republic reading on-line news; 2017 (%)



Source: CZSO 2018, Household ICT usage survey

Figure C23 Individuals in the Czech Republic playing on-line games; 2017 (%)



Source: CZSO 2018, Household ICT usage survey

- The number of Czech citizens reading the news or magazines over the internet in 2017 was **the sixth highest within the EU**, high above the EU average. Apart from e.g. Scandinavian states, reading news on the internet has expanded also to Luxembourg, Estonia or precisely the Czech Republic.
- Other activities, by means of which free time can be spent on the internet, concern **playing and downloading computer games.** The history of computer game playing commenced way before the internet came into existence. However, along with the existence of the internet, the offer of computer games, as well as the structure of their players, has expanded.
- Computer games exist since the beginning of the Computer age and today the computer game industry is an important ICT branch. In 2017, a fifth of inhabitants of the Czech Republic, or alternatively a fourth of internet users, claimed to have played a computer game on the internet or by means of it. **Playing online games** is preferred by men rather than by women, where the percentage of players is 29% and 11%, respectively. It may not come as a surprise that the number of players decreases as age increased. Within the youngest monitored age group, i.e. 16–24 years of age, games are played by nearly 67% of young people, as opposed to that, only 4% of inhabitants over the age of 65 play these games. It is worth mentioning that compared to other analysed effects within the survey, the higher the degree of education, the lower the percentage of online game players among the internet users.

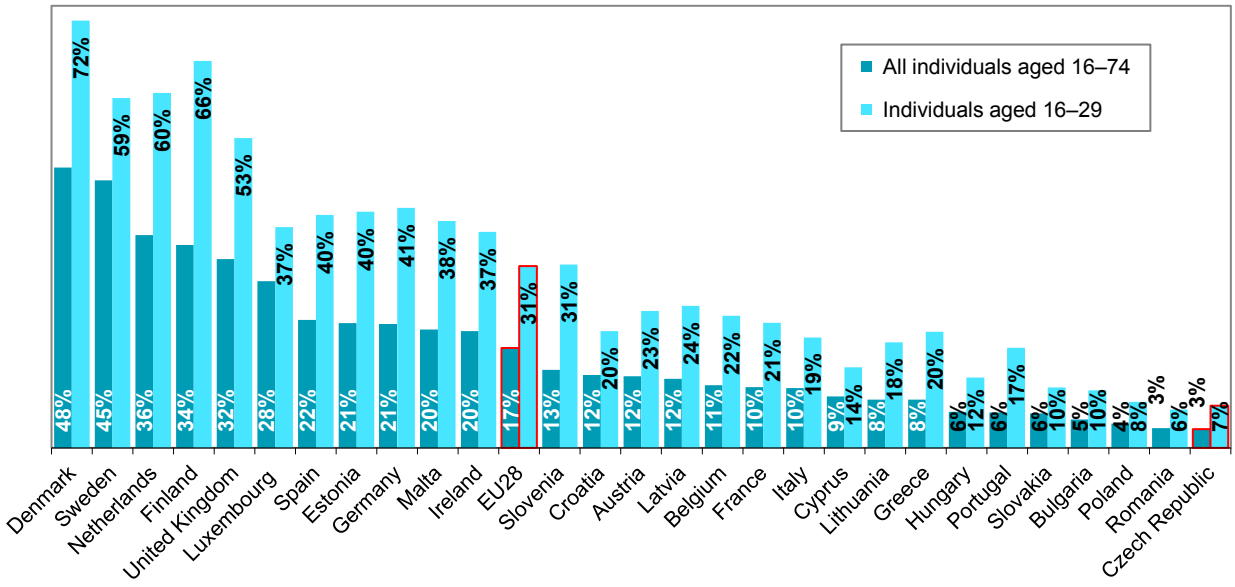
Watching videos on the internet

Another change in lifestyle is consumption of entertainment provided via internet like streaming video services and audio services.

- In 2016, **internet broadcasts of classic TV stations** were watched by 24% of persons over the age of 16 in the Czech Republic. Since 2010, the percentage of persons watching TV on the internet has increased by 10%; online broadcast is preferred by men rather than women.
- In recent years, the number of **internet TV stations** functioning only online without their classic TV broadcast counterpart, e.g. *Stream* or *Playtvak*, has increased. In 2016, these stations were watched by 21% of adults in the Czech Republic. They are the most popular with the young generation – within the age group of 16–24; programmes on these channels were watched by 46% of persons, and within the 25–34 age group it was 38% of persons.

- Spectators with higher demands, who find the offer of internet TV broadcasts insufficient, may pay for the access to **catalogues of paid programmes**, e.g. *Netflix*, *Voyo*, *DIGI2GO* or *HBO GO*, where they may select from a wide range of films. In the Czech Republic, this option is used only by a small group of inhabitants. In 2017, only 4% of inhabitants claimed to have used the programme range of **catalogues of paid films**[31], the majority of which consists of younger age groups, university graduates, and students.

Figure C24 Individuals in EU countries watching video on demand from commercial services by age; 2016 (%)*



* as a percentage of all individuals in a given age group and country

Source: Eurostat 2018

- The **international comparison** shows that this activity is not too typical of Czech citizens. Within the European Union, in 2016, the percentage of individuals (16–74 of age) watching paid online programmes in the Czech Republic, along with Romania, was of the lowest value (3%), compared to 17% which represent the average use within the EU28. Across all EU countries, this option is mainly used by the young generation. For instance, in 2016, more than a half of individuals aged 16–29 claimed to have watched videos on the internet by means of paid film catalogues in the following EU countries – in Great Britain (53%), in Sweden (59%), in the Netherlands (60%), in Finland (66%), and in Denmark it was even 72%.

Internet use for travelling and accommodation

Persons planning trips, whether of a domestic or international nature, find the internet as a priceless means of assistance. Besides searching for information, it is also possible to purchase flight tickets or other transport tickets, as well as to book accommodations. The trend of recent years is travelling by private cars within the car-sharing option and booking accommodation with private providers – all arranged via the internet.

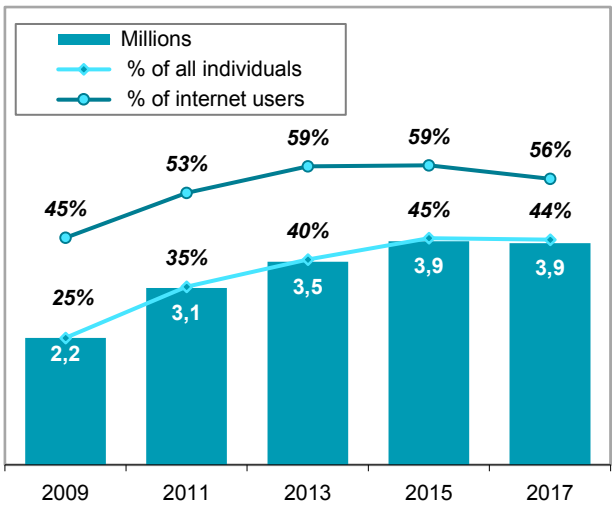
- In 2017, 44% of inhabitants over the age of 16 in the Czech Republic claimed to have searched for **information related to travelling and accommodation** on the internet[32]. This activity was more frequently performed by women, and, with respect to age, younger persons (aged 25–34).

[31] **Watching video on demand (e.g. Netflix)** includes commercial services (charged-for) and, therefore, the videos that one might watch are on the basis of a kind of subscription (also one-time).

[32] Looking for **information related to travel or accommodation** includes using the internet for ascertaining information about travel destination, trips, hotels or any other type of accommodation, travel tickets, etc. The reference period for looking for information about travel or accommodation is 3 months prior to interviewing. Only persons who looked for such information for private purposes were included.

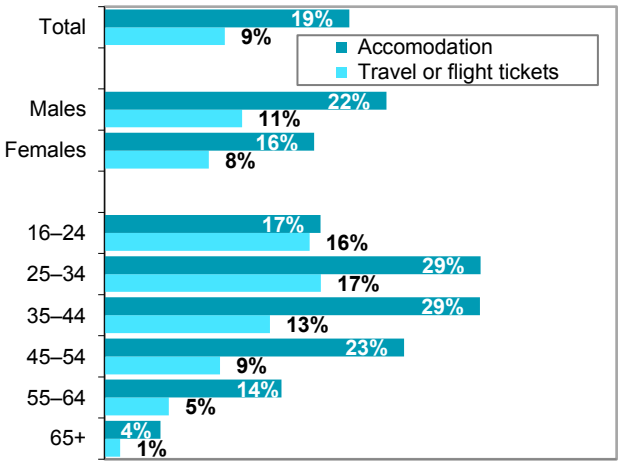
- Merely a fifth of inhabitants of the Czech Republic **paid for their accommodation via the internet** in 2017; those were mainly individuals aged 25–44. Accommodation over the internet is also more frequently arranged by university graduates. In the same year, 9% of persons over the age of 16 bought a **flight ticket or travel ticket** over the internet. They were mainly students or university graduates.

Figure C25 Individuals in the Czech Republic aged 16+ looking for information about travelling or accommodation



Source: CZSO 2018, Household ICT usage survey

Figure C26 Individuals in the Czech Republic purchasing accommodation or travel/flight tickets; 2017 (%)*

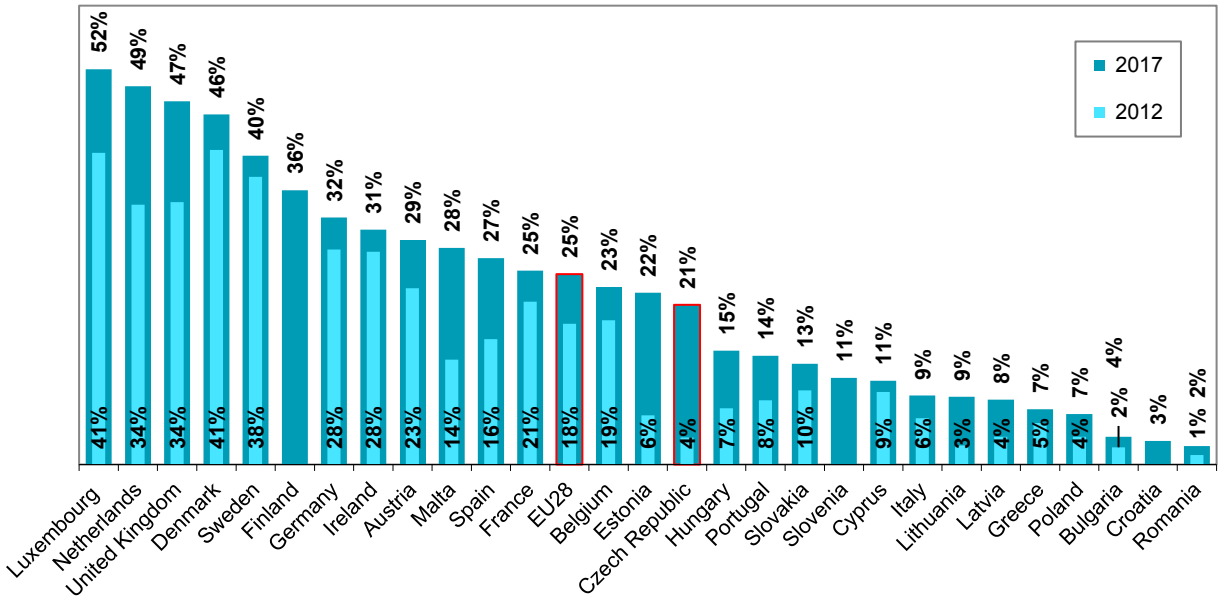


* as a percentage of all individuals in a given group

Source: CZSO 2018, Household ICT usage survey

- Czech people are very active with respect to seeking information on travelling and accommodation. In **European comparison**, for 2017, the Czech Republic found itself on the **eighth highest ranking**. Citizens of Luxembourg, Germany, and Scandinavia have been most active in this area. Should we compare the results for the years 2007 and 2017, in this decade **the Czech Republic has recorded the highest increase** in individuals, who use the internet for information seeking on travelling and accommodation.
- In the Czech Republic, in 2017, **accommodation** was arranged via the internet **from private providers** by 4.4% of individuals. Approximately a half of them used specialised platforms to do this (e.g. Airbnb, Couchsurfing), the other half used other websites (e.g. groups within social networks). This indicator represents the number of persons, who arrange this type of accommodation via the internet. These persons then went on holiday by themselves or with their families or friends. The indicator will provide even more evidence if concerning the total percentage of persons, who arranged some type of accommodation via the internet (therefore, including the accommodation from legal entities). With respect to this, the percentage of persons arranging accommodation from private providers amounted to 21%.

Figure C27 Individuals in EU countries aged 16–74 purchasing accommodation over the internet (%)*



* as a percentage of all individuals aged 16 to 74 in a given country

Source: Eurostat 2018

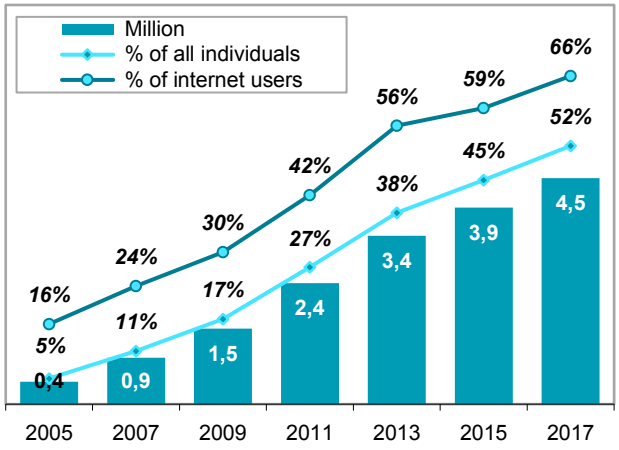
- Apart from shared accommodation, there are also websites providing **car-sharing**. Car-sharing commenced among students in 2010, and it pioneered car-sharing in the Czech Republic. Similarly, to accommodation, even here the interested persons may use specialised websites and applications (e.g. Uber, BlablaCar.cz), and other websites and applications (e.g. groups within social networks). In 2017 this service (via any kind of website or application) was used by 1.6% of individuals, i.e. 16% of users, who arranged transportation via the internet. With respect to car-sharing, the most involved group is the 16–24 age group (6%), or students (8%).

Use of cloud computing and internet banking by individuals

- With respect to the interconnection of various types of electronic devices used for internet access, the usage of **internet storage space**[33] has become increasingly significant. In 2017, internet storage space in the Czech Republic was used by 22% of individuals. Compared to the year 2014, this number has increased by 7%. There is a higher number of male users than female (25% and 19%, respectively). The highest number (48%) is recorded within the age group 16–24. These services are frequently used by students (54%), who use devices with access to the internet more often, therefore they appreciate the possibility of access to documents from various places.

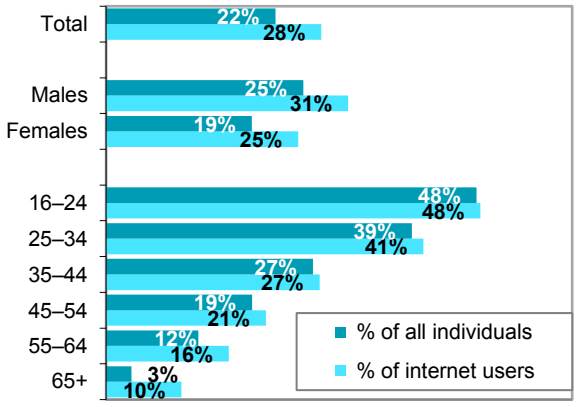
[33] This includes services that enable uploading, storage, and access to one's own documents and files by means of remote online data storage spaces (e.g. Google Drive, OneDrive, Dropbox, uloz.to). Stored data may be viewed and modified from various places and devices.

Figure C28 Individuals in the Czech Republic aged 16+ using internet banking



Source: CZSO 2018, Household ICT usage survey

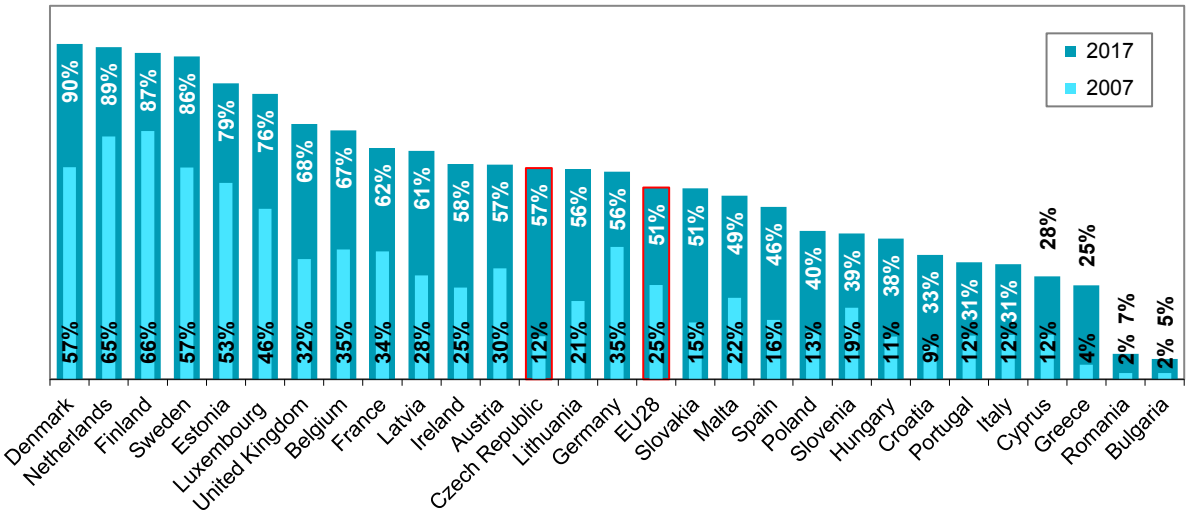
Figure C29 Individuals in the Czech Republic using storage space on the internet, 2017 (%)



Source: CZSO 2018, Household ICT usage survey

- **Internet banking** is one of the fundamental financial online services designed primarily to provide remote control, and administration of a bank account. The portal offers the possibility to verify a bank account balance, to place payment orders, standing orders, set payment and withdrawal limits, etc. In Q2 of 2017, internet banking was in the Czech Republic used by 4.5 million individuals (52% of adult population and 66% of internet users) – ten years ago it was 0.9 million individuals (11% of adult population).

Figure C30 Individuals in EU countries aged 16–74 using internet banking (%)*



* as a percentage of all individuals aged 16 to 74 in a given country

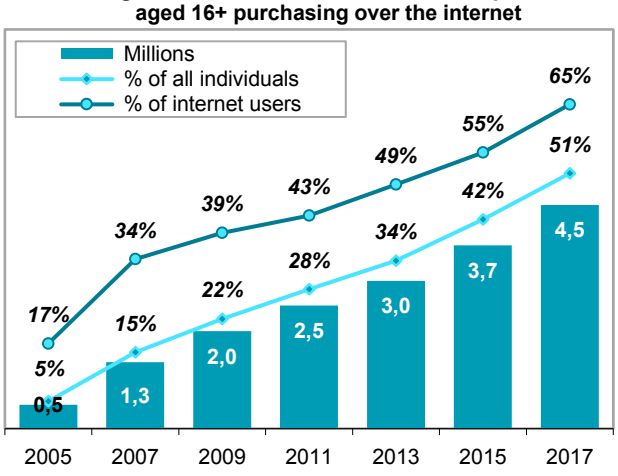
Source: Eurostat 2018

- Online banking services are now widely available in EU countries – often via apps as well as websites. In 2017, internet banking usage in our country was slightly above the **EU28 average**. The most active users of internet banking are the citizens of northern countries, and of the Netherlands. In the comparison of years 2007 and 2017, we must mention that within this decade, the Czech Republic recorded the highest increase in individuals using internet banking.
- Internet banking is the most frequently used online financial service in the Czech Republic. Other monitored **financial services** – online arrangement of insurance, loans, and securities trading – are used significantly less frequently. With respect to arranging insurance (e.g. travel insurance) online, the percentage is 10.2% (or 12.8% among the population using the internet). Only 0.7% of individuals (or 0.9% among the population using the internet) arrange loans and securities trading online.

C.4 Purchasing over the internet

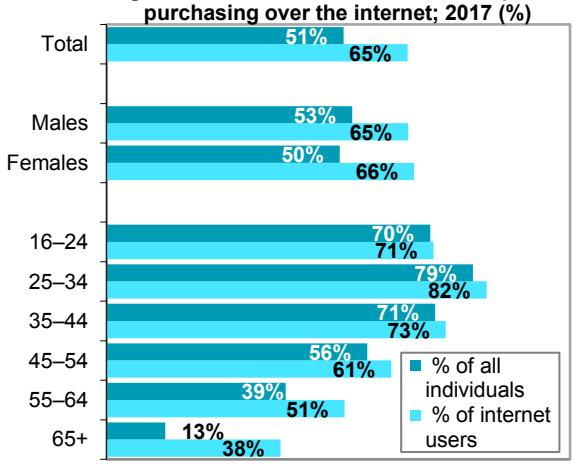
Online shopping is still increasing in popularity. Purchasing in e-shops has become a widespread purchasing variant among Czech consumers, as well as among other EU countries. The main advantage of purchasing over the internet is the possibility to shop anytime and anywhere, access to a wider range of products, and the possibility of fast price comparison of various sellers. This section reviews various aspects of online shopping behaviour of individuals, for example the development of online shopping, types of goods and services purchased, frequency of online shopping and how much e-shoppers spend.

Figure C31 Individuals in the Czech Republic aged 16+ purchasing over the internet



Source: CZSO 2018, Household ICT usage survey

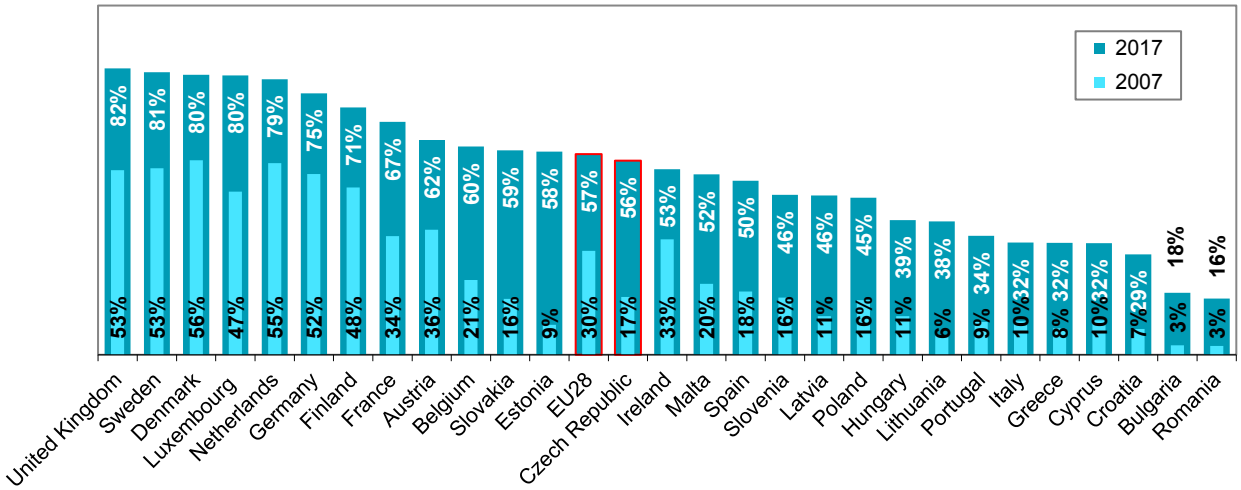
Figure C32 Individuals in the Czech Republic purchasing over the internet; 2017 (%)



Source: CZSO 2018, Household ICT usage survey

- The number of people using the internet for **online purchases**[34] in the Czech Republic is increasing year by year. In Q2 of 2017, a total of 51% (4.5 million) of Czech inhabitants over the age of 16 stated to have purchased goods on the internet in the past 12 months. Only ten years ago, online purchasing was not a very sought service, used only by 15% (1.3 million) of the Czech adult population.

Figure C33 Individuals in EU countries aged 16–74 purchasing over the internet (%)*



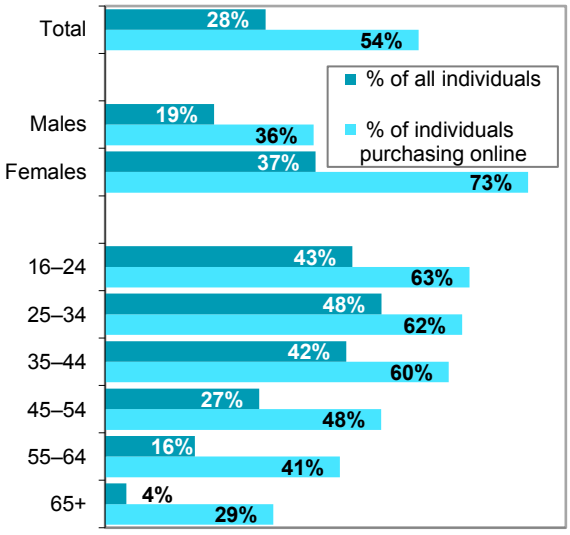
* as a percentage of all individuals aged 16 to 74 in a given country

Source: Eurostat 2018

[34] **An individual purchasing on the internet** is a person who in the last 12 months purchased or ordered goods or a service over the internet for private purposes. This e-commerce activity may be performed on any device including smart phone. Goods or services ordered do not need to be paid over the internet. Goods or services may be delivered on-line (over the internet) or off-line (by mail or in person). Reference period for online purchases is 12 months prior to the interview, only the amount of money spent on online purchases and frequency of purchasing online is measured with the reference period of 3 months.

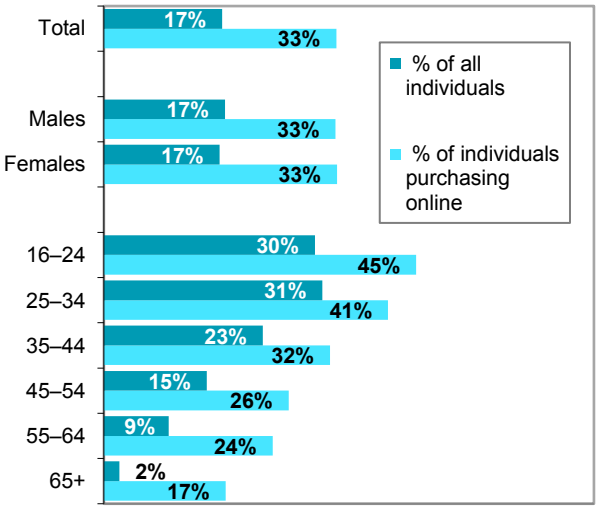
- Despite the fact that online purchasing **has been gaining in popularity** in the Czech Republic, in international comparison we still stand **just below the EU28 average**. Out of all EU countries, online purchasing has been **most commonly used in Great Britain** (in 2017 this was performed by 82% of individuals aged 16–74). Online purchasing is also very well-liked by the citizens of Denmark, Luxembourg, Sweden, Germany, and the Netherlands.

Figrure C34 Individuals in the Czech Republic who purchased clothes or shoes over the internet; 2017 (%)



Source: CZSO 2018, Household ICT usage survey

Figure C35 Individuals in the Czech Republic who purchased tickets for cultural or sport events over the internet; 2017 (%)



Source: CZSO 2018, Household ICT usage survey

- The main advantage of purchasing over the internet is the ability to purchase from the comfort of home, and the possibility for fast comparison of prices from various sellers. This is also priceless when purchasing goods or services from **foreign sellers**. In 2017, the accommodation in hotels abroad, and goods via Amazon or eBay, were purchased by 10% of individuals in the Czech Republic; i.e. 19% of individuals purchasing online, purchased goods from a foreign seller, whether from another EU country or elsewhere in the world.
- Nevertheless, purchasing over the internet also has its downsides. One of them is the impossibility to view, test or try on the product. This is exactly the reason why a half of all persons who did not do any online purchasing in 2017 stated to prefer purchasing in bricks-and-mortar shops. Persons over the age of 65 do not prefer purchasing over the internet due to their lack of skills (77% of persons among this age group). They either do not use the internet at all (67%) or they use it only for basic activities, such as sending emails or viewing websites.
- Czech people mostly prefer to purchase clothes, shoes or fashion accessories online (28% of adult population and 54% of individuals purchasing online). **Online purchasing of groceries** and of cosmetic products has also been gaining in popularity in recent years. In 2017, these types of goods were purchased by 11% of inhabitants.
- The percentage of Czech citizens, who purchase groceries, beverages, and cosmetic products over the internet, was below the EU average in 2017, meaning 14% of individuals or 24% of individuals purchasing online. These types of goods are most frequently purchased over the internet by the inhabitants of the Netherlands, Estonia, and Great Britain.
- In addition to purchasing goods, **services** may also be purchased over the internet. In 2017, Czech citizens were mainly interested in purchasing **accommodation** (19% of individuals; 24% of individuals purchasing online) and **tickets** to cultural or sports events (17% of individuals; 33% of individuals purchasing online).

Chapter D Enterprises and ICT

Progress in the development of digital economy is considered crucial for the improvement of competitiveness of any country's economy. Information and communication technologies (ICT) have rapidly become an integral part of enterprises, and their usage has significantly influenced their functioning. The ICT has not only been involved in inter-company communication, information sharing with business partners or as a means of communication with their customers, but digitalisation has gradually become an increasingly common part of nearly all business processes.

This chapter, devoted to enterprises, provides the monitored development of spreading, and using the modern ICT, as well as applications relevant thereto among business entities since 2002, when the CZSO first realised its own survey on the usage of information technologies among enterprises[35]. The source of international comparison of key indicators is the Eurostat database[36], which was last updated in mid-December 2017.

D.1 Enterprises and computer networks

The interconnection of computers, or other ICT devices in company networks, has been bringing many benefits to companies, as opposed to a situation, where these devices would exist independently. These benefits include, for instance, the possibility of data transfer or sharing, communication between employees, shared internet connection, and, above all, the integration and automation of individual activities performed within a company.

Use of internal computer network

- In January 2017, **internal computer network**[37] could be found in more than three quarters of Czech enterprises with 10+ employees. During the previous decade, the number of enterprises using **wireless technologies** within their internal computer network, has increased significantly. Ten years ago, in January 2007, wireless connection to the internal computer network was used by approximately a fifth of monitored enterprises. In January 2017, there were nearly two thirds of them (64%). This means, that the share of such enterprises tripled in the past decade.
- The equipment of enterprises, with an internal computer network, varies with respect to their **prevailing/main economic activity (NACE categories)**. The local computer network is most frequently used by enterprises from the "*Information and communication activities*" (NACE J) (97%) or "*Professional, scientific and technical activities*" (NACE M) (85%) sectors where you can find firms with main economic activity, for instance, the provision of lawyer services, accounting services, research and development, market research, etc. The internal computer network, as well as other ICT, are least frequently used by enterprises belonging to the "Food and beverage services" sector (NACE I), where in January 2017, they were used by less than a half (44%) of all enterprises with 10+ employees in this NACE category. This is mainly due to the fact that, as opposed to other industries, this sector is highly represented by small enterprises.

Enterprises with intranet and extranet

- In the same month, **intranet** (internal website) was operated by less than a third of enterprises in the Czech Republic. This share has been relatively stable in the past few years. According to the outputs of

[35] The detailed information on the expansion and manner of usage of the selected ICT by enterprises is monitored within the scope of Selective Survey on ICT usage in the business sector (ICT 5-01). The survey is carried out by means of a **sample survey of approx. 9 thousand enterprises with 10+ employees of selected industries**. Since 2006, the survey is carried out yearly in all EU countries as a **mandatory survey stipulated by the Regulation (EC) No. 808/2004 of the European Parliament and of the Council** concerning Community statistics on the information society. For more details see: https://www.czso.cz/csu/czso/podnikatelsky_sektor

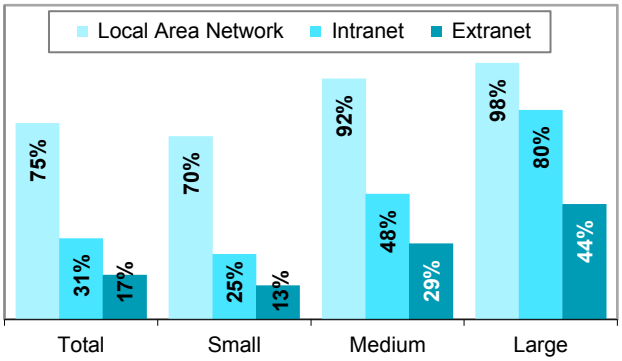
[36] http://ec.europa.eu/eurostat/web/digital-economy-and-society/data/comprehensive-database

[37] **Enterprises with an internal computer network** shall mean enterprises using an internal computer network interconnecting at least two computers for the purpose of sharing of data, as internal email files, and for communication and internet connection within the enterprise.

the last survey, in January 2017, intranet was operated by 80% of large enterprises, by less than a half of medium-sized ones, and by a quarter of small enterprises.

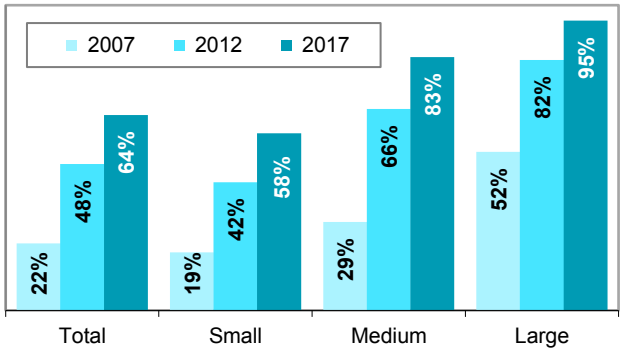
- **Extranet**[38], i.e. special extension used for communication with entities having their organisation, location or business outside the enterprise's headquarters, was used by less than a fifth of enterprises in 2017. Even in this case, the equipment of enterprises, with this type of website, has not changed significantly in recent years. Extranet was used by large firms more often than by small ones (44% and 13%, respectively).
- When it comes to the equipment of enterprises with an internal computer network, it also applies to intranet and extranet, since these are more commonly used in industries specialised with information and communication activities. The smallest usage is in the food and beverage services sector, where lots of smaller enterprises operate.

Figure D1 Enterprises in the Czech Republic using computer networks; 2017 (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

Figure D2 Enterprises in the Czech Republic with wireless Local Area Network (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

* as a percentage of all enterprises with 10+ employees in a given size class

- Increasingly more often, enterprises in the Czech Republic enable their employees to use **remote access** to internal documents, files or applications, available on their computer network. This is typically done by means of a secured internet connection. Whereas in 2010 this option was offered by a third of enterprises, in 2017, it was more than a half (56%). Even among large enterprises, this option is offered to employees more frequently than in small ones (95% and 48%, respectively); there are also significant differences in the prevailing economic activities of the monitored entities.

D.2 Enterprises with access to the internet

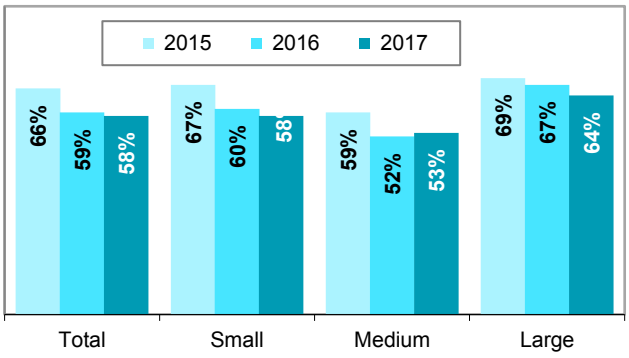
Since the beginning of internet development in the Czech Republic, it was evident that enterprises are to find this technology a very useful, and, with time, a practically indispensable one. Internet usage in Czech enterprises has been increasing much faster than in households. At the beginning of 2017, only 2 enterprises out of 100 were not connected to the internet. It comes as no surprise that in 2000, there were 75% of enterprises with 10+ employees online in the Czech Republic. The situation is very similar in the majority of EU countries. In January 2017, on average, only 3% of enterprises were not connected to the internet. The highest number of enterprises, with no internet access, was recorded in Greece (13%) and in Romania (15%). Therefore, the crucial question is not whether or not an enterprise is connected to the internet, but how it is connected and what the internet is used for.

[38] **Extranet** is a closed network that uses internet protocols to securely share enterprise's information with suppliers, vendors, customers or other businesses partners. It can take the form of a secure extension of an intranet that allows external users to access some parts of the enterprise's intranet. It can also be a private part of the enterprise's website, where business partners can navigate after being authenticated in a login page.

Type of internet connection used by enterprises

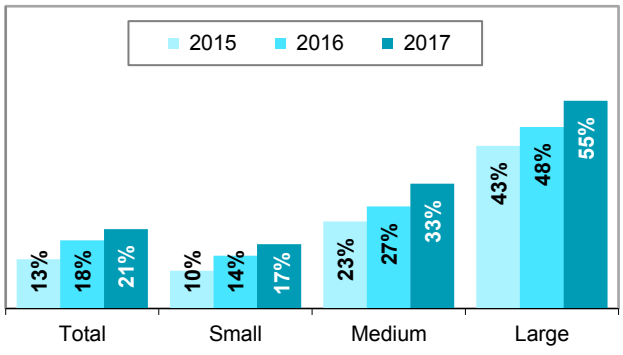
- Over the past few years, there has been a significant change with respect to **technologies** used by enterprises in order to gain internet access. In 2017, nearly a half of enterprises (48%) in the Czech Republic had **mobile internet** access. In 2015, this means of connection was used by less than a third of enterprises (31%). In 2017, mobile internet connection, exclusively, was solely used by less than 1% of enterprises, which means that enterprises using a mobile connection also used another means of fixed internet connection.
- On a long-term basis, another type of **fixed (wired) connection** to the internet in Czech enterprises, has been the connection via **DSL technology**. In January 2017, this means of connection was used by just under 58% of enterprises. In recent years we have been monitoring a decrease in the usage of this technology – in 2015, internet connection via ADSL or another xDSL technology was used by two thirds of enterprises.
- Among EU countries, fixed internet connection is the prevailing one; in January 2017, on average, it was used by 93% of enterprises with 10+ employees. Mobile internet connection (by means of data tariffs from mobile operators) is used by an increasing number of enterprises in the Czech Republic; this trend also applies within the EU28. In 2017, on average, this means was used by 69% of enterprises in **EU countries,** as opposed to less than a third in 2010. Mobile connection to the internet is the most used type in Finnish enterprises; in 2017, it was used by 94% of enterprises compared to 68% in 2010.
- On the other hand, two other types of connection to the internet have been gaining in popularity: **optical internet connection** and **leased line**, provided by operators of telecommunication services. In January 2017, each of these two technologies was used in the Czech Republic by approximately fifth of enterprises with 10+ employees, which is approximately a two-fold share compared to the situation 5 years ago, when they were used by every tenth company.

Figure D3 Enterprises in the Czech Republic using xDSL internet connection (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

Figure D4 Enterprises in the Czech Republic using fibre (FTTx) internet connection (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

* as a percentage of all enterprises with 10+ employees in a given size class

- In January 2017, more than **two types** of fixed internet connection were used in the Czech Republic by seven enterprises out of ten; with respect to large firms it was nine out of ten.

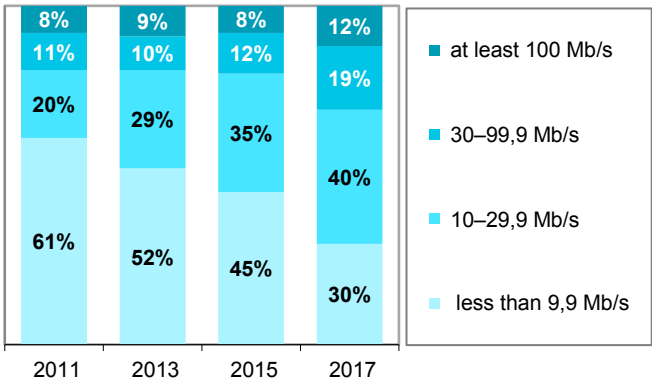
Speed of internet connection used by enterprises

- With regards to the spreading of new or improved existing technologies used for internet connection, the contractually-binding internet connection download speed of Mbit/s has been increasing year by year, with the fastest fixed internet connection in Mbit/s used in enterprises – further below, this term is simplified to **internet connection speed**. In 2015, less than a fifth (19%) of enterprises with 10+ employees in the Czech Republic, claimed to have been using internet connection of 30Mb/s and higher; two years later it was already nearly a third and with respect to large enterprises the percentage was 60%.
- In 2017, the number of enterprises using internet connection enabling downloading of **at least 100 Mb/s** was, as expected, the highest in enterprises operating in the telecommunication industry (68%) or in IT

activities (39%). Opposed to this, the lowest number was found in enterprises operating in the food and beverage services sector or in retail. In both of these industries, it was "only" 7.6% – this low number is again caused by the fact that these industries are highly represented by small enterprises, compared to other industries.

- The prevailing internet connection speed in Czech enterprises, in January 2017, was between 10–29.9 Mb/s (40% of enterprises with internet access). 19% of enterprises with internet access were downloading data with a speed of 30–99.9 Mb/s, and a further 12% of enterprises got connected with speed exceeding 100 Mb/s. In 2017, a download speed lower than 10 Mb/s was only used by less than a third of enterprises in the Czech Republic. Only in 2011, was it the most frequently used speed (61% of enterprises with internet access).

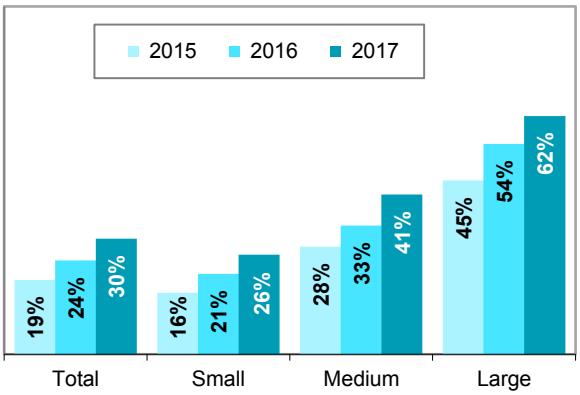
Figure D5 Internet connection speed used by enterprises in the Czech Republic (%)*



* as a percentage of all enterprises with 10+ employees with the internet

Source: Czech Statistical Office 2018, ICT use survey in enterprises

Figure D6 Enterprises in the Czech Republic with at least 30 Mb/s connection speed (%)*



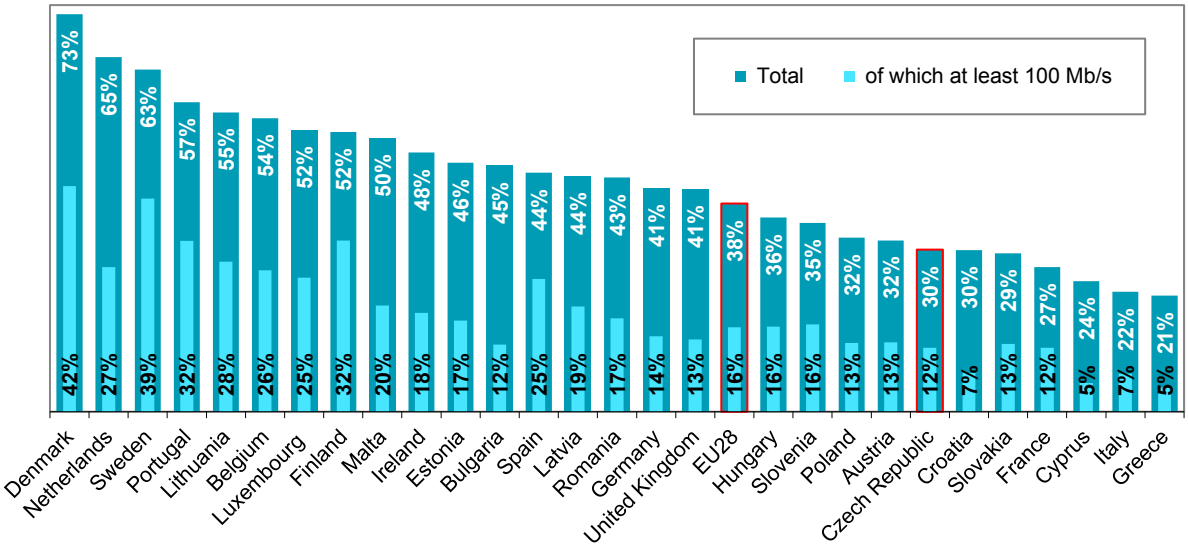
* as a percentage of all enterprises with 10+ employees in a given size class

Source: Czech Statistical Office 2018, ICT use survey in enterprises

Note: maximum contracted download speed of the fastest fixed internet speed

- On the European scale of enterprises, with internet connection speed of at least 30 Mb/s, Czech enterprises took the place below **the EU28 average** in 2017, i.e. only on the 22nd place, along with enterprises from Slovakia and Croatia.
- During the last four years, the share of enterprises using a very fast internet connection (**at least 100 Mb/s**) has doubled. In 2017, internet connection enabling the aforementioned speed of data download was used by an average of 16% of enterprises within the EU28; in 2013 there were not even 8%.
- The fastest internet connection was available to enterprises in Nordic EU states: Denmark, Sweden, and Finland, where at the beginning of 2017 more than 30% of enterprises stated to be using the maximum download speed of even 100 Mb/s and higher. Opposed to this, in Croatia, Italy, Cyprus, and Greece there were less than 10%.

Figure D7 Enterprises in EU countries with internet connection speed at least 30 Mb/s; 2017 (%)*



* as a percentage of all enterprises with 10+ employees in a given country

Source: Eurostat 2018

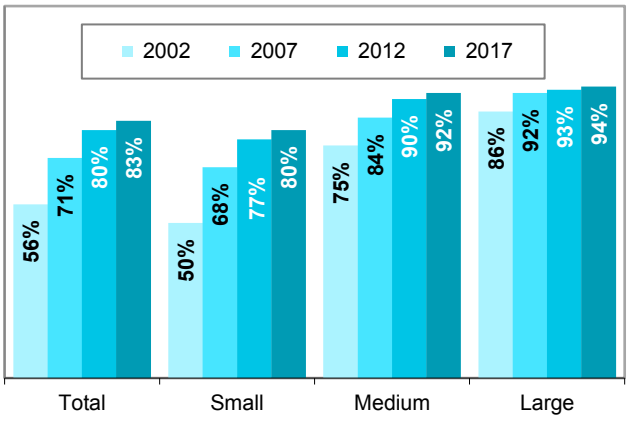
D.3 Enterprises with a website

Through the internet, economic entities may make their presentation very efficient and increase the awareness of their existence – they may establish a good reputation – but also communicate with their customers or suppliers. Possibly the most famous environment for self-promotion of an enterprise, on the internet, is its website. Enterprises represent, not only themselves and their products online, but in many cases, they also sell these products via their own website.

- In January 2017, a total of 83% of enterprises in the Czech Republic with 10+ employees had a **website**[39]. Compared to the year 2000, when a website was owned by 40% of enterprises, it is more than twice as many. However, there have not been any significant changes to this share in recent years. In January 2017, a web presentation was most frequently owned by entities operating in the accommodation industry (CZ NACE I (55)), in tourism (CZ NACE N (79)), and in the category CZ NACE J *Information and communication activities* (over 95%).
- In January 2017, approximately two fifths of enterprises had their website **customized for mobile devices**. The number of enterprises with their website customized for mobile devices has increased in recent years, on a year-on-year basis by 10%. In some areas (for instance, accommodation, travel agencies and offices, in the sector of media or IT industry), the share of enterprises providing their website customized for mobiles was more than 65%.

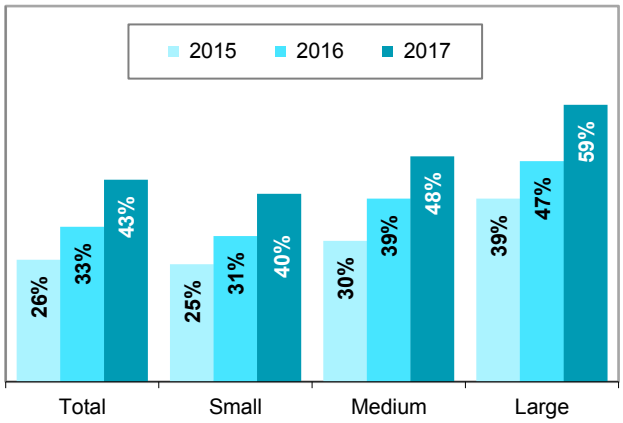
[39] **Enterprises with websites** shall mean enterprises using the web pages, which content they may affect themselves for the purposes of official presentation and offering of products and/or services. These also include web pages shared with other legal person. These do not include information on the enterprise solely on information servers (in so-called catalogues of companies).

Figure D8 Enterprises in the Czech Republic with a website (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

Figure D9 Enterprises in the Czech Republic with a website customized for mobiles (%)*

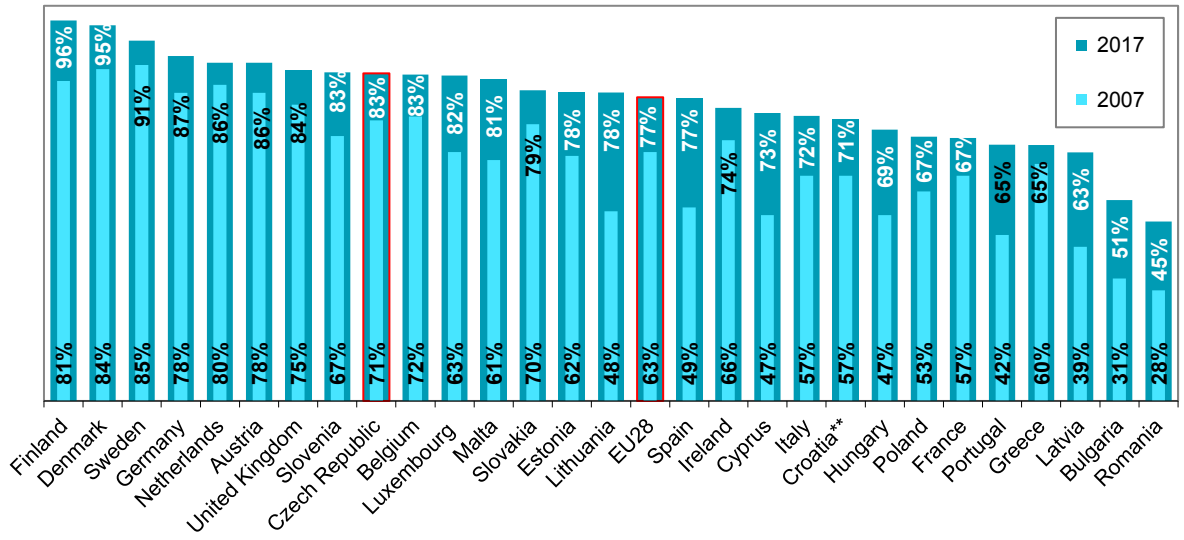


Source: Czech Statistical Office 2018, ICT use survey in enterprises

* as a percentage of all enterprises with 10+ employees in a given size class

- On a long-term basis, the number of enterprises operating in the Czech Republic with their own website has been one of the highest in **EU countries**. In 2017, their share was higher than the EU28 average (83%) by 6%, therefore, as the indicator shows, the Czech Republic was ninth. As well as in a variety of other indicators, from the digitalisation area of the business sector, the dominating countries are Scandinavian states, where over nine out of ten enterprises have their own website. Opposed to this, for instance, in Bulgaria or Romania, there is still approximately a half of enterprises with 10+ employees, which do not have their own website.

Figure D10 Enterprises in EU countries with a website (%)*



* as a percentage of all enterprises with 10+ employees in a given country
** data for year 2009

Source: Eurostat 2018

Language version and type of domain used by enterprises on their website

- In 2016, more than a third of enterprises (35%) in the Czech Republic had the information on their website also available in a foreign language. With respect to **websites** of enterprises available **in a foreign language**, there are significant differences between the individual fields of business. The crucial point is whether their products or services are also offered abroad. For instance, in January 2016, there were more than 80% of large enterprises in the accommodation or media sectors, which had their websites in a foreign language.

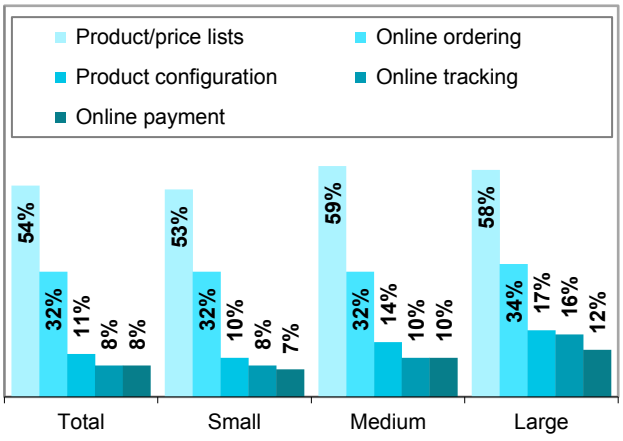
- In 2016, Czech **national domain .cz** was registered for websites of more than three quarters of all enterprises with 10+ employees operating in the Czech Republic. Another nation's domain (e.g. *.sk* or *.de) or a* multinational domain (e.g. .eu) was used for the website of 20% of enterprises in the same year. A generic domain (e.g. .com), or another domain, was used by 16% of entities. The use of other domains, than the Czech national domains, is more typical of websites of large enterprises, and with respect to sectors, it is more typical of enterprises involved in IT or of travel agencies or offices.

Applications available on enterprises' website

In 2017, more than two thirds (68%) of individuals in the Czech Republic claimed to be using the internet for seeking product information (goods and services), and a half of them claimed to have purchased some goods or services over the internet in the same year – for more details see Chapter C. Enterprises have logical reactions to such a demand, and not only do they provide product information on their website, but it is more and more common that they provide a whole range of other customer functions, as well.

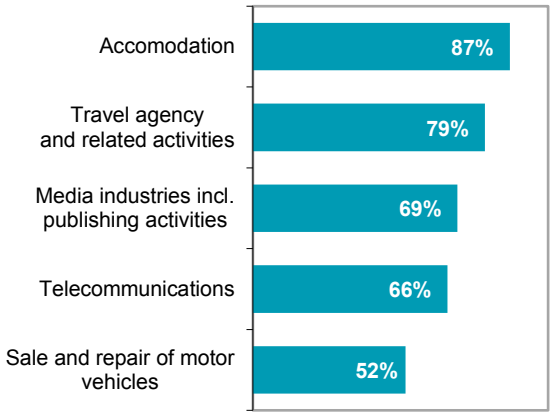
- In January 2017, more than a half (54%) of enterprises in the Czech Republic enabled the visitors to their websites to view their **catalogues or product price lists**, and just under a third (32%) of them offered the option to **order or make reservation** of offered goods or services. A pleasing factor is that, on the international scale, both of the aforementioned functions of Czech companies' websites, stand above the European average. For instance, the aforementioned share of Czech enterprises, enabling their visitors to make an online order or reservation, in comparison with European countries, lead to the Czech Republic being in third place, along with Denmark, and behind enterprises from Sweden and the Netherlands.
- In January 2017, one of the less commonly used **functionalities** of enterprises' websites was the option to **configure the offered product**, in order to accommodate specific demands. 11% of Czech enterprises enabled their customers to do so. 8% of enterprises provided **online tracking** of dealt-with orders on their website, and 7.5% of enterprises provided the possibility of **online payment** for purchased products off the internet.
- The number of enterprises which publish their products and price lists on their website is, as expected, the highest in the area of accommodation and food and beverage services. The TOP 5 industries with the highest share of enterprises with websites enabling to realise online orders or reservations in January 2017 included the aforementioned accommodation industry and travel agencies and offices, and enterprises operating in the audio-visual sector, telecommunications, or in business.

Figure D11 Enterprises in the Czech Republic with selected websites facilities; 2017 (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

Figure D12 TOP 5 industries with the highest share of enterprises in the Czech Republic with a website enabling online ordering; 2017 (%)*



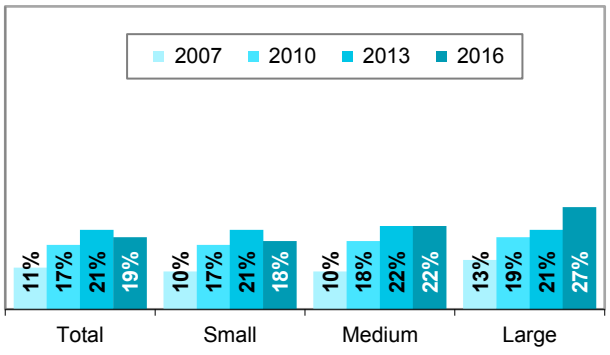
Source: Czech Statistical Office 2018, ICT use survey in enterprises

* as a percentage of all enterprises with 10+ employees in a given size class, resp. industry

Enterprises selling via their websites

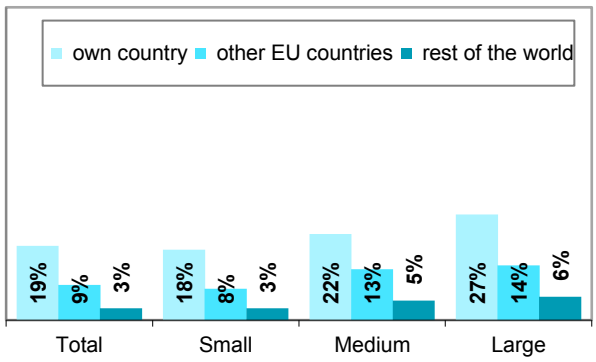
- Not only is the presentation and communication of enterprises realised online, there is also a year-by-year increase in those which **sell their goods or services online**. In 2016, a fifth of Czech enterprises with 10+ employees were selling online. Despite the fact that this number had nearly doubled in comparison with the year 2007, the highest increase of enterprises selling online was recorded between the years 2007–2012. Since then, the number of enterprises selling their products or services online has not changed significantly.
- With regards to enterprises with 10+ employees, the turnover from sales conducted via website amounted to 9% of total enterprise turnover in 2016. For more than 12% of Czech enterprises, the **sales via website comprised over a tenth of their total turnover**. It is the **fourth highest share in the EU**. For more details on the e-sales of enterprises, either via website or via EDI messages, including the significance of e-sales compared to the total turnover, see Part D9 called Electronic sales of enterprises.
- Enterprises selling their products (goods and services) via website, most frequently operate in the industry of **travel agency and related activities as well as accommodation** – in 2016, the share of enterprises of these two industries selling via websites was 63% and 60%, respectively. With respect to travel agencies and offices, these e-sales via websites formed over two fifths (42%) of their total turnover; for enterprises operating in the field of accommodation this share was lower (23%), however, still above the average.
- Enterprises selling online **almost exclusively sell via their own websites**. Sales via a so called **e-commerce market place**[40] have not been commonly used in the Czech business environment – except for enterprises operating in the industry of accommodation, travel agency, and related activities. In 2016, this way of sales was used by less than 3% of enterprises with 10+ employees. Companies performing sales via their own website sell approximately the same number of goods and services to their end customers (so called B2C sales), as well as to organisations of public administration (so called B2B or B2G sales).
- In 2016, half of enterprises in the Czech Republic, using their websites for sales, sold their products or services to customers of **other EU countries**, and 16% of them to **non-EU countries**.

Figure D13 Enterprises in the Czech Republic selling via a website or aplications (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

Figure D14 Enterprises in the Czech Republic selling via a website by customers' locations; 2016 (%)*



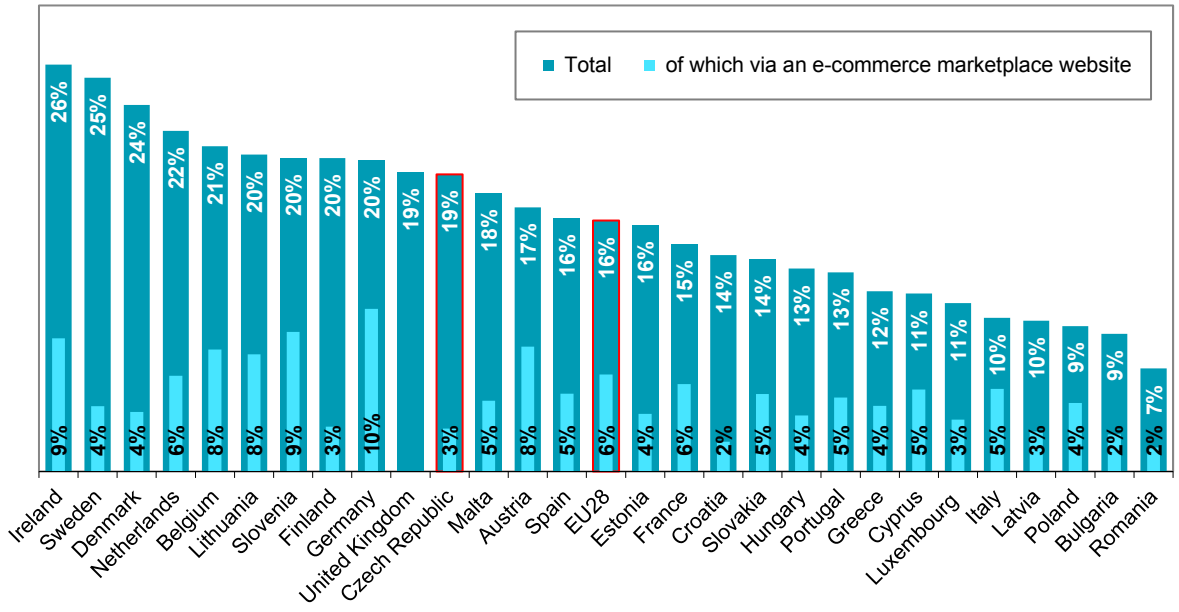
Source: Czech Statistical Office 2018, ICT use survey in enterprises

* as a percentage of all enterprises with 10+ employees in a given size class

[40] The term **'e-commerce marketplace'** refers to websites or apps used by several enterprises for trading products (e.g. Booking, eBay, Amazon, Amazon Business, Alibaba, Rakuten, etc.). E-commerce marketplaces are trading platforms with the necessary trading functionalities (a marketplace does not sell or buy goods or services for itself) and is open to several buyers and sellers. The following should not be considered as e-commerce marketplaces: a) a website of an enterprise, selling the enterprise's own products; b) a website of one seller acting as distributor, selling other enterprises' specific products; c) a website that provides e-commerce solutions; d) a website that focuses on non-trading activities like collaborative design.

- In international comparison of enterprises performing sales via websites, Czech enterprises were in 11th place in 2016, **above the EU28 average**. In the same year, the highest share of enterprises selling via website – approx. 25% – was in Ireland, Denmark or Sweden, and the lowest one – less than 10% – in Poland, Bulgaria, and Romania.

Figure D15 Enterprises in EU countries selling via a website; 2016 (%)*



* as a percentage of all enterprises with 10+ employees in a given country

Source: Eurostat 2018

D.4 Use of selected internet applications and services by enterprises

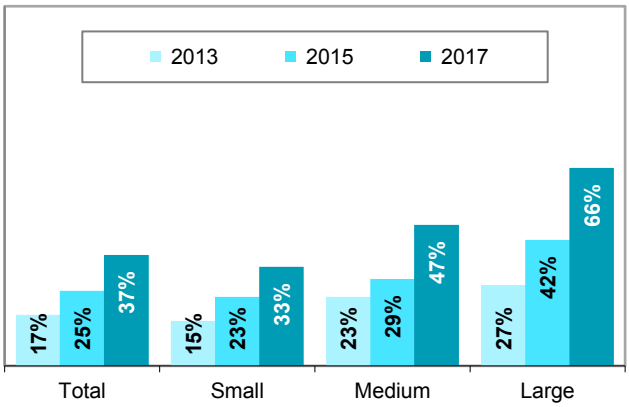
As most companies in the Czech Republic now have broadband internet and their own website, there is a considerable basis for advanced and large scale ICT applications. There are differences between companies in the use of advanced applications, and these differences will probably remain in the near future. This chapter describes a number of ICT applications used by companies in the Czech Republic. The use of these applications differs, sometimes significantly, between large and small businesses, but also between sectors of industry. The decision on whether or not to invest in technology or an ICT application will always be based on business considerations, and the cost-benefit analysis will not work out the same for all companies.

Enterprises and social media

A website is not the only channel used by enterprises to present themselves on the internet. The usage of social media is currently experiencing its boom. In January 2017, the most common type of social media, used by enterprises, were social networks, where already a third of entities in the Czech Republic had established their own account. Thanks to social networks, enterprises have the opportunity to improve communication with their customers, as well as other advantages. The main benefit of an enterprise's presentation and promotion, on social networks, is building relationships with its supporters, providing support, and relevant information. This way, enterprises may obtain feedback concerning their products or services by a relatively comfortable and interactive method.

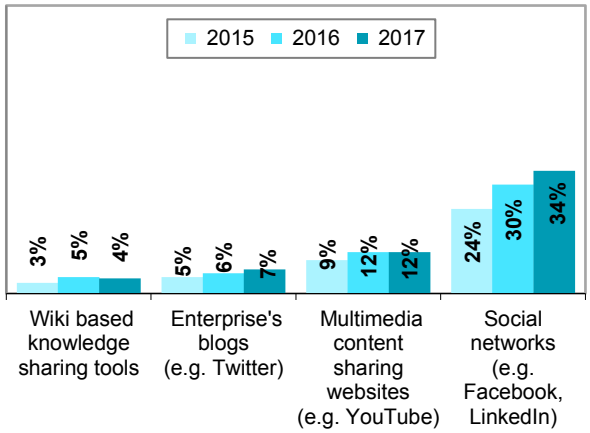
- At least one type of **social media**[41] was used by more than a third (37%) of enterprises in the Czech Republic in January 2017, mostly by the large ones (66%). We have been monitoring the usage of social media since 2013. Since then, the share of enterprises with their own user profile or account, with any social media, has more than doubled – in January 2013 – social media was actively used by 17% of enterprises.
- The most significantly used types of social media in the Czech Republic, in January 2017, were **social networks** (Facebook. LinkedIn, etc.), where 34% of all enterprises had their own account. In the last four years, the share of enterprises with a social network profile in the Czech Republic has more than doubled. The highest increase has been recorded among large entities with 250+ employees, where a user profile was owned by 62% of enterprises, compared to 25% of them in 2013. It applies to all types of social media that they are more frequently actively used by large enterprises rather than small ones.

Figure D16 Enterprises in the Czech Republic using any online social media (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

Figure D17 Types of social media used by enterprises in the Czech Republic (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

* as a percentage of all enterprises with 10+ employees in a given size class

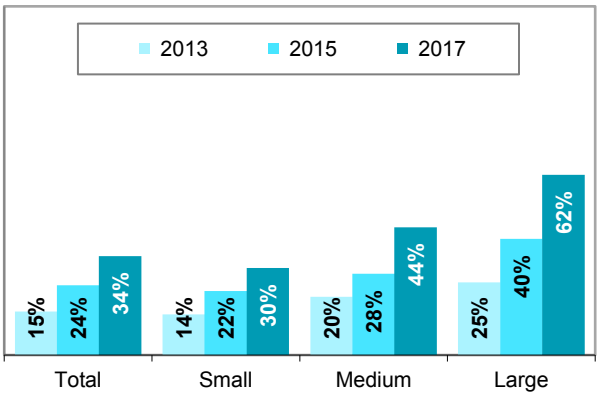
- In January 2017, social networks in the Czech Republic were most frequently used by **travel agencies and offices** (84%), or enterprises operating in the **field of accommodation provision, or in the media sector** – in both of these cases, a social network profile was owned by 79% of enterprises with 10+ employees. Active usage of social networks is often recorded by enterprises, whose main economic activity is related to the provision of ICT activities (62%), or the provision of food and beverage services (52%). With respect to the manufacturing industry, enterprises with a social network profile mainly include those operating in food industry, as well as the automotive industry. Opposed to this, the lowest share was recorded in enterprises involved in the metallurgical or chemical industry.
- Apart from social networks, enterprises have also been using other types of social media, but much less frequently. For instance, enterprises may post contributions to their websites designated to the sharing of **multimedia content**, out of which probably the most well-known is the YouTube portal, enabling enterprises to share their video presentations or various manuals. By means of user commentaries of individual contributions, enterprises may monitor their own reputation, or the reputation of their products or services, they may improve them, react to them or target their advertising campaigns more precisely. Czech enterprises, however, rarely use this type of social media (12% in January 2017). They are popular with enterprises operating in the media sector (52%), and with travel agencies or offices (36%).
- The usage of **enterprise's blogs**, e.g. Twitter, was five times lower in the Czech Republic compared to the usage of social networks – in January 2017 a blog or Twitter account was solely owned by 6.7% of enterprises. Once again, blogs are most frequently used by enterprises operating in the media sector

[41] **Enterprises using social media** shall mean enterprises that have used their profile, account, or licence of social media. The main social media communication platforms and tools are social networks (e.g. Facebook, LinkedIn), blogs or microblogs (e.g. Twitter), multimedia content sharing websites (e.g. YouTube, Instagram, Flickr), or Wiki-based knowledge sharing tools (e.g. Wikipedia).

(activities related to publishing, film-making, video-recording, and TV programmes). As well as in the case of social networks, enterprises may use the blogs to keep in touch with their customers, to increase awareness of their existence, and to build a good reputation.

- The lowest one was the share of enterprises (4.2%) operating their **wiki-based** websites, i.e. websites enabling to quickly edit and update their contents practically to anyone. The most well-known website of this kind, is the internet encyclopaedia, *Wikipedia.* However, wiki may also be used as an enterprise's information system, intranet, knowledge base of specialised communities, or support system of IT product development. This is why they are most frequently used by entities operating in the industry category CZ NACE J (62-63) *Activities specialised in information technologies* (a third in January 2017).
- Enterprises use social networks similarly to their websites. They serve for their self-promotion, and for informing the public of news related to their activities. Nine out of ten enterprises, with a social network profile, use these to **improve their image**, or to **launch their products at the market**. At the same time, they are often used for **customer service**. By means of them, enterprises create space for their customers, enabling them to **ask questions** (used by 61% of enterprises with an active social network profile), or to **cooperate in their improvement** of the goods on offer/services provided (used by 23%). In January 2017, the third most frequently stated reason for the usage of social networks, was **gaining new employees** (used by 57% of enterprises with a social network profile).

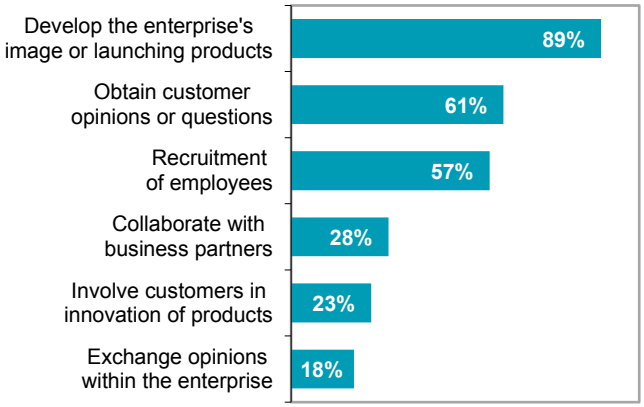
Figure D18 Enterprises in the Czech Republic using online social networks (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

* as a percentage of all enterprises with 10+ employees in a given size class

Figure D19 Main reasons for using social networks by enterprises in the Czech Republic; 2017 (%)*



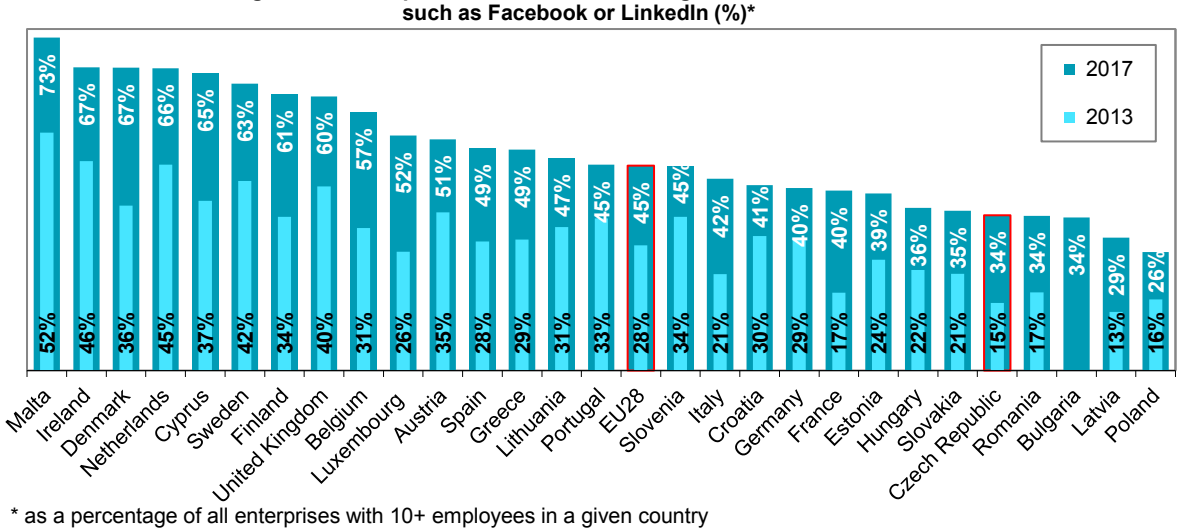
Czech Statistical Office 2018, ICT use survey in enterprises

* as a percentage of all enterprises with 10+ employees using social networks

- In January 2017, a third of all enterprises had **a web presentation as well as a social network profile**; the percentage of such enterprises is increasing slightly year by year. The percentage of large enterprises, which have social network profiles, and operate their websites as well, exceeds 60%. Regarding small and medium-sized enterprises, there is still an overriding trend, that they solely use websites, but not social networks. In 2017, a social network profile was owned solely by a small fraction of enterprises (1%).
- In the same year, on average, nearly a half (48%) of enterprises with 10+ employees **in EU countries**, claimed to be using at least one type of social media – mostly social networks (45%). In January 2017, substantially fewer of them (16%) used websites enabling the multimedia content sharing, and 14% contributed to company blogs. In the same period, only a fraction of all entities (on average, 5% of all enterprises in the EU28) used "wiki-based" online encyclopaedias.
- Since 2013, the number of EU enterprises using social networks increased by 17% from 28% in 2013, to the aforementioned 45% in 2017. **In the Czech Republic, the number in the same period doubled**. Although, since 2013, the number of enterprises actively using social media increased from 15% to 34%, in the year 2017, **we still belong to EU countries with the lowest usage** of this means of communication. A similar situation can be found in Slovakia, Hungary, Romania or Bulgaria.

- In January 2017, the highest share of EU enterprises actively using social networks was recorded in Malta (73%), websites designated for **multimedia content** sharing were most frequently used by enterprises in the Netherlands (29%), and company blogs including Twitter in Great Britain (42%).

Figure D20 Enterprises in EU countries using online social networks such as Facebook or LinkedIn (%)*



* as a percentage of all enterprises with 10+ employees in a given country

Note: Enterprises using social media = enterprises that have a user profile on online social networks

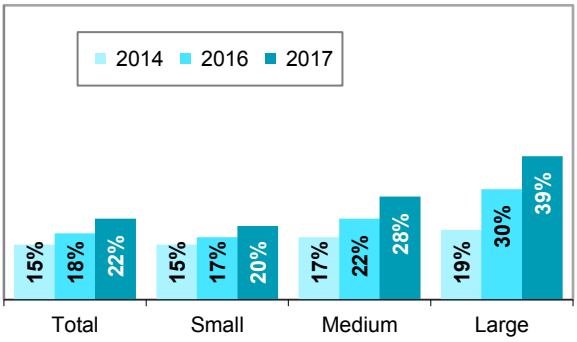
Source: Eurostat 2018

Enterprises using paid cloud computing services

One of the newest signs of digitalisation, within the business sector, is the usage of paid cloud computing services, where enterprises solely pay for the provided services, programmes or storage space available on the internet, by means of remote access, e.g. by means of a web browser. Enterprises thus do not need to possess, maintain or update the necessary ICT equipment and applications (software), and they usually do not even need to know where the data or software itself is physically located. Services are paid proportionally to their consumption or agreed scope.

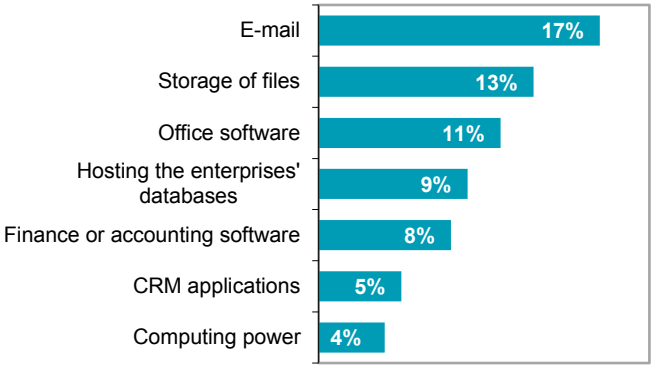
- In January 2017, a type of **paid cloud computing service**, by means of the internet in the Czech Republic, was used by nearly a quarter (22%) of local enterprises **–** three years ago, in January 2014, there were 15%. Cloud computing services are used by large entities rather than small ones; approximately twice as often, and with respect to sectors, the enterprises involved in ICT activities are more common (56%).
- The most frequently used service, in the Czech Republic, is a paid **cloud email**. In January 2017, this was used by nearly a fifth of enterprises. The second most frequently purchased type of service is **cloud storage of files**, used by 13% of entities. In January 2017, the third place belonged to the usage of **office software**, by means of a cloud (11%).
- The usage of all ascertained cloud computing services is becoming more and more popular every year; the highest year-on-year increase was recorded in January 2017, with cloud data storage and cloud office software.

Figure D21 Enterprises in the Czech Republic using paid cloud computing services (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

Figure D22 Enterprises in the Czech Republic using selected paid cloud computing services; 2017 (%)*

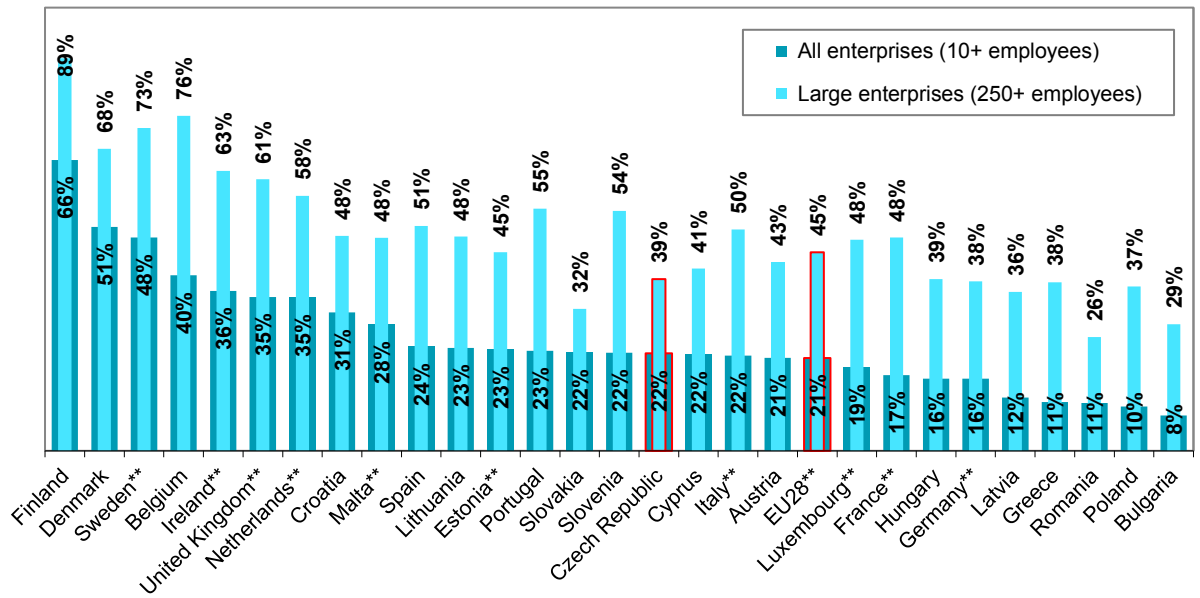


Source: Czech Statistical Office 2018, ICT use survey in enterprises

* as a percentage of all enterprises with 10+ employees in a given size class

- Paid cloud computing services may either be used on **shared servers** of service providers (so called public cloud), or on servers of providers, which are reserved directly for the given company (**so called private clouds**). A more frequently used option, in the Czech environment, are shared servers, where a type of cloud services was used by 17% of all enterprises in January 2017 (i.e. more than three quarters of entities using cloud computing). With respect to servers reserved exclusively for the given company, 9% of entities use cloud computing services (i.e. 42% of enterprises using cloud). Private cloud is mainly used by large entities with 250+ employees.
- The broader usage of paid cloud services is also visible in other **EU countries**. In 2016, paid cloud computing was used, on average, by over a fifth (21%) of enterprises. The greatest share was recorded in Finland, where in January 2017, it was used by two thirds of enterprises with 10+ employees; in Denmark, it was a half of all enterprises. In comparison with other EU countries, the usage of cloud computing by Czech companies is average.

Figure D23 Enterprises in EU countries using paid cloud computing services; 2017 (%)*



* as a percentage of all enterprises in a given size class and country
** data for year 2016

Source: Eurostat 2018

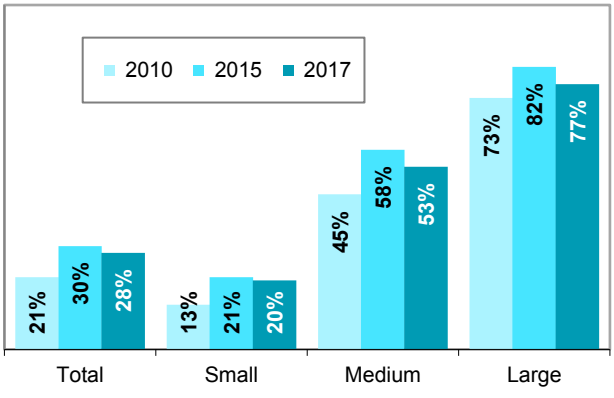
Enterprises using selected software applications

Company information systems, and software applications supporting administration and financial processes, HR management, production, warehouse management systems, service, and seeking customers or supply chains, serve for more efficient decision-making based on more accurate information and data. There are various kinds of systems, and applications, supported by various technologies. Along with the gradual creation of company ICT infrastructure, launching of economic and operational information systems, and their automated interconnection or integration, enable fast and accurate real-time decision-making. Within the survey, conducted by the Czech Statistical Office, enterprises are questioned about their usage of the following three information systems: ERP, CRM, and SCM.

Also the usage of these software applications differs, sometimes significantly, between large and small businesses, but also between industries. In the manufacturing industry, the use of ICT to support business processes has focused more on the production and distribution chain, while in the services sector it has been used more for marketing and customer services. ERP software is used more in manufacturing and in trade, while CRM software is more common in business services. These differences can be explained quite easily, as they show a rational use of ICT in different companies.

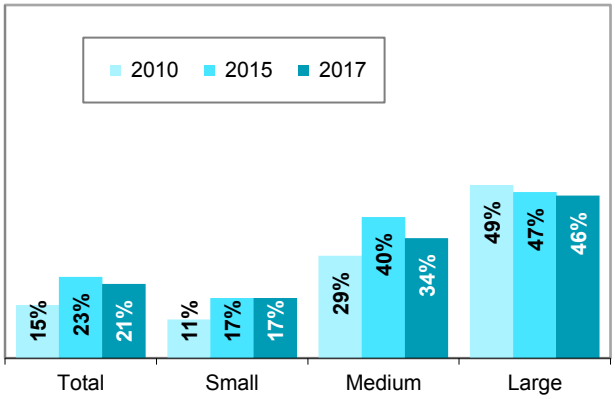
- In 2017, the **ERP system**[42], designated for information sharing between various production areas, was used by 28% of economic entities with 10+ employees in the Czech Republic. This information system **was more frequently used by large enterprises** rather than small ones (more than 77% of large ones, a fifth of small ones). With respect to sectors, ERP is mainly used by enterprises **active in IT and in wholesale**; opposed to this are the least frequent users found in food and beverage services (6%).
- The **CRM system**, serving primarily for the collection and assessment of **customer information**, was used by 21% of enterprises. The CRM, as well as the ERP system, is **more frequently used by large enterprises** than small ones. The system for administration and usage of customer information in the Czech Republic is much more used by **IT and telecommunication enterprises** (more than a half of them), as well as by enterprises active in media sector (46% in 2017).

Figure D24 Enterprises in the Czech Republic using an ERP software application (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

Figure D25 Enterprises in the Czech Republic using a CRM software application (%)*



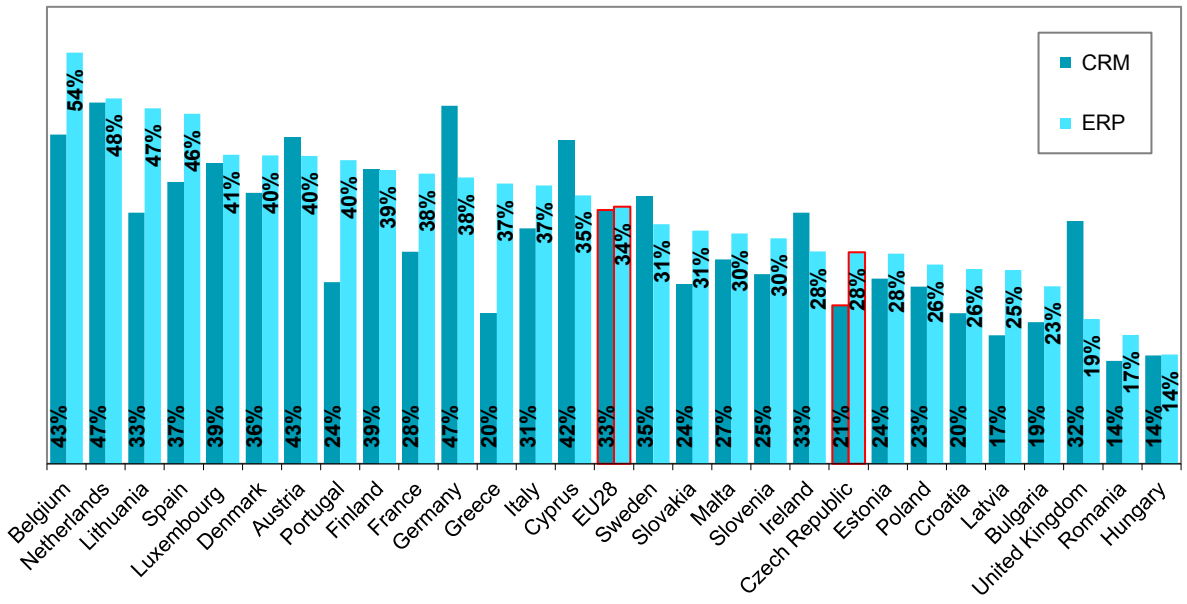
Source: Czech Statistical Office 2018, ICT use survey in enterprises

* as a percentage of all enterprises with 10+ employees in a given size class

[42] **Enterprise Resource Planning (ERP)** is business process management software that allows an organization to use a system of integrated applications to manage the business and automate many back office functions related to technology, services and human resources. ERP consists of one or more sets of software applications that integrate information and processes across the several business functions within an enterprise. ERP software can be customised software, custom built for or built within the enterprise, but there is also package software designed to perform this function. However, this ERP package software is usually built as a modular way allowing enterprises to customise it for their specific economic activity or size, by implementing only some of the modules.

- In January 2017, nearly a fifth (18%) of enterprises in the Czech Republic stated that they were using the CRM system in order **to gain, store, and access customer information** for other functional areas of their enterprises. 16% of enterprises used this system in the same period **to analyse customer data**, e.g. in order to set a price policy and discounts, or in order to set a suitable means of communication and promotion for a given customer group.
- In January 2017, there were still nearly 70% of Czech enterprises which had neither used the ERP nor the CRM system. Neither of these information systems is used by small entities, or enterprises providing food and beverage services (more than 90% of those). They are also hardly used in the construction sector, in transport and storage, retail trade, accommodation, real estate activities or administrative, and support activities. The reason for this may be the fact that these systems are very expensive to purchase.
- With respect to using the aforementioned information systems, the Czech Republic finds itself below the EU average. In January 2017, ERP, as well as CRM, were used approximately by a third of enterprises with 10+ employees in the EU. In comparison – in 2010, each of these systems was used by approximately a fifth of enterprises.
- The ERP system is most frequently used in Belgium, while the highest usage of CRM is found in Germany. The least frequent usage of both systems is recorded in Hungary and Romania.
- In the Czech Republic, as well as in other EU countries, it applies that these information systems are mostly spread among large enterprises. In January 2017, the ERP system was used approximately by three quarters of large enterprises operating in the Czech Republic (77%), and a very similar average share is found within large entities in the EU28 (76%).

Figure D26 Enterprises in EU countries using ERP and CRM software application; 2017 (%)*



* as a percentage of all enterprises with 10+ employees in a given country

Source: Eurostat 2018

- The **SCM**[43] application, or the information system, was only used by a fraction of Czech enterprises (2.4%) at the beginning of 2017. Once again, the supply chain management system is most frequently used by large entities (9% in January 2017). With respect to sectors, it was most frequently used by enterprises operating in **trading** (10%), as well as in selected areas of process industry, especially in **the production of cars, computers**, electronic and optic devices, and also for electrical appliances and machines.

[43] **Supply chain management (SCM)** is the software tools or modules used in executing supply chain transactions, managing supplier relationships and controlling associated business processes.

D.5 Enterprises using electronic invoicing and commerce

A dream of every financial director has always been to have all suppliers whatsoever send him or her completely error-free invoices, in a format suitable for automated processing by information systems, and conclusive for tax offices and auditors. The whole process of incoming invoice processing (receipt => processing => approval => booking) generally has high demands for administration across the whole enterprise. Computerisation and digitalisation are natural trends, and they may often facilitate the performance of obligations, decrease error rate and lower costs.

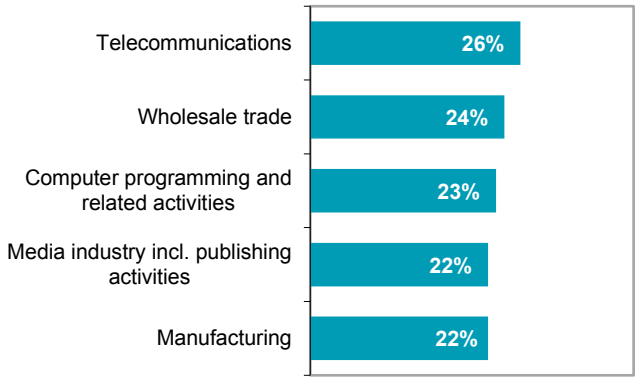
The number of firms carrying out business transactions (placing or receiving orders) over the internet has increased dramatically over the last decade. The Internet has effectively made transactions such as ordering goods and services more efficient and less expensive. At the same time, the internet facilitates new transactions that could not have occurred without its existence (e.g. the use of the internet by SMEs to sell goods globally).

Use of electronic invoicing by enterprises

In Czech enterprises, a very common issue is still the sending of "electronic invoices" in PDF format, which de facto solely transfers the printing costs from the supplier to the client. A full electronic invoice, within the meaning of computerization and advantages arising therefrom, is solely such an invoice where all data is transferred automatically (by machine), and in a standard structure to the inter-company or accounting system of the counterparty, where it is once again processed electronically.

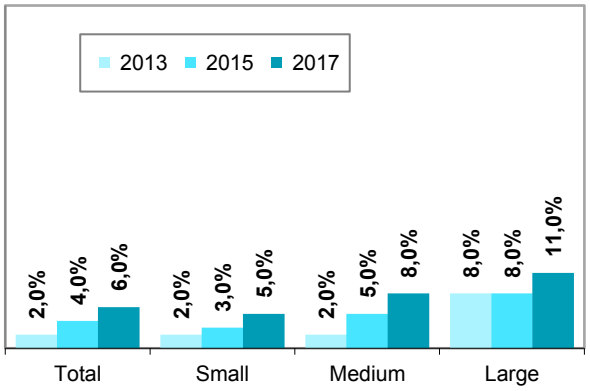
- In January 2017, three quarters of enterprises, with 10+ employees in the Czech Republic, issued and sent **an invoice electronically**[44]. A more common form of electronic invoices issuance is, however, a **structure not suitable for automated processing**, e.g. email attachment as a PDF file – in January this option was used by more than two thirds (69%) of Czech enterprises.
- **Fully automated invoices (so called e-invoices)** were sent by less than a fifth (18%) of enterprises at the beginning of 2017, i.e. approximately **four times less frequently** than the aforementioned electronic invoices not suitable for automated processing (e.g. as a PDF file).

Figure D27 TOP 5 industries in the Czech Republic with the highest share of enterprises sending e-invoices; 2017(%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

Figure D28 Enterprises in the Czech Republic using data boxes for sending invoices (%)*



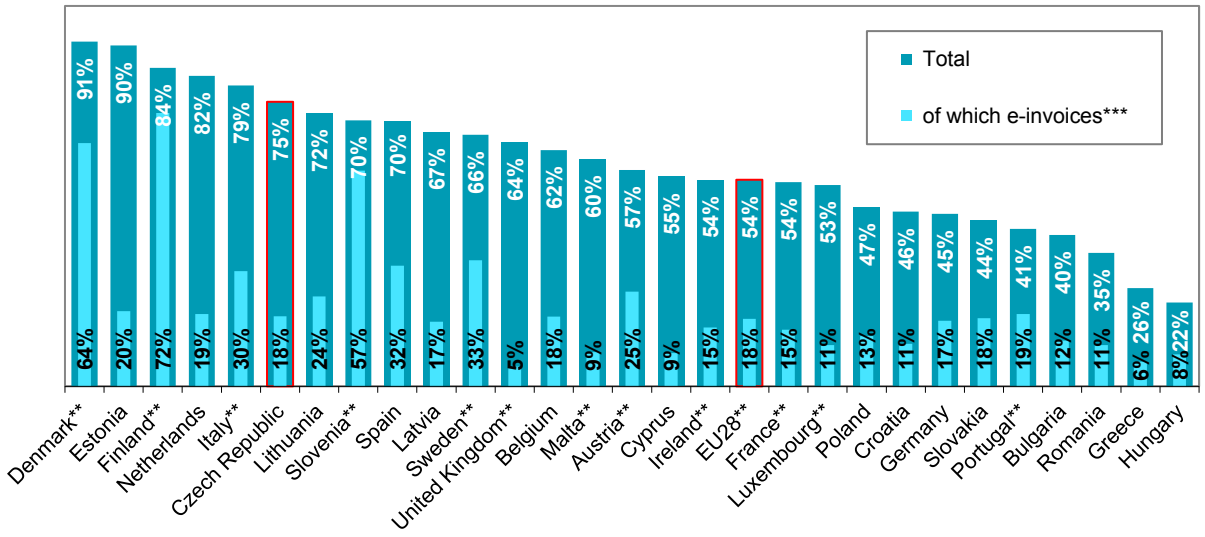
Source: Czech Statistical Office 2018, ICT use survey in enterprises

* as a percentage of all enterprises with 10+ employees in a given industry, resp. size class

[44] The use of **electronic invoicing** shall mean a form of electronic billing. There are two types of these invoices:
i) The "true" electronic invoices (e-invoice) processable by automated data processing tools. Issuer of the invoice (seller or service provider) upload the invoice into the recipient (customer) software applications which deal with it. The transmission format may be, for instance, edi, xml, isdoc, idoc, csv, or other formats used by invoicing software producers.
ii) The electronic invoices in a format that does not enable them to be processed automatically (non-structured invoices). These are, for instance, invoices sent in as a text by means of standard email, or invoices sent in as an email attachment in the pdf format, for example.

- In January 2017, e-invoices were sent more frequently by large enterprises, with 250+ employees; with respect to sectors, these were most commonly issued by entities in the automotive industry, telecommunications, wholesale or in computer programming and related activities (in all these sectors it was more than a fifth).
- Relatively many enterprises operating in the Czech Republic still issue their invoices in a **standard paper structure** – in January 2017, there was nearly a quarter of them (23%). This mostly involves small entities; with respect to the prevailing economic activities, those are entities operating in food and beverage services (36%), and in retail trade (33%).
- In January 2017, only 5.6% of all enterprises used a **Data Box**, in order to send an invoice; this mainly concerned large entities (11%). Nevertheless, in comparison with previous years, the share of Data Boxes used in order to send electronic invoices has been increasing slightly. In 2017, invoices were mainly sent by means of Data Boxes by enterprises operating in telecommunication services (21%).
- In regard to sending invoices electronically, in January 2017, in international comparison, Czech enterprises are highly **above the average (6th place)**. However, should we form the comparison solely out of fully automated e-invoices, in EU28 comparison, such usage by Czech enterprises would be approximately average. Most e-invoices are issued by enterprises in Finland, Denmark, and in Slovenia.

Figure D29 Enterprises in EU countries sending invoices in electronic form; 2017 (%)*



* as a percentage of all enterprises with 10+ employees in a given country
** data for year 2016
*** Invoices in electronic form in a standard structure suitable for automated processing (e.g. EDI, XML, ISDOC) that are exchanged either directly or via service operators or via an electronic banking system.

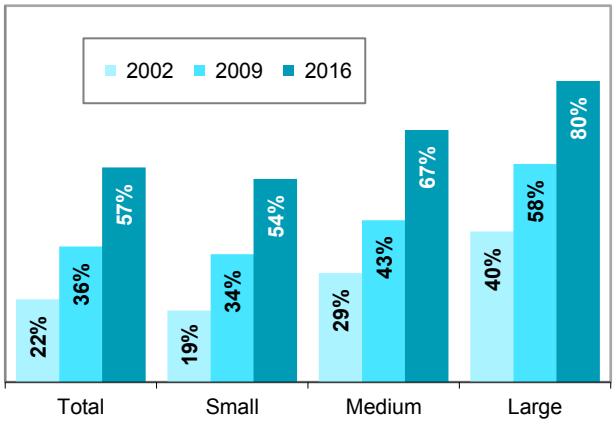
Source: Eurostat 2018

Enterprises buying online and value of their electronic purchases

On a long-term basis, Czech enterprises have been very successful within the monitored indicators, in the area of e-commerce[45]. Not only is the number of enterprises conducting electronic purchases increasing, but, above all, the value of e-purchases is increasing. It is a fact that for many years, with respect to e-purchases, enterprises prefer purchasing via websites over purchasing via EDI messages. On a long-term basis, despite the fact that enterprises make frequent purchases via website, the value of such purchases is relatively low. Higher amounts of money are spent via EDI messages.

- In 2016, 57% of enterprises in the Czech Republic – twice as many as eight years ago – **placed an electronic order** via the internet, or another computer network.
- Electronic purchases are preferred by large enterprises (in 2016, these were realised by 54% of small enterprises and by 80% of large ones). **With respect to industries**, e-purchases are mostly used by entities providing telecommunication services, where e-orders are placed by over 90% of entities.
- Over the past few years, the **value of Czech enterprises' e-purchasing**, realised via orders placed in computer networks, has been increasing. Whereas in 2010, the share of this e-purchasing reached 25% of their total volume, in 2016, the share was already at 41%.
- On a long-term basis, when purchasing electronically, enterprises prefer purchases **via website** over **EDI messages[46]**. In 2016, more than a half of enterprises (55%) in the Czech Republic claimed to have made purchases via website, as opposed to approximately a fifth of them (21%), that used so called EDI messages.

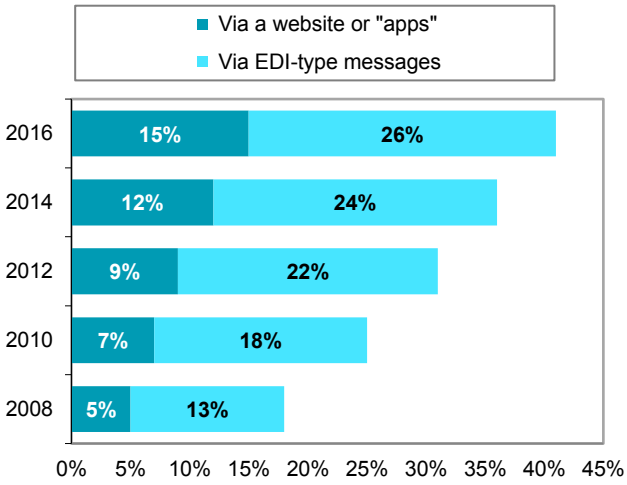
Figure D30 Enterprises in the Czech Republic purchasing over computer networks (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

* as a percentage of all enterprises with 10+ employees given size class

Figure D31 Value of enterprises' electronic purchases in the Czech Republic (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

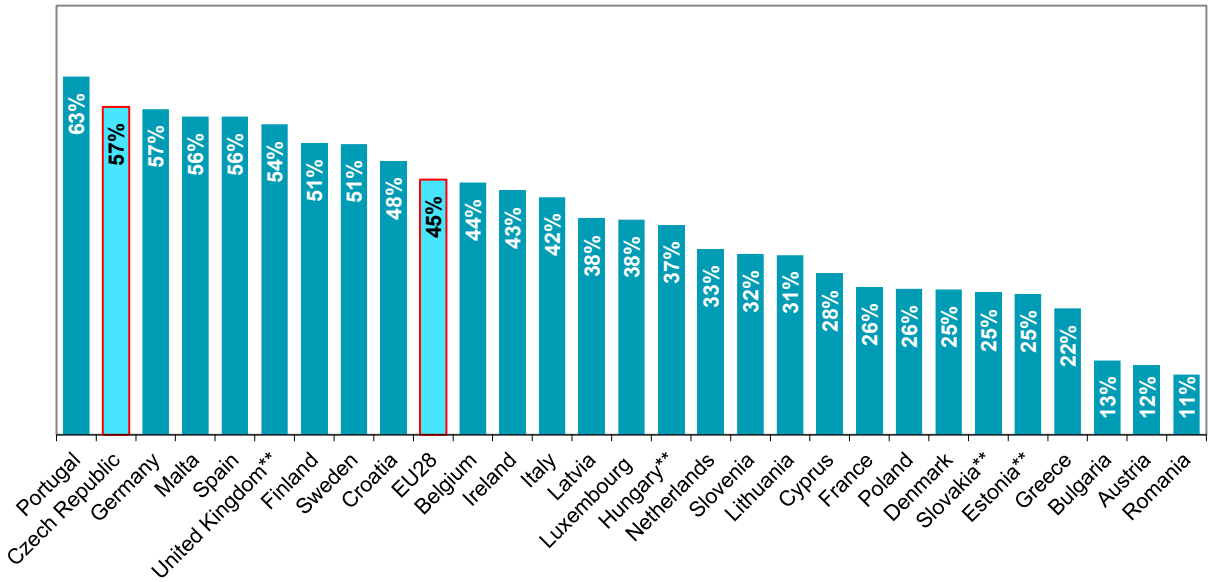
* as a percentage of total purchases' value of enterprises with in a 10+ employees

[45] **Electronic commerce (e-commerce)** shall mean purchases or sales (placing or accepting orders) is performed by means of the internet or other computer networks through websites or the electronic data interchange (EDI), regardless the method of payment or delivery. Purchases (sales) implemented on the basis of orders prepared from information obtained on the internet but placed in a traditional way (in person, by phone, fax, or written order), or by electronic mail are not included.

[46] **Electronic Data Interchange (EDI)** refers to the structured transmission of data or documents between organizations or enterprises by electronic means. It also refers specifically to a family of standards (EDI-type) and EDI-type messages suitable for automated processing. EDI is an e-business tool for exchanging different kinds of business messages. EDI is here used as a generic term for sending or receiving business information in an agreed format suitable for automated processing (e.g. EDIFACT, XML, etc.) and without the individual message being manually typed.

- Despite the fact that electronic purchasing via websites is much more common for enterprises in the Czech Republic, the **frequency of e-purchases** (i.e. the value share of e-purchases over the total value of enterprises' purchases) realised via EDI messages (26% in 2016), most frequently used for trading between the enterprises within a supply chain, is higher by two thirds, compared to the frequency of enterprises' e-purchases via websites (15% in 2016).
- In 2016, the highest frequency of e-purchases realised **via websites**, was recorded by enterprises active in computer programming and related activities, where these electronic commercial transactions took 41% share in the financial value of their total purchases. With respect to industries, the frequency of e-purchases realised via website, was the highest in enterprises active in the automotive industry (31%), or enterprises involved in the media sector (29%).
- In 2016, the highest **frequency** of e-purchases via EDI messages, in the Czech Republic, within individual industries, was recorded by enterprises specialised in the production and distribution of energy, gas, water or heat (CZ NACE D), where these purchases concerned a half of the financial value of their total purchases. Within the process industry, this frequency was the highest with enterprises involved in computer production, and the production of other electronic appliances and devices, as well as in the automotive industry. Besides the industrial area, the frequency was also high in telecommunication services or in trading.
- The share of enterprises, conducting e-purchasing in the Czech Republic, was the second highest of all **EU countries** in the year 2016. Along with Portugal, Germany, Spain, Malta, Great Britain, Finland, and Sweden, we belong to countries with more than five enterprises out of ten that conducted purchasing via the internet or another computer network. In contrast, in Romania, Bulgaria, and Austria there were less than 15% of enterprises purchasing via the internet or another computer network.

Figure D32 Enterprises in EU countries that purchased (placed orders) over computer networks; 2016 (%)*



* as a percentage of all enterprises with 10+ employees in a given country
** data for year 2015

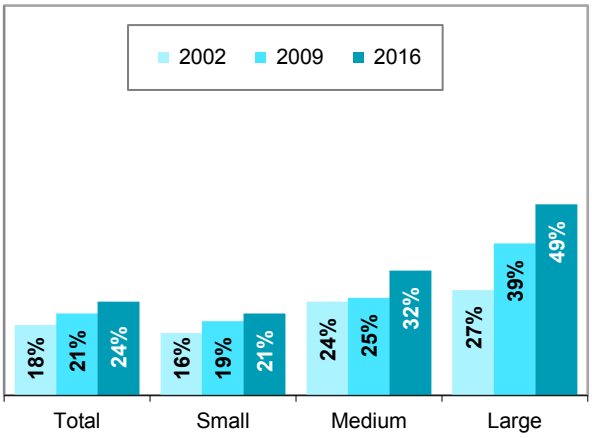
Source: Eurostat 2018

Enterprises selling online and value of their electronic sales

As mentioned in the previous chapter, the popularity of electronic trading in the Czech Republic is increasing on a year-by-year basis. In 2016, a quarter of enterprises conducted electronic sales, and such sales formed nearly a third of the enterprise's total turnover in that year. In the previous decade, the share of enterprises conducting electronic sales has doubled, and the frequency of electronic sales (% of the enterprise's total turnover) is nearly four times as high. Enterprises conducting sales via the internet, or another computer network, use this method to access foreign markets – a half of enterprises, selling via website in 2016, received an order from non-EU customers (apart from the Czech Republic), and nearly another fifth of them conducted sales outside the EU28 in that year.

- In 2016, nearly a fourth (24%) of enterprises, with 10+ employees in the Czech Republic, claimed to have received at least one electronic order via the internet, or another (private inter-company) computer network, via website or EDI messages, and with respect to any goods or services. In the same year, the turnover from these **electronic sales** formed nearly a third (31%) of the total turnover of enterprises with 10+ employees. Although the share of enterprises selling electronically has almost been at a standstill over the past five years, the turnover share in electronic sales, with respect to the total turnover of enterprises, has been gradually increasing.
- With respect to **size category of enterprises** conducting electronic sales, large enterprises prevail. In 2016, a half of them sold electronically, and more than two fifths of their total turnover (43%) originated precisely from these e-sales.

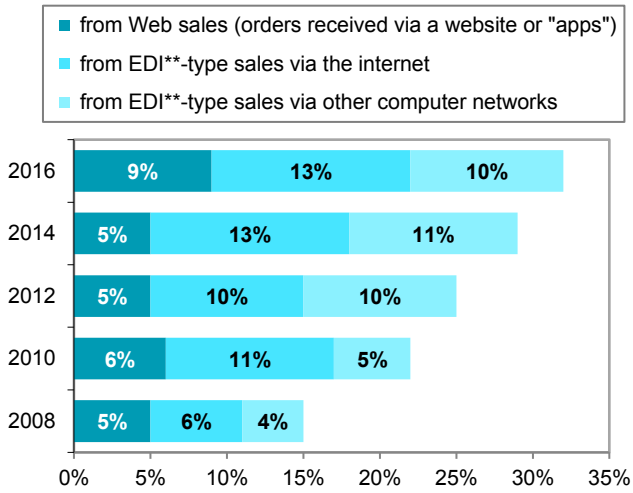
Figure D33 Enterprises in the Czech Republic selling over computer networks (%)*



Source: Czech Statistical Office 2018, ICT use surveyin enterprises

* as a percentage of all enterprises with 10+ employees in a given size class

Figure D34 Turnover from enterprises' electronic sales in the Czech Republic (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

* as a percentage of total enterprises' (10+) turnover

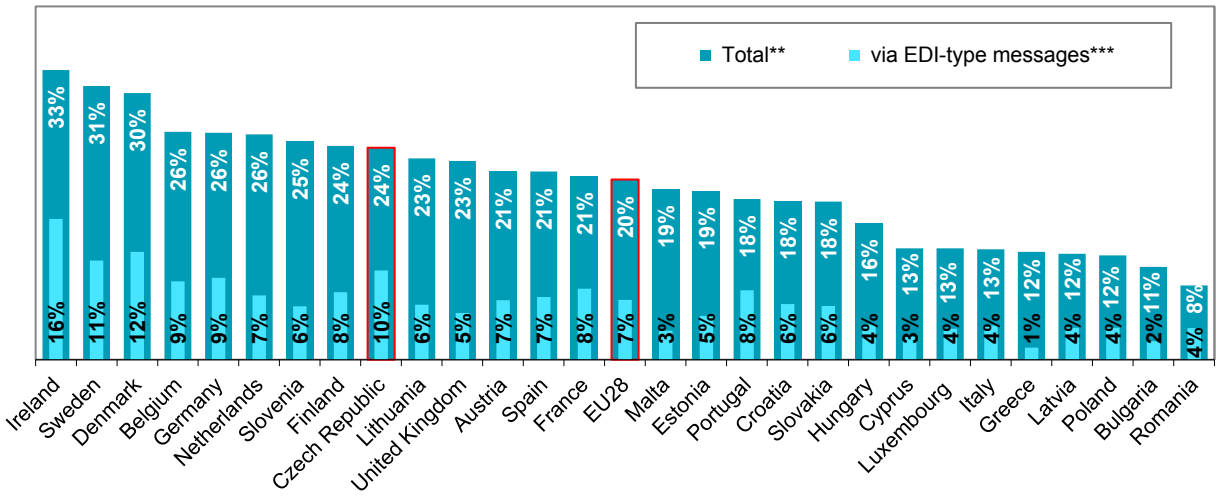
** Electronic transmission of messages suitable for automated processing, i.e. using EDI, XML for business-to-business e-Commerce

- On a long-term basis, the share of enterprises selling goods or services **via website (web sales)**[47] has been higher, than the one of enterprises selling goods or services **via EDI messages (EDI sales)**. In 2016, approximately a fifth of enterprises in the Czech Republic conducted their sales via website; a tenth of enterprises did so via EDI messages.

[47] **Web sales** are sales made via an online store (web shop), via web forms on a website or extranet, or apps. Web sales are distinguished from EDI sales. In particular, the type of e-Commerce transaction is defined by the method of making the order. This approach should mitigate the interpretation problems where both types, EDI and Web, are used in the process. An example is a situation where an order is made by the customer through a web application but the information is transmitted to the seller as an EDI-type message. Here the type of selling application is however web; EDI is only a business application to transmit information about the sale. Web sales can be done by mobile phones using an internet browser.

- The situation is the opposite when regarding the **turnover percentage** from these e-sales. The turnover from sales conducted via website only amounted to 9% of the total enterprise's turnover in 2016, whereas the turnover reached via EDI messages comprised nearly a quarter (23%) of the total enterprise's turnover, i.e. nearly a threefold of turnover from sales via website.
- E-sales via **EDI messages** are typical, when enterprises conduct business between each other. EDI messages are mainly used by large enterprises. In 2016, 36% of large enterprises sold their goods or services this way, but only 7% for small enterprises.
- From the **sectoral point of view**, the sales conducted via EDI messages are, on a long-term basis, conducted mainly in the process industry, particularly **in the automotive industry**; in 2016, this way was used by nearly 39% of enterprises with 10+ employees, and the turnover from such sales comprised more than 50% of these enterprise's total turnover.
- On the scale of enterprises conducting e-sales, in 2016, the Czech Republic was **in ninth place – above the EU28 average**. The Czech Republic also stands above the average with respect to e-sales conducted via EDI messages (4th place in 2016).

Figure D35 Enterprises in EU countries selling over computer networks; 2016 (%)*



* as a percentage of all enterprises with 10+ employees in a given country
** Includes any enterprises that during the reference year received at least one electronic order over the internet or other computer network via a enterprise's website or 'apps' or via an e-commerce marketplace website or 'apps' used by several enterprises for trading products or by using EDI-type message.
*** Electronic transmission of messages suitable for automated processing, i.e. using EDI or XML standards for business-to-business eCommerce transactions without the individual messages being typed manually.

Source: Eurostat 2018

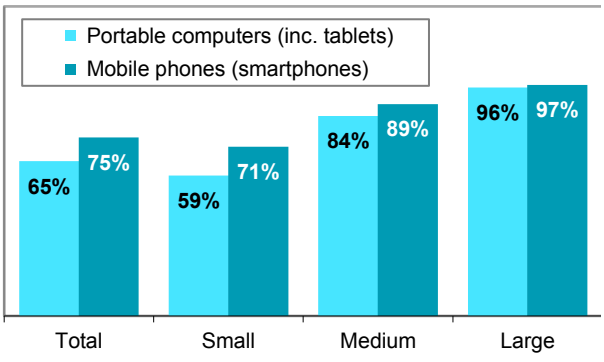
D.6 Employees and ICT

Despite the fact that nearly all enterprises with 10+ employees (98%) in the Czech Republic use computers, and practically the same share of enterprises has internet access, only less than a half of all employees in such enterprises use a computer. The total low number of employees using a computer at work, compared to other EU countries, is also defined by the structure of our economy, with a strong manufacturing orientation, where the use of ICTs, is not necessary for a large number of employees.

Employees using selected information technologies

- The percentage of **employees** using a **computer** at work in Czech enterprises has not changed significantly over the past years. Since 2006, the number has been slightly above 40%; in January 2017, it was precisely 49% of employees. The percentage of employees using a computer at work does not differ significantly with respect to size categories of enterprises; differences can rather be found between individual industries. In January 2017, most employees using a computer at work could be found in telecommunication services and IT related activities (identically 95%). In contrast, the lowest percentage was found in food and beverage manufacturing (27%), and in administrative and support activities, where, in January 2017, computers were used for work by 22% of employees.
- The share of employees, having **internet access from their company computer** in the Czech Republic, is increasing slightly on a year-by-year basis; in January 2017, the share exceeded 40% for the first time – in 2010, it was only a third. In contrast to the number of employees using a computer at work, the number of employees using an office PC to access the internet is decreasing, along with the company size. The reason for this might be the restrictions in providing internet access from employees' company computer by their employer, apparently applied more frequently in large enterprises.
- Computers with internet access are more often provided to employees in the media sector, in telecommunication services or IT (above 90%). Computers are least frequently used (similarly to the access to a computer) by employees in food service (24%), and in other administrative and support activities (21%).

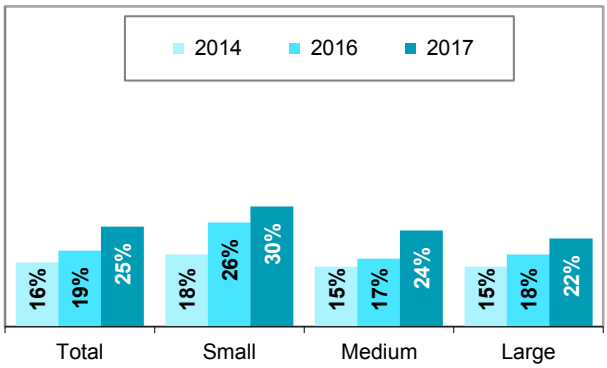
Figure D36 Enterprises in the Czech Republic providing employees with selected devices that allow internet connection; 2017 (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

* as percentage of all enterprises with 10+ employees in a given size class

Figure D37 Employees in the Czech Republic using portable devices that allow internet connection for business purposes (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

* as percentage of all employees in enterprises with 10+ employees in a given size class

- In recent years, it is increasingly common that enterprises provide their employees with **portable and mobile devices** for business purposes (laptops, tablets, smart phones), with internet access. In 2017, these were provided by eight enterprises out of ten. In January 2017, these portable devices were **used at work** approximately by a quarter of their employees – more frequently by the employees of small enterprises (30%), and, with respect to sectors, mostly by employees in ICT industries.
- In comparison to other **EU countries**, Czech enterprises report one of the lowest percentages of employees using a computer for their work, or computer with **internet access**. In January 2017, the Czech Republic was the seventh to last in EU comparison. The number of employees using the internet

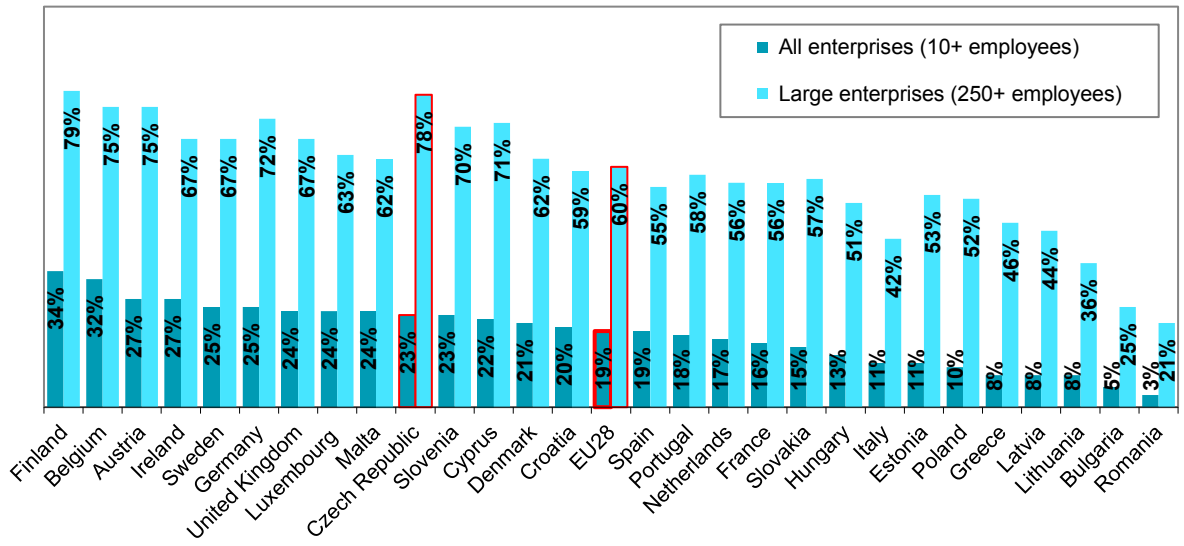
for business purposes is the highest in enterprises of Nordic countries, where, in 2017, the internet was used by seven enterprises out of ten for this purpose.

ICT training provided to employees

Besides the aforementioned information technologies, enterprises may also provide their employees with training focused on gaining, or improving, their computer skills. In 2016, approximately a quarter of employees of enterprises with 10+ employees in the Czech Republic had the opportunity to undergo such training.

- In 2016, approximately a quarter (23%) of enterprises in the Czech Republic provided their employees with a possibility of **training**, in order to gain or improve their computer skills. The opportunity to undergo such computer training was much more frequently offered to employees of medium-sized enterprises (43%), and particularly of large enterprises (78%); with respect to sectors, this mainly involved the employees involved in IT (76%) and telecommunications (67%).
- From an international point of view, Czech enterprises that provide their employees with training are above the EU28 average. In comparison with large enterprises, providing their employees with training, Czech enterprises with 250+ employees can even be found in first places – along with enterprises from Finland, Belgium, and Austria we belong to countries, where three quarters of large entities provide their employees with computer training.

Figure D38 Enterprises in EU countries providing training for employees to develop their ICT related skills; 2016 (%)*



* as a percentage of all enterprises in a given size class and country

Source: Eurostat 2018

Enterprises employing ICT specialists

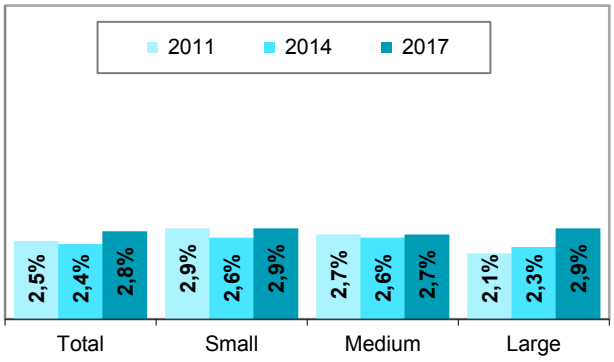
The growing digitalisation of the economy requires an increasing number of ICT specialists. In the past 10 years, the percentage of ICT specialists, out of the total number of employees in the Czech Republic, has doubled, however, the number is still insufficient. Out of enterprises employing ICT specialists, 29% of them claimed to have had jobs available in 2016, for which it has been hard to find an ICT specialist(s), with appropriate knowledge and skills. These problems were more frequent within large enterprises, especially the ones from the ICT industries.

- In January 2017, ICT specialists[48] were employed by a fifth of enterprises. ICT specialists formed 2.8% of all employees in the relevant business sector. It may not come as a surprise that most ICT specialists can be found in the sector CZ NACE J Information and communication activities.

[48] **ICT specialists** are employees for whom ICT is the main job. For example, to develop, operate or maintain ICT systems or applications.

In 2016, a tenth of enterprises (11%) offered their ICT specialists the possibility of **specialised training**. Should we solely consider enterprises employing ICT specialists, specialised training was provided to over a half of them (53%), particularly by large enterprises (74%); with respect to sectors, they were mainly enterprises involved in telecommunications and IT-related activities.

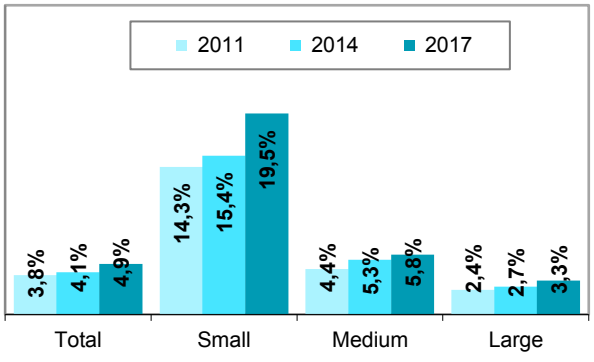
Figure D39 ICT specialists in all enterprises in the Czech Republic (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

* as percentage of all employees in all in a given size class

Figure D40 ICT specialists in enterprises with ICT specialists in the Czech Republic (%)*

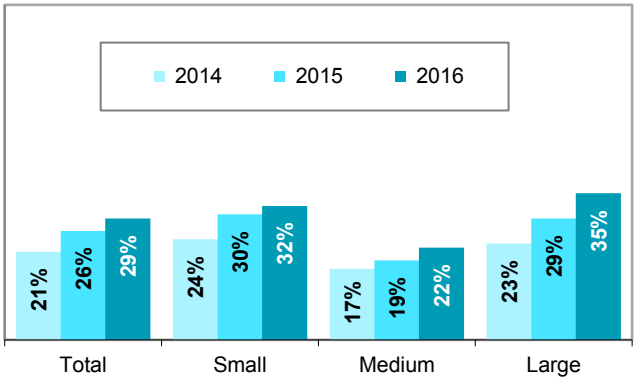


Source: Czech Statistical Office 2018, ICT use survey in enterprises

* as percentage of all employees in enterprises with ICT specialists in a given size class

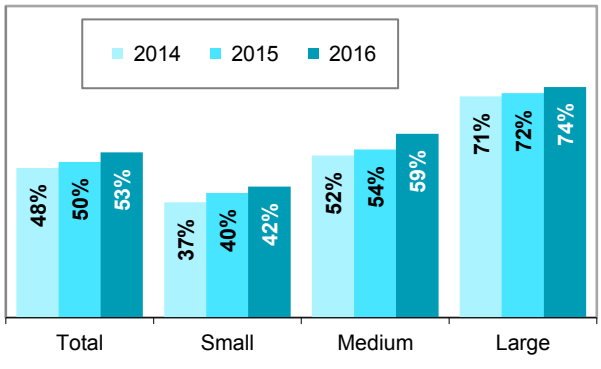
- In 2016, **new ICT specialists** were recruited by 7% of enterprises with 10+ employees. These were mainly enterprises involved in the ICT sector (66%). The lowest number of newly recruited ICT specialists was found within enterprises in the food and beverage services (1%). With respect to enterprises already employing ICT specialists, new ICT specialists were recruited by a third of them; the least frequently by construction companies.
- In 2016, finding ICT specialists with an appropriate qualification was difficult for 6% of enterprises (or 29% of enterprises already employing ICT specialists). Difficulties with finding suitable ICT specialists are more frequently claimed by large enterprises with 250+ employees (28%, or 35% of large enterprises already employing ICT specialists). With respect to sectors, this issue was more frequently raised by entities involved in IT or telecommunication services.
- In 2016, less than 5% of enterprises recruited new ICT specialists, and claimed to have had other available jobs, for which it was difficult to find suitable employees, with the relevant skills.

Figure D41 Enterprises in the Czech Republic having vacancies for ICT specialists that were difficult to fill (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

Figure D42 Enterprises in the Czech Republic providing training for ICT specialists to develop their ICT related skills (%)*



Source: Czech Statistical Office 2018, ICT use survey in enterprises

* as percentage of all enterprises with 10+ employees employing ICT specialists in a given size class

Chapter E Government and ICT

The Czech Republic has been familiar with eGovernment since the beginning of the 90s of the last millennium, however, only when the internet started to be seen as the technology of the future, after the year 1999, has this technology started to be used with respect to public authorities, and other institutions of public administration. The Ministry of Informatics[49] was founded in 2003, and three years later the National Politics on Information and Communication: e-Česko 2006. In the same year, a network of contact points of public administration, Czech POINT, was established, providing the greatest development of eGovernment in the Czech Republic yet – at least with respect to its citizens.

In 2008, the Act No. 300/2008, on electronic acts and the authorised conversion of documents, was passed. Sometimes also called "the Act on eGovernment", the purpose of which was to create optimal conditions for electronic interaction between public authorities and citizens, as well as between the public authorities themselves. In July 2009, the system of data boxes was launched, facilitating the communication with public administration, as well as the system of basic registers, enabling thus the interconnectivity of basic data on Czech citizens between individual public administration authorities.

As opposed to households, medical facilities or schools, for instance, in 2008, i.e. ten years ago, all organisations of public administration, including individual municipal authorities, had access to the internet, and 90% of them even had their own website. In 2010, there were nearly 100% of them. The websites of these organisations are also frequently visited by citizens. For instance, in 2010, already a fifth of citizens claimed to have sought necessary information on the websites of public authorities. Apart from simple website viewing, there is a possibility to find and download official forms from the websites of many public authorities. In 2017, 15% of individuals stated to have downloaded a form from the public authority website, upon the completion of which they delivered the form to the relevant authority in person, by mail or email. Apart from information and forms to download, only a small part of these organisations – a tenth in 2008 – enabled the complete electronic submission on their websites[50].

Same as in 2008, currently most personal situations, which citizens solve through public authorities, require the personal visit to the given office[51], which originates due to legislative reasons in particular. These are situations, such as the issuance of a passport, a driving licence or a national ID card, reporting a change of address, obtaining a copy of registry documents, and requesting social and other allowances.

Therefore, with respect to providing services of eGovernment, the Czech Republic still has a long way to go. The development of digital services, however, is important with respect to better convenience for the user – citizen, company, civil servant – as well as with respect to the cost effectiveness of public means. The present low development level of electronic services, provided to Czech citizens, is confirmed, not only by European and global surveys, but also by the data of the CZSO. Data surveying the use of online services, provided by public administration, should currently be one of the key pillars of evaluation of Czech eGovernment level, therefore, the computerizing of public administration.

ICTs are already widely used by government bodies, as it happens in enterprises, but eGovernment involves much more than just the tools. It also involves rethinking organisations and processes, and changing behaviour so that public services are delivered more efficiently to people and businesses. Implemented well, eGovernment enables citizens, enterprises and organisations to carry out their business with government easier, quicker and at lower cost.

[49] In 2007, the ministry was closed.

[50] Electronic submission is parallel to the submission sent by the classic form, but made via the internet. Legal entities or natural persons do not need to go to the offices of the public authorities in person.

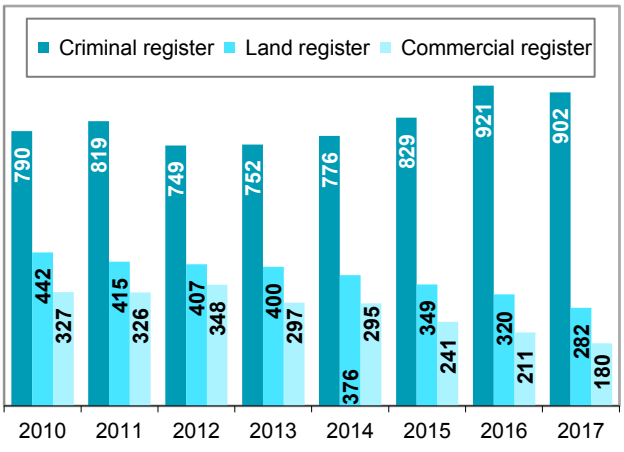
[51] Unless a qualified electronic signature or a Data Box is owned.

E.1 Use of Czech POINT for Government Services

Czech POINT[52] is a project whose aim is to reduce excessive bureaucracy with respect to citizens – public administration. The specific task of Czech POINT is to serve as an assisted place for the performance of public administration. By means of this universal place, enabling the interaction of citizens with the state, citizens may obtain all data held in evidence of themselves in public registers, as well as copies of and extracts from such data. It is also a place (municipal authority, post office, etc.), where one may verify his or her documents, signatures or electronic document versions.

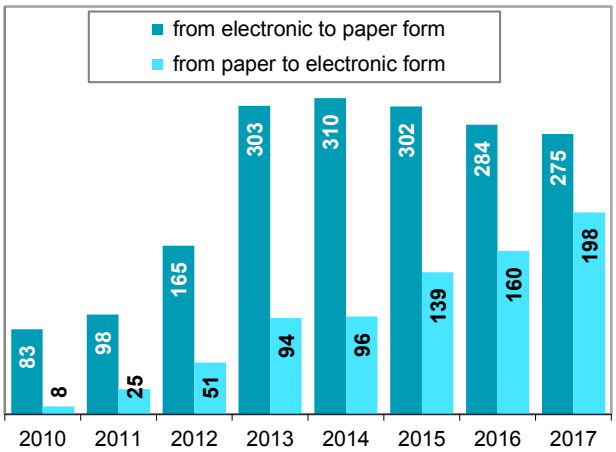
- As of the 31st of December 2017, there were 7,536 **contact points** involved in the Czech POINT system in the Czech Republic, out of which 5,937 (79%) were available for citizens at the municipal authorities, and 984 (13%) at post offices.
- By means of **Czech POINT**, at the aforementioned contact points, Czech citizens were provided with over 2 million (2,124 thousand) **outputs** in 2017. This total number of outputs has not changed significantly in the past five years; the number is still around 2.1 million per year.
- These mainly included **copies of an entry**, creating three quarters (1,522 thousand) of all Czech POINT outputs in 2017. In 2017, less than a quarter (473 thousand) of outputs involved **conversion of documents**, particularly from electronic form to paper form. The other outputs mainly involved **requests on the registration of Data Box**, as there were over 43 thousand in 2017.
- With respect to the individual **types of copies of an entry** issued by means of Czech POINT, even in 2017, these were most frequently the copies of an entry in the **Criminal Records** (902 thousand), in the **Land Registry** (282 thousand), and in the **Commercial Register** (180 thousand). With respect to the copies of an entry in the Land Registry, as well as in the Commercial Register, over the recent years, we observe a decrease in the number of their required issuance. For instance, in 2010 there were more than half as many (nearly 450 thousand) copies of an entry in the Land Registry issued, at the contact points of Czech POINT, than in 2017; with respect to the copies of an entry in the Commercial Register, there were even 80% more at the same period of time.

Figure E1 Number of verified copies issued 'at the desk' of the Czech POINT public contact points for selected services (thous.)



Source: Ministry of the Interior, 2018

Figure E2 Number of authorized conversions of documents issued at Czech POINT public contact points (thous.)



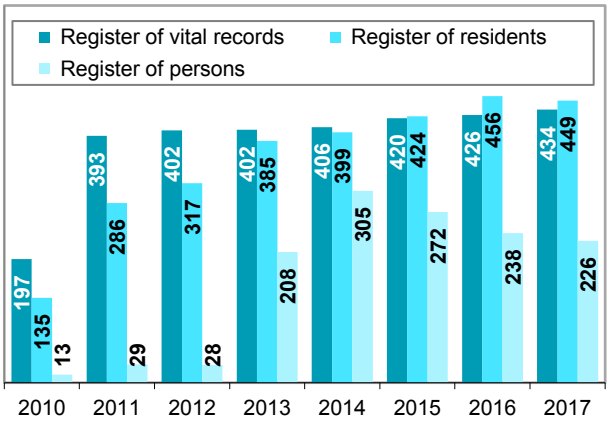
Source: Ministry of the Interior, 2018

- Whereas the total number of issued outputs to the citizens, by means of contact points of the Czech POINT, has not changed over the past years, the number of authorised conversions of documents, in particular **from paper form to the electronic one**, has been increasing year by year. In 2017, nearly 200 thousand paper documents were converted for the citizens, as opposed to 50 thousand in 2012.

[52] There are currently 3 main interfaces – **Czech POINT** as the **assisted contact point** of public administration designated for citizens, **CzechPOINT@office** – a non-public internet application designated for civil servants of public administration who must access the registers by law or perform the conversion of documents by virtue of office, and the newest interface **CzechPOINT@home** functioning as a contact point with a remote access (not only) from home for the holders of Data Boxes. For more details see: http://www.czechpoint.cz/public

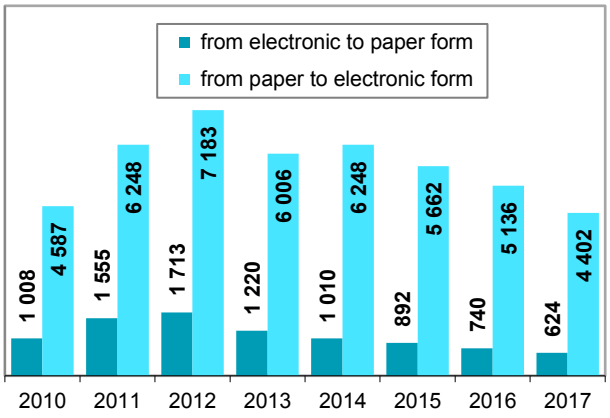
- Since 2009, in order to perform their authorities, the civil servants of public administration may use the non-public interface of the Czech POINT system at their workplaces, the so called **Czech Point@office**, where they may independently find information, verify, and submit claims within the eGovernment. In 2017, civil servants of public administration used this option for the authorised conversion of documents, records of registers, registration offices or courts, or for the copies of an entry in fundamental registers, in total for 6.3 million **outputs**.
- Mainly non-public service was provided by means of the interface (application) CzechPoint@office, used for the conversion of documents from the electronic form to the paper one, and vice versa. In 2017, 5 million such **authorised conversions** were performed.

Figure E3 Verified copies/extracts issued from the CzechPoint@office interface for selected services (thous.)



Source: Ministry of the Interior, 2018

Figure E4 Number of authorized conversions of documents issued from the CzechPoint@office interface (thous.)



Source: Ministry of the Interior, 2018

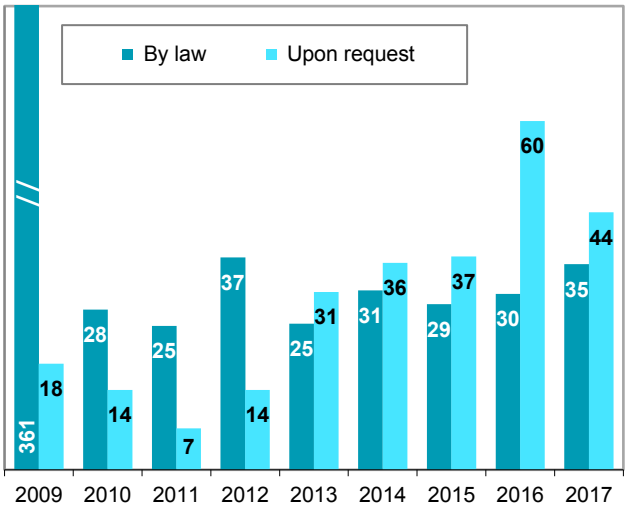
- This service is less frequently used for, so called, **official records** of selected administrative tasks. In 2017, civil servants used this option nearly in a million cases, total. These were most frequently the official records within the scope of **administrative duties of registers** (records of data concerning birth, decease, matrimony, and registered partnership), and within the scope of **administrative duties of registration offices** (records of mailing address and addresses of permanent residence). With respect to both these administrative duties, the civil servants used this option, in 2017, in over 400 thousand cases. This option is also less frequently used within the scope of **administrative duties of courts**, for the records of invalidity, divorce, non-existence of matrimony or a registered partnership, and the limitation of legal capacity or incapacitation.
- Since 2012, the newest Czech POINT system interface has been the web application **CzechPOINT@home, an internet contact point** designated for citizens owning a Data Box, who may remotely obtain certain copies of an entry in public, and non-public register, in order to their data box by means of forms located within this interface, without having to go to the “bricks-and-mortar” Czech POINT contact point. In 2017, our citizens requested a total of 14.1 thousand outputs, by means of this interface, their computers or mobile phones. These mainly included the copies of an entry in the Penalty Point System concerning drivers (5.4 thousand copies), and in Criminal Records (4.6 thousand).

E.2 Use of Data Boxes for Communication with Public Authorities

Since the launching of Data Boxes, in the 2nd half of 2009, Data Boxes represent a new standard for the delivery of official documents. Data Boxes are a communication tool guaranteed by the state, replacing the classic registered delivery of letters, and serving mainly as a means of communication with public authorities. Therefore, through Data Boxes you may send documents to public authorities electronically, and also obtain documents from them the same way[53].

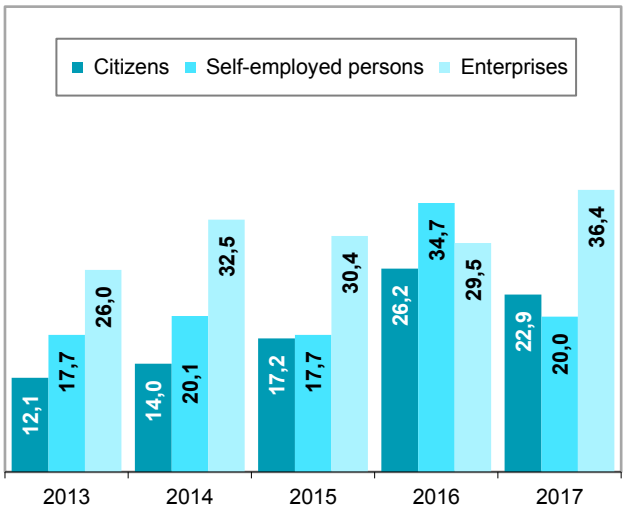
- Up to the 31st of December 2017, 861 thousand Data Boxes total were established in the Czech Republic. A large part of them (361 thousand) was established already in 2009, i.e. during the first year of the operation of this service, as it was stipulated by law to all public authorities and legal entities recorded in the Commercial Register. In the following years, the number of voluntary requests for a registration of a Data Box has been on the increase, and since 2013, the number of entities establishing a Data Box voluntarily prevails over the ones who do so by law.
- During the course of 2017, 80 thousand new **Data Boxes** were established in the Czech Republic. A large part of them (56%) was established **upon request**, 44% new data boxes were established **by law**. The majority of **new Data Box** owners are legal entities or self-employed individuals. In 2017, there were nearly 23 thousand Data Boxes established for individuals – non-entrepreneurs (citizens).

Figure E5 Number of newly activated Data Boxes in the Czech Republic (thous.)



Source: Ministry of the Interior, 2018

Figure E6 Number of new Data Boxes in the Czech Republic by type of entity (thous.)



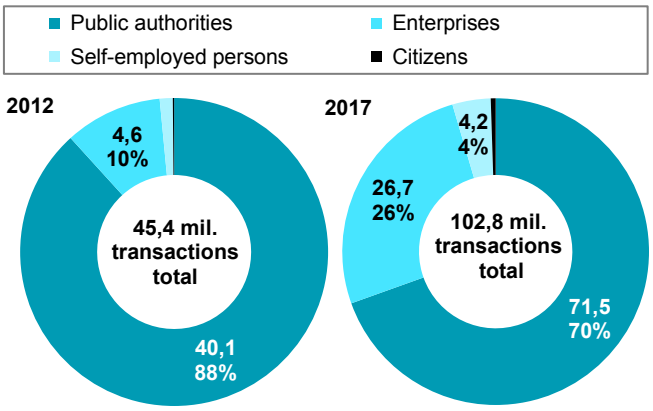
Source: Ministry of the Interior, 2018

- Year by year, the **number of transactions** conducted via Data Boxes is increasing. Overall, between the years 2012 and 2017, the number of transactions conducted via Data Boxes has nearly doubled, i.e. from 45.4 million in 2012 to 102.8 million in 2017.
- As it may have been expected, most data messages (i.e. conducted transactions) have been sent by **public authorities**, which have the obligation to use Data Boxes for mutual interchange of information. In 2017, over 71 million transactions were conducted. In 2017, legal entities, self-employed individuals, and other entities conducted a total of 31 million transactions, which is not even a half with respect to the volume of transactions conducted by public authorities. This means of communication has been gaining

[53] **Data Box** – electronic identity used as an email box from the user's point of view. Under Czech laws, it is defined as an electronic storage space of a special type serving as a secure and trustworthy delivery method of electronic documents and messages between public authorities on the one side and individuals and legal entities on the other. In the Czech Republic, Data Boxes were implemented by the Act No. 300/2008 Sb., on electronic transactions and authorised conversion of documents, effective as of 1 July 2009. Since 1 January 2010, individuals and legal entities may use Data Boxes between each other as well. Data Boxes are mandatory for public authorities and legal entities recorded in the Commercial Register, they are voluntary for the majority of self-employed individuals and may be established even by individuals – non-entrepreneurs (citizens). For more details see: http://www.mvcr.cz/clanek/datove-schranky-datove-schranky.aspx

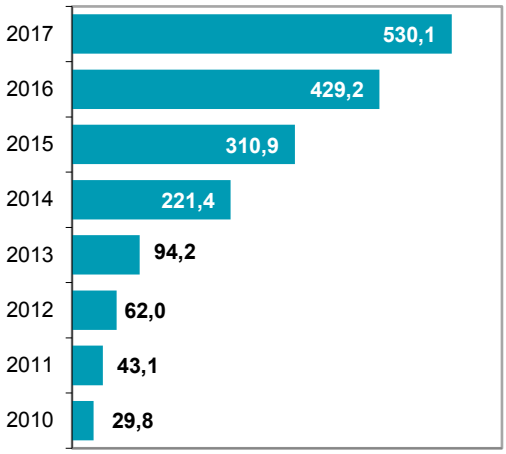
popularity, not only with self-employed individuals (in Czech "OSVČ"), but also with individuals – non-entrepreneurs (citizens).

Figure E7 Number of e-transactions made via Data Boxes in the Czech Republic by type of entities that conducted these transactions (mil.; %)



Source: Ministry of the Interior, 2018

Figure E8 Number of e-transactions made via Data Boxes in the Czech Republic by citizens (thous.)



Source: Ministry of the Interior, 2018

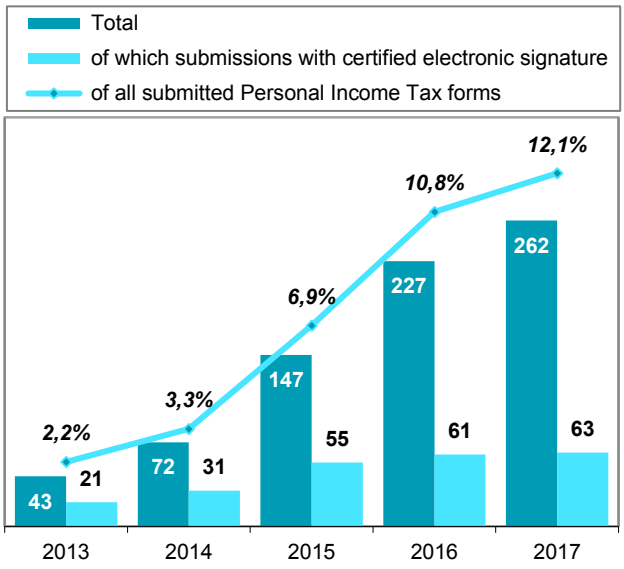
E.3 Electronic Tax Returns[54]

The Czech Financial Administration enables companies, as well as citizens, to submit their tax returns, declarations, reports or other documents electronically. In order to do so, the computer application called EPO (electronic submissions) was established for the Czech Financial Administration. It is a form of an electronic registry office of the authorities of the Czech Financial Administration, which can be used by means of a common internet browser. Electronic submissions conducted via EPO application must be provided with a qualified electronic signature (QES).

- Year by year, the number of electronic submission to the Czech Financial Administration is increasing in the Czech Republic. In 2017, a record number of 8.6 million electronic submissions was submitted via EPO application; out of which a fifth was provided with a qualified electronic signature, and less than a third was provided with a certified identity of the submitting person, by means of his or her Data Box. Two years ago, it was 2.4 times (5 million) less, and five years ago it was even 5.6 times less (1.5 million in 2012).
- With respect to the total number, since 2003, the largest part (47% in 2017) of electronic submissions to the Czech Financial Administration has been formed by **Value Added Tax declaration**. In 2017, 2.2 million Value Added Tax declarations (VAT) were submitted via the EPO application. In the last three years (since 2014), the number of these declarations has risen by 50%, and since 2012 it has risen even fivefold.

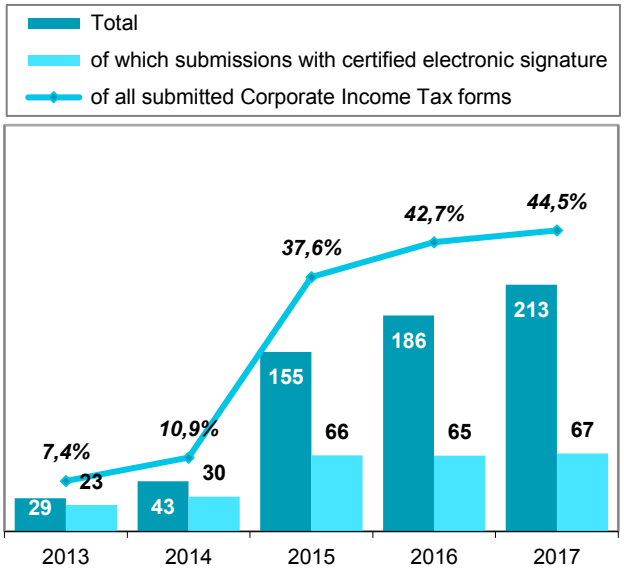
[54] Data concerning the number of **tax returns submitted electronically** to Czech Financial Administration via the **EPO web application** (electronic tax returns) or by means of **Data Boxes** is processed by the CZSO from the data publicly available at the **Financial Administration**. The newest data from these sources relate to the year 2017. In 2015, it was stipulated that for all owners of an active Data Box, the communication with Czech Financial Administration is to be mandatory by means of the Data Box.

Figure E9 Personal Income Tax forms sent electronically to the Czech Financial Administration via EPO application



Source: Czech Financial Administration, 2018

Figure E10 Corporate Income Tax forms sent electronically to the Czech Financial Administration via EPO application



Source: Czech Financial Administration, 2018

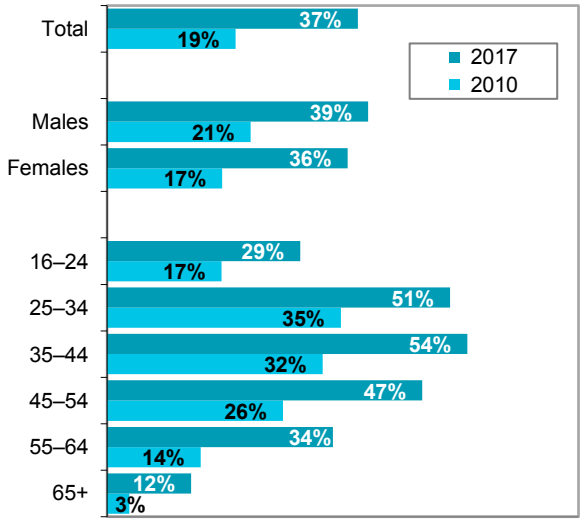
- The number of electronic submissions of Personal Income **Tax declaration** and Corporate Income Tax declaration has also been increasing year by year. With respect to **Personal Income** Tax declaration, in 2017, there were 262 thousand submissions in total, conducted via EPO application, compared to less than 150 thousand in 2015, or 32 thousand in 2012. In 2017, the number of such electronic submissions was 12.1% of the total number of "independently submitted" Personal Income Tax declarations (in Czech "DPFO"), compared to 6.9% in 2015.
- With respect to **Corporate Income** Tax declaration, in 2017, there were 213 thousand submissions in total conducted via EPO application, compared to 155 thousand in 2015, or 23 thousand in 2012. In 2017, there were 44.5% electronic submissions, out of the total number of Corporate Income Tax declarations, compared to 37.6% in 2015, or 6.4% in 2012.
- Apart from the aforementioned tax declarations via the EPO application, available at the website of Czech Financial Administration, since 2013, legal entities, as well as individuals, may submit their tax declarations electronically, by means of their **Data Boxes**. In 2015, it was actually stipulated that all owners of an active Data Box must hold the communication with the Czech Financial Administration electronically.
- In 2017, this option of tax declaration submission was used by 146 thousand **individuals**, which is ten times more than three years ago. In 2017, tax declarations were submitted electronically – either via EPO application or by means of Data Boxes – by 408 thousand persons. The total share of Personal Income Tax declarations submitted electronically amounted to 21%.
- With respect to **legal entities**, in 2017, the option to submit tax declarations via Data Boxes was used by 249 thousand entities, which is also ten times more than three years ago. Nearly all companies (legal entities) – as stipulated by law – have been submitting their tax declarations solely electronically in the past two years.

E.4 Use of eGovernment services by individuals

Computerization of public administration forms is the integral part of a well-functioning economy and society. Public administration, which uses new technological options, contributes to a simplified communication between the state and its citizens. The prerequisite of such communication is the interconnectedness of government offices, as well as a sufficient offer of online eGovernment services, for their possible usage by enterprises and individuals.

- Within the scope of the regular survey of the CZSO, concerning the usage of information technologies in households and among individuals[55], the methods of internet usage by individuals are monitored with respect to public administration. In 2017, the internet was used **for interaction with public authorities**[56] by less than a half (47%) of all internet users, which is more than a third (37%) of all inhabitants over the age of 16.
- The survey also implies that the highest percentage of users using the internet, for interaction with public authorities, may be found among university graduates – in 2017, this option was used by nearly two thirds (64%) of them. For interaction with public administration, the internet is frequently used by women on parental leave and persons aged 35–44 – in both of these cases 54% of the persons belonging to this category used this option in 2017. With respect to age, the internet is used the least for the interaction with public administration by users aged 16–24 and, above all, by users over the age of 65.

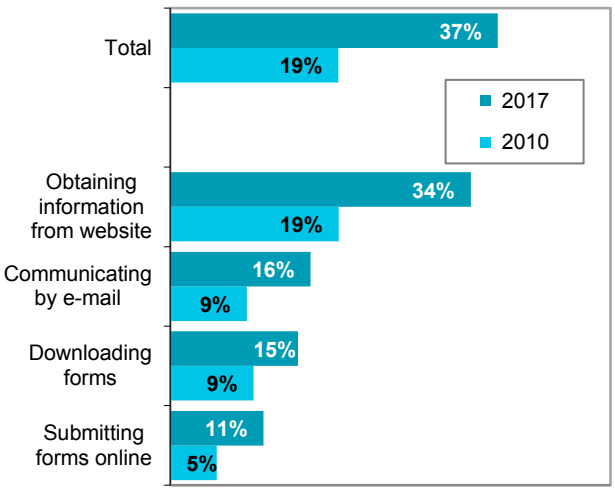
Figure E11 Individuals in the Czech Republic using the internet for interaction with public authorities (%)*



* as a percentage of all individuals aged 16+

Source: Czech Statistical Office, ICT use survey in households, 2018

Figure E12 Individuals in the Czech Republic aged 16+ using the internet for interaction with public authorities for selected activities (%)*



* as a percentage of all individuals aged 16+

Source: Czech Statistical Office, ICT use survey in households, 2018

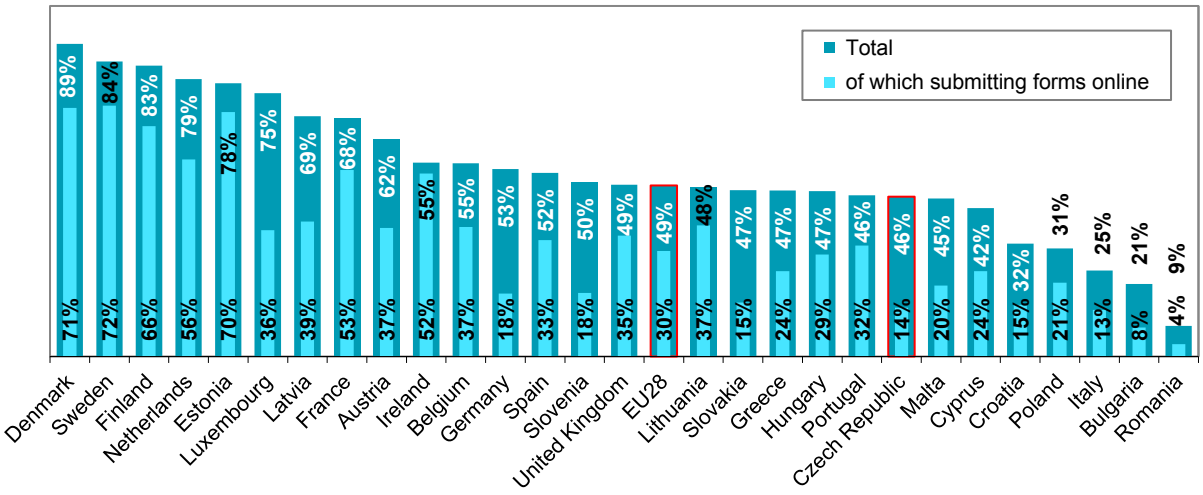
- With respect to internet activities concerning public administration, individuals in the Czech Republic use the internet most frequently to **seek information** on public authorities' websites. In 2017, this activity was performed by approximately a third (34%) of persons over the age of 16, compared to less than a fifth (19%) in 2010.

[55] Data concerning the internet usage with respect to public administration by individuals is obtained from the Selective Survey on ICT usage in households (VŠIT). The survey is carried out by means of personal interviews with a survey sample of approx. 10 thousand individuals. The ascertained data is available to a wide range of demographic and social characteristics of persons living in the monitored households, such as sex, age, highest attained education, etc. Since 2006, the survey is carried out yearly in the 2nd quarter of the monitored year in all EU countries as a mandatory survey stipulated by the Regulation (EC) No. 808/2004 of the European Parliament and of the Council concerning Community statistics on the information society. For more details see Chapter C.

[56] This includes individuals who have stated to have used the internet for private purposes at least once in the last 12 months for at least one of the following activities concerning the interaction with public authorities: information seeking on the public authority's website; interaction with public authorities via emails; form downloading from the public authority's website, and/or filling-in and sending a form to public authorities electronically.

- Other internet activities, concerning public administration, have not been this popular. In 2017, 16% of individuals **communicated** with public authorities **by email**, and a similar share (15%) **downloaded a form** from the website of the given institution. Even a lower number of persons – approx. a tenth (11%) – **filled-in, and submitted, the form to public authorities via the internet**.
- Precisely the option to fill in and submit a form online, from the person's home or from any other place, forms part of so called eGovernment, which represents another phase of computerization of public administration. The vast majority of the population in the Czech Republic (89% in 2017) has not been using the option to fill in and submit forms electronically, yet. The most common reason, why adult Czech citizens did not complete and submit online forms to authorities in 2017, was that **they had no need to fill in any form**. This was the response of nearly a half of all persons (47%). A quarter of all individuals (24%) stated that they had not used the online forms because they **did not use the internet**, and the other individuals (30%) provided other reasons for not using it, such as insufficient knowledge, skills, concern over personal data protection, or that someone else had submitted the form for them. Some of them also stated that they had wished to fill in the form online, but the required form was not available online at the time.
- With regards to the usage of the internet for interaction with public authorities[57], for selected activities **in EU countries**, the Czech Republic is still below average. In 2017, the internet was used for the interaction with public administration, by an average of 49% of individuals aged 16–74 in the EU, however, only 46% in the Czech Republic. The highest percentage of individuals, using the internet with respect to public administration institutions, can be found in the Nordic states, in the Netherlands, and in Estonia.

Figure E13 Individuals in EU countries aged 16–74 using the internet for interaction with public authorities; 2017*



* as a percentage of on individuals aged 16 to 74 in a given country

Source: Eurostat 2018

- Whereas in some EU countries, such as Estonia, Ireland or the Nordic states, the online filling-in and submitting of forms is common for the interaction with public authorities, Czech citizens are more passive in interaction with public authorities, and they use the internet mainly for information seeking on the public authority's website. In aforementioned Estonia, in 2017, a form was filled-in and submitted via the internet by 70% of individuals, whereas in the Czech Republic the total was solely 14%. The EU-average was 30%.

[57] Eurostat publishes solely the total data concerning public administration – besides public authorities, some other public institutions are included in this indicator. These mainly include public schools, medical facilities, and libraries.

Chapter F Education and ICT

Information and communication technology is of course a matter of interest for students these days – most of them have never experienced life without the internet, thus they cannot imagine their lives to be offline[58].

Nevertheless, adequate knowledge or education in the ICT area, does not solely concern the young generation. Every day or occasional contact with ICT in our work life and leisure time, creates pressure on nearly everyone to be able to acquire computer and digital skills. Working with computers or the internet, no longer belongs to the world of highly educated and enthusiastic individuals, but to most of us, as it has become a routine part of everyday lives.

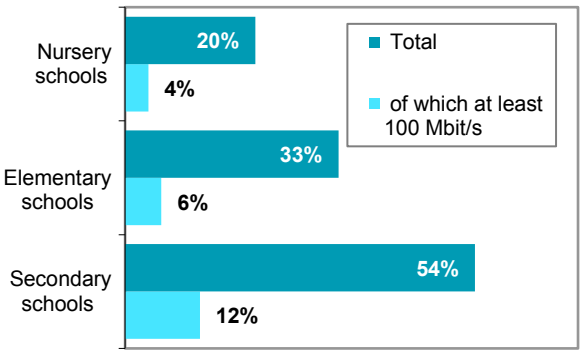
The field of ICT development requires a sufficient structure of specialists, whose knowledge and skills may contribute to innovative solutions. Expert knowledge in the field of ICT may be attained by studying within the formal education system or within further (non-formal) education or self-study, or alternatively by learning from experience.

F.1 ICT at schools

It has been a long time since computers at schools were solely located in computer classrooms or teachers' offices. Increasingly, there are language classrooms or scientific classrooms available at schools, which are equipped with multimedia and digital technologies. Whereas in the past, pupils/students used to present their papers only verbally, due to computer development in schools, they may enhance their papers visually and interactively, by means of various media and presentation programmes. Presentations are also a common means of involving students in lessons, and serve as visual support for teachers' lectures.

- **Internet access** in Czech schools is almost guaranteed. Internet speed differs along with school degrees. Whereas a fifth (20%) of nursery schools is provided with internet speed higher than 30Mb/s, among secondary and higher professional schools this speed is provided by more than 54%.

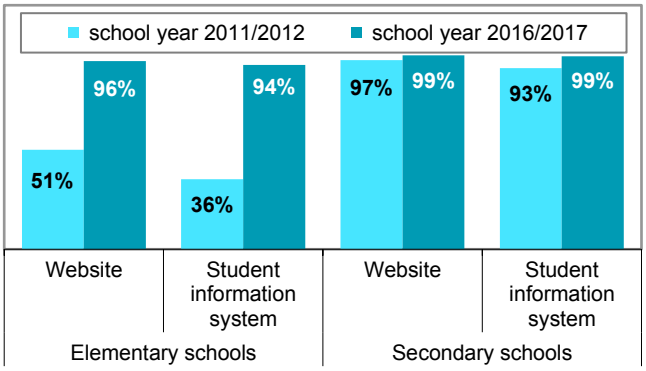
Figure F1 Schools in the Czech Republic with at least 31 Mbit/s internet; 2016/2017 (%)*



* as a percentage of all schools of a given type

Source: Czech School Inspection, 2018

Figure F2 Elementary and secondary schools in the Czech Republic with a website and Student information system (%)*



* as a percentage of all schools of a given type

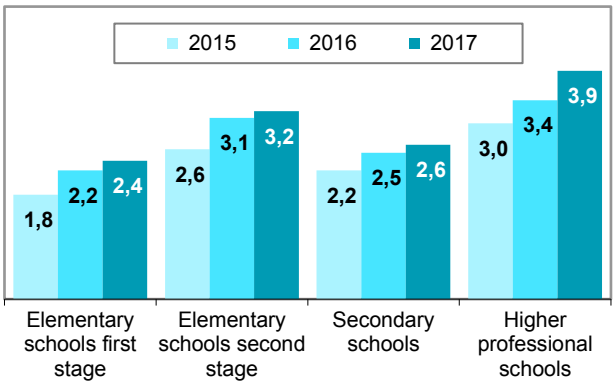
Source: Czech School Inspection, 2018

- In the 2016/2017 school year, **websites** were nearly available at all secondary and higher professional schools (99%). With respect to elementary schools, the number of them with their own website has nearly doubled in the past five years, i.e. from 51% in the 2011/2012 school year to 96% in the 2016/2017.
- In the 2016/2017 school year, a majority of schools in the Czech Republic had a **student information system** – 95% of elementary schools and 99% of secondary schools. In comparison, in the 2011/2012 school year, 93% of secondary schools had these systems, however, solely 36% at elementary schools.

[58] According to the results of the OECD Programme for International Student Assessment (PISA), already in 2012, on average, for OECD countries where data was available, less than 0.5% of 15 year-olds reported never having accessed the internet.

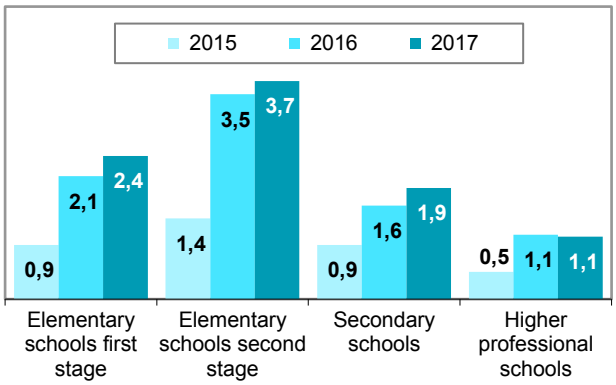
- The availability of information technology at schools has not changed much over the past years in the Czech Republic. In the 2017/2018 school year, there were, for instance, on average, **25 computers per 100 students** at Czech secondary schools, compared to 24 computers the year before. Nowadays, the absolute majority of these computers are connected to the internet.
- At the same time, the number of **portable computers** has been increasing, too. In 2017, for instance, 3.2 laptops were used per 100 pupils at elementary schools – 2nd stage, compared to 2.6 laptops in 2015. Even the highest **number of tablets** in 2017 was recorded with the pupils of elementary schools – 2nd stage, nearly 4 tablets per 100 pupils, i.e. nearly three times as many as two years ago.

Figure F3 Number of laptops with internet access per 100 students in the Czech Republic



Source: Ministry of Education, Youth and Sports of the Czech republic, 2018

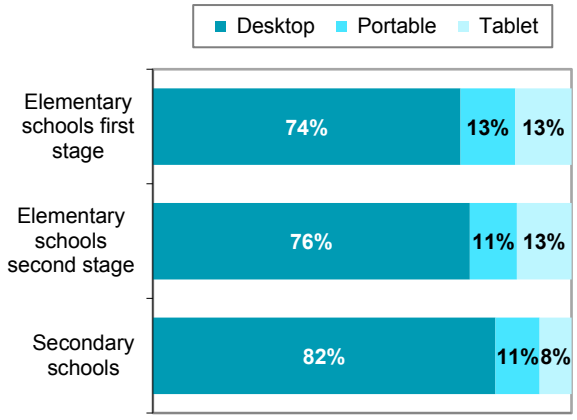
Figure F4 Number of tablets per 100 students in the Czech Republic



Source: Ministry of Education, Youth and Sports of the Czech republic, 2018

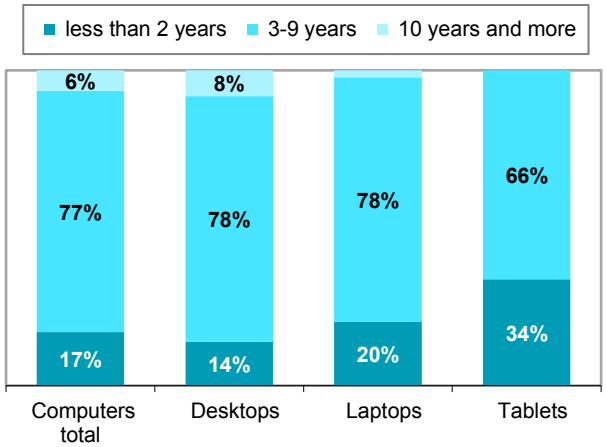
- **In absolute numbers** – desktop, portable ones or tablets – available to pupils/students of elementary schools and secondary schools, in the Czech Republic, in 2017, reached a total of 262 thousand. Three quarters of them (200 thousand) still consisted of desktop computers. In elementary schools, their share was approx. 10% lower (70%), than in secondary schools (80%). In both cases, the number of tablets and laptops in elementary schools reached 21 thousand.

Figure F5 Computers available to students in Czech schools by type of device; 2017 (%)



Source: Ministry of Education, Youth and Sports of the Czech Republic, 2018

Figure F6 Computers available to students in Czech schools by the age of devices; 2017 (%)



Source: Ministry of Education, Youth and Sports of the Czech Republic, 2018

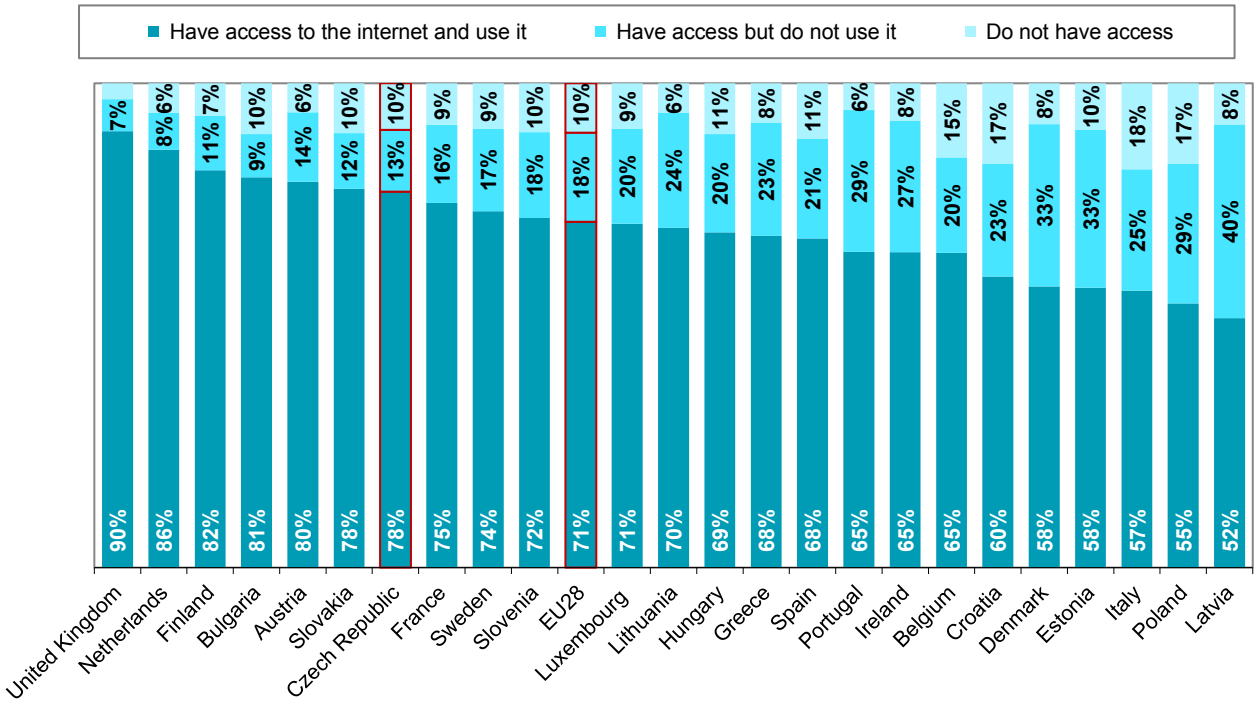
- The **age of computers**, available to pupils/students of Czech elementary and secondary schools, is most frequently around 3 to 9 years. As mentioned above, the students of all types of schools are most frequently provided with desktop computers, which are also of the oldest service age. Only 14% (28 thousand) of them are of a service age of up to 2 years. The relatively "youngest" device (service age of up to 2 years), at elementary and secondary schools, in the Czech Republic, are tablets (34% of all tablets). The rest of the tablets were purchased 3 to 9 years ago for study purposes.

F.2 Access of 15-year-old pupils to ICT

The internet permeates every aspect of the economy and society, and is also becoming an essential element of children's lives. However, it carries a spectrum of risks, to which children are more vulnerable than adults. While access to information via the internet may bring considerable benefits for children's education, it also exposes them to online risks, such as access to inappropriate content, harmful interactions with other children or adults, and exposure to aggressive marketing practices. Children online may also be put at risk though the computers they use, especially by inadvertently disseminating their own personal data. Addressing risks faced by children online is becoming a policy priority for an increasing number of governments.

- In 2015, the international survey PISA (OECD), was conducted at schools[59], focusing, besides other things, on whether 15-year-old pupils in schools have **internet access**, and whether they use this opportunity. In 2015, Czech pupils took seventh place in **EU ranking** – 78% of 15-year-olds had internet access in school and used it. The EU28 average was 71%.
- PISA assessment, carried out on 15-year-old pupils in the Czech Republic, also implies that nearly all (97%) of them used the internet at home. In schools, it is 78% of them – once again data for the year 2015. Desktop computers are available, and used, by the same number of pupils at home and at school (66%). Laptops used by 15-year-old pupils are significantly more often used at home (76%), than at schools (18%). The same applies for the use of tablets (at home used by 50%, at schools 13%).

Figure F7 15 years old students in EU countries with the internet access at school; 2015 (%)*



* as a percentage of all 15 years old students in a given country

Source: OECD 2015, survey PISA

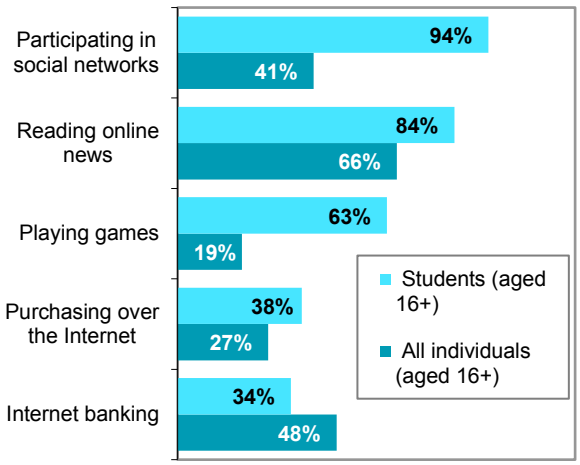
[59] In 2015 over half a million students, representing 28 million of 15-year-olds in 72 countries and economies, took the internationally agreed two-hour test. Students were assessed in science, mathematics, reading, collaborative problem solving, and financial literacy.

F.3 Internet use by students aged 16+

Nowadays, probably hardly anyone can imagine a life without the internet. Millennials, also known as Generation Y (born in 1985–2000) grew up in an era of great development of information and communication technologies, which significantly affects their lifestyles. They use the internet to communicate with each other, meet friends, to shop, or to educate themselves. The school system plays an important role in providing all children and students with the skills needed to actively participate in an increasingly digital life and world of work.

- In the years 2015 to 2017, nearly all **students over the age of 16** (99.5%), in the Czech Republic, used the internet. In the same period of time, nearly 80% of students used **mobile internet**[60].
- On average, from 2015 to 2017, the most frequent activity of students, with respect to internet usage, was to monitor events on social networks (94%), a further frequent activity is to read the news (84%), or play online games (63%).
- If we focus on the internet usage by students, with respect to **educational activities**, we can see that between 2015 and 2017, 39% of them used online **educational resources**, and 31% of students communicated with their lecturers, or other students, by means of **educational portals**. Nearly 7% of students attended an **online course**.
- In international comparison, the position of Czech students, in 2017, with respect to the usage of educational resources over the internet, is the tenth, i.e. significantly **above the European average**. However, in regard to the communication with lecturers, or other students, over the internet, we take fourteenth place of the European scale, and we are exactly on the EU28 average.
- It may not come as a surprise that **students' (16+) activity over the internet** is more common than the activity of adult **individuals (16+) in total**. The most significant difference lies in the subject of **participation in social networks** (94% of students and 41% of individuals), and in **online game playing** (63% of students; 19% of individuals in total). The only area, where individuals outperformed students, was the usage of **internet banking** (34% of students, 48% of individuals in total).

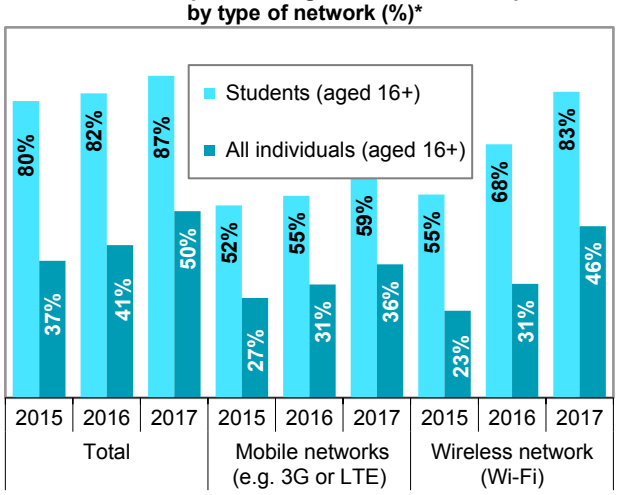
Figure F8 Students and individuals in the Czech Republic aged 16+ using the internet for selected activities; 2015–2017 (%)*



* as a percentage of all students aged 16+

Source: Czech Statistical Office 2018, ICT use survey in households

Figure F9 Students and individuals in the Czech Republic using internet on mobile phone by type of network (%)*



* as a percentage of all students and individuals aged 16+

Source: Czech Statistical Office 2018, ICT use survey in households

[60] The data is based on the Sample Survey on the ICT Use in Households and by Individuals, which has been carried out annually by the Czech Statistical Office since 2002. The survey is carried out using the Computer Assisted Personal Interviewing (CAPI) method on the sample of about 10 000 individuals aged 16+.

F.4 Digital skills

Not only access to the internet and access to other ICTs, but primarily the motivation and ability of individuals to efficiently use the applications and services offered, through these technologies (digital skills), is currently considered as one of the key factors of economic, social, and political development of society. The ability to work with digital technologies belongs among eight key skills, which are absolutely indispensable for know-how-based society[61]. At the same time, safe navigation through the internet is equally important.

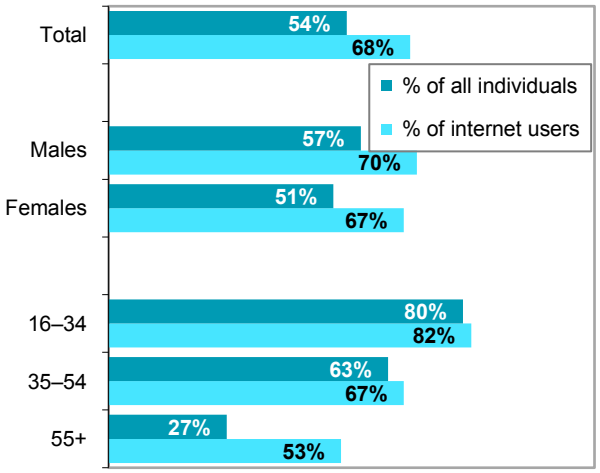
With the intensive use of ICT at work, individuals are required to make use of new skills along three lines. Firstly, the production of ICT products and services – software, web pages, e-commerce, cloud, big data, etc. – requires ICT specialist skills for the programming and development of applications, as well as for managing networks. Secondly, workers across an increasing range of occupations need to acquire generic ICT skills in order to be able to use such technologies in their daily work – to access information online, use software, etc. Finally, the use of ICT is changing, the way work is carried out, and raising the demand for ICT complementary skills, e.g. the capability to communicate on social networks, to brand products on e-commerce platforms or capability to find, evaluate and create information in different media and for different contexts (media and information literacy).

While the majority of people in the Czech Republic now have access to the internet, the digital divide based on lack of skills to use the internet efficiently limits not just people's job prospects, but its implications extend to all areas of well-being. In people's daily lives, this inequality in digital skills manifests itself in the form of different abilities to use the internet in a variety of ways. All time-saving opportunities, new ways to access information and social networking depend on people's ability to take advantage of the various possibilities that internet provided. As internet access rates are very high in all EU countries, differences in ability to use the internet are a key motor of inequalities.

- In the Czech Republic, three fifths of persons over the age of 16 (60%) stated, in 2016, to have **copied** or transferred files or folders throughout their computer, in the past 12 months. A quarter of individuals worked with a graphic **photo-editing programme**, and 4% of them **did the programming**. These selected computer skills are mainly the interests of the young generation and men's (programming in particular). The aforementioned skills are also more frequently exhibited by students and people with a higher degree of education.
- The Czech Statistical Office also inquired on the number of inhabitants, of the Czech Republic, using the common **office computer programmes**. Most individuals aged 16+ stated to have been using **word processing software** (e.g. MS Word) – in 2017, there was nearly a half of them (54%). In the same year, more than a third (41%) of them used **spread sheet software** (e.g. MS Excel), and a quarter of them (25%) stated to have been using **presentation software** (e.g. MS PowerPoint). All these office programmes are **more frequently used by men than women**. With increasing **age**, the percentage of people using the given software is decreasing, however, with an increasing level of **education**, the percentage of such people is increasing.

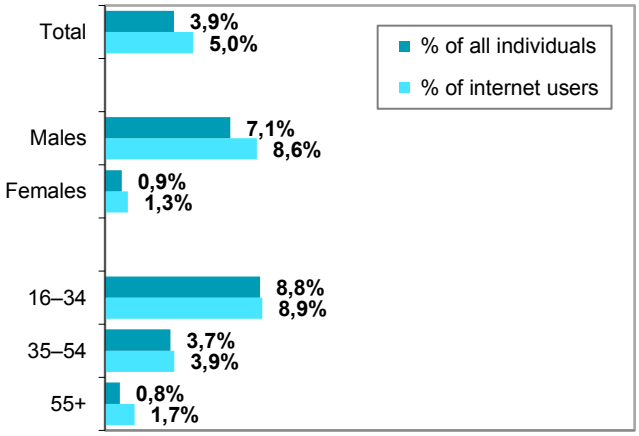
[61] The 2006 European Reference Framework of Key Competences for lifelong learning defined eight key competences that were in 2018 updated, and includes also digital competence. Digital competence involves the confident, critical, and responsible use of digital technologies for learning and engagement with them at work, and for participation in society. It includes information and data literacy, communication and collaboration, digital content creation (including programming), safety (including digital well-being and competences related to cybersecurity), and problem solving. For more information see:
https://ec.europa.eu/education/sites/education/files/annex-recommendation-key-competences-lifelong-learning.pdf

Figure F10 Word processing software use in the Czech Republic; 2017(%)



Source: Czech Statistical Office 2018, ICT use survey in households

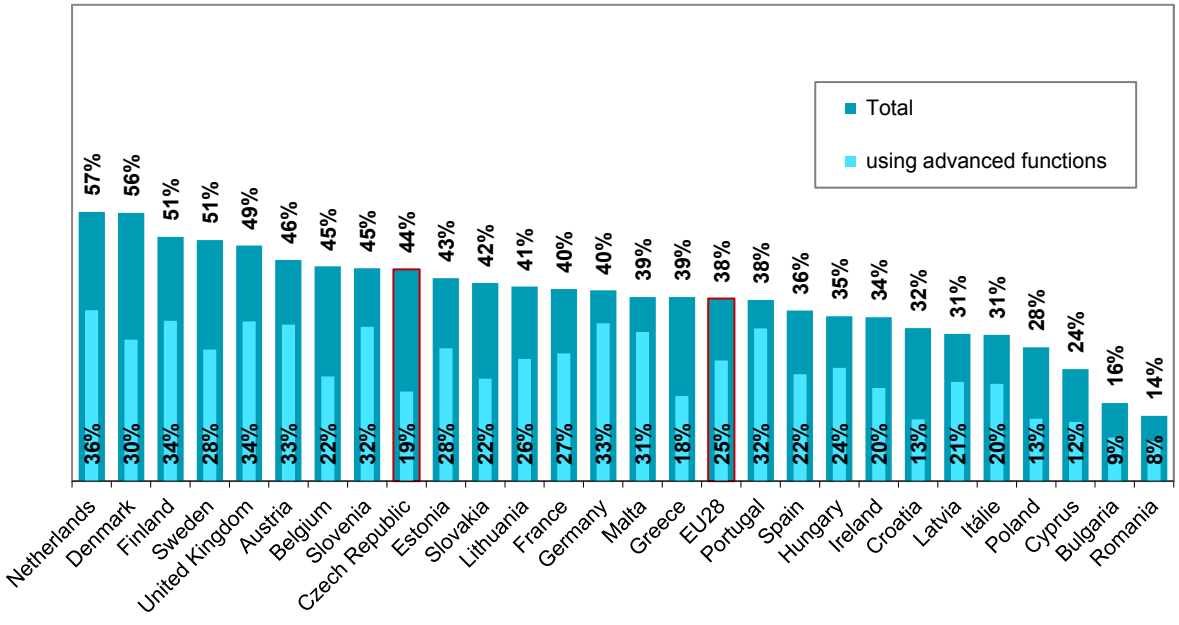
Figure F11 Use of programming by individuals in the Czech Republic; 2017 (%)



Source: Czech Statistical Office 2018, ICT use survey in households

- **In international comparison**, the percentage of Czech individuals using **spread sheet software**, found themselves approximately in the middle position, slightly **above the EU28 average**. If solely assessing the advanced skills of using the spread sheet software (e.g. calculations usage, graph creation, filter usage, and so on), the Czechs would be placed below the EU28 average.

Figure F12 Individuals aged 16–74 in EU countries who used spreadsheet software*; 2017 (%)**



* e.g.. MS Excel or OpenOffice Calc
** as a percentage of all individuals aged 16 to 74 in a given country

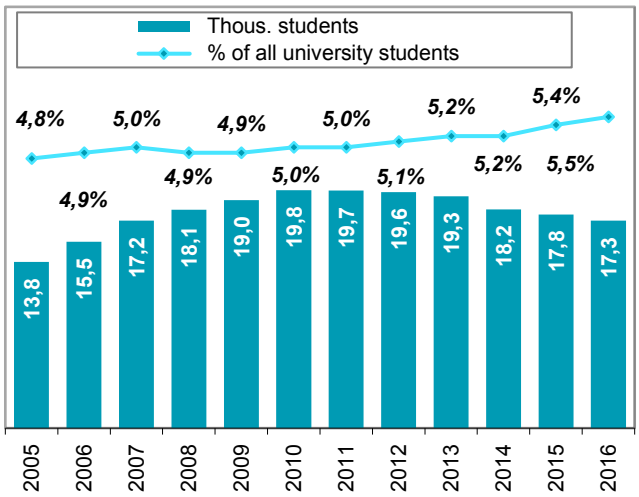
Source: Eurostat 2018

F.5 Students and graduates in ICT field of education

When choosing a university to study at, the future of the ICT field, and the opportunities it provides, are acknowledged by a large number of students. Apart from motivating earnings potential, which belongs to the higher ones within the national economy, applicants are often tempted by the possibility of home office, flexible working hours, custom-made work, and other advantages.

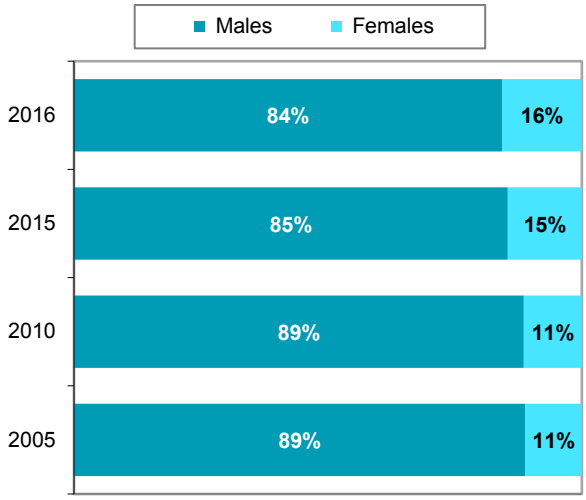
- In 2016, over 17 thousand students at Czech universities studied within the **ICT fields of education,** which is 5.5% of the total number of students[62]. Nearly a fifth (15.7%) of the total number of ICT field studies was formed by **women** a quarter (25%) of all these students had **foreign citizenship**.

Figure F13 University students of ICT field of education in the Czech Republic



Source: CZSO calculation based on MEYS database, 2018

Figure F14 University students of ICT field of education in the Czech Republic by sex (%)



Source: CZSO calculation based on MEYS database, 2018

- The highest share of university students of ICT was found in **bachelor degree programmes** (68%), more than a quarter (27%) in master programmes, and 5% in doctoral studies.
- Compared to other **EU28 countries**, in 2015, the Czech Republic's 20–29 age group was formed by an extraordinarily higher number of ICT university students (1.4%; EU28 average was 1.2%). The highest share of ICT students, within the aforementioned group, was reported by universities in Finland, Ireland, and Greece; the lowest share by those in France and Portugal.
- In 2016, nearly 3 500 university students **graduated from the ICT field**. They represent 4.5% of all graduates from bachelor and master programmes. 85% of all ICT graduates were men.
- The highest share of ICT graduates, among university graduates (bachelor and master degree programmes), was found in Ireland and Finland, the lowest one in Belgium and in Portugal. The Czech Republic is found approximately in the mid-position.

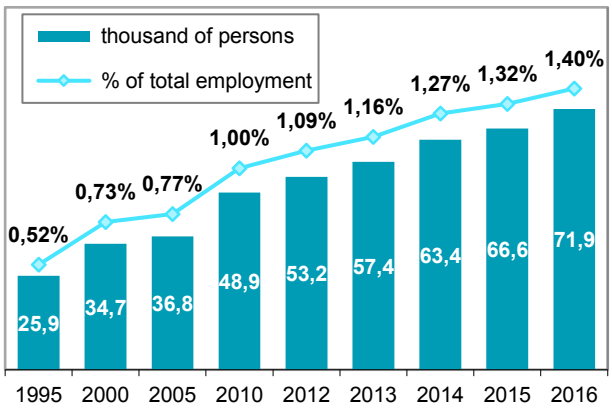
[62] Numbers of ICT students and graduates are based on the International Classification of Education (ISCED-F 2013), broad field code 06 Information and Communication Technologies (ICT) that involves detailed defined fields of education as follows: Computer use (0611); Database and network design and administration (0612); Software and applications development and analysis (0613); ICT not elsewhere classified (0619); and Inter-disciplinary programmes and qualifications involving ICT (0688). Education at universities presented in this chapter for the Czech Republic belongs to the tertiary level of education and includes a bachelor (ISCED level 6), master (ISCED level 7), and doctoral (ISCED level 8) study programmes of all public and private universities.

F.6 ICT professionals

ICT has already been the cause of significant changes to both methods and patterns of production. Policy-makers and researchers are therefore interested in tracking employment developments for ICT professionals, which influence a country's comparative advantage in the development, installation, and servicing of ICT.

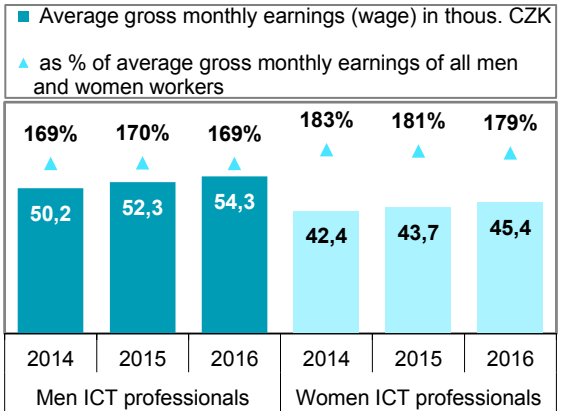
- In 2016, nearly **72 thousand ICT specialists** worked in the Czech Republic[63]. Approximately two thirds of them were analysts, software, and computer application developers. A third was formed by specialists in the field of databases and computer networks.
- Only a tenth of ICT specialists, in 2016, were **women**. A half of ICT specialists, in 2016, had a master's or doctoral degree; looking at the age group, the surpassing group was 30–39 (28%), followed by the age 40–49 group (18%).
- In 2016, the average **gross monthly earnings of ICT specialists**[64] exceeded 53,000 CZK and formed 183% of the average Czech wages. On average, men working in the ICT field earned nearly 10,000 CZK more than women. It may not come as a surprise, that higher earnings are found with ICT professionals in the private sector (receiving wages), than ICT professionals in the public sector (receiving salaries), and the earnings of ICT professionals grow along with their highest attained education. The highest average wages are earned by "middle aged" ICT professionals, i.e. 35–44 years of age.
- With respect to selected ICT professions, the highest income exceeding 61 thousand CZK is earned by **professionals in the area of data security**. In 2016, over 58 thousand CZK of gross wage was earned by system analysts or software developers. The relatively lowest earnings in the ICT field were found with system administrators and network administrators, or database designers and administrators (less than 50 thousand CZK).
- With respect to the income of ICT professionals in selected industries (in accordance with CZ-NACE classification), in 2016, the highest income was earned by ICT professionals engaged in the field of **Financial and insurance activities** (over 64 thousand CZK), or within the sector **Information and communication activities** sector (nearly 58 thousand CZK). At the end of the scale, there were ICT professionals involved in the Public administration sector, whose income nearly amounted to 37 thousand CZK, in 2016.

Figure F15 ICT specialists in the Czech Republic



Source: CZSO, Labour Force Survey, 2018

Figure F16 Earnings of men and women ICT specialists in the Czech Republic



Source: CZSO, Structural Earnings Statistics, 2018

[63] The data on the numbers of ICT professionals come from the Labour Force Sample Survey (LFSS) of the CZSO and presents the average annual data for the given year.

[64] Data on wages of the ICT professionals come from the structural employee wage statistics which is generated by merging of databases of the sample survey of the Information System on Average Earnings of the Ministry of Labour and Social Affairs, which covers the wage sphere, and from the database of the administrative data source of the Salary Information System of the Ministry of Finance, which exhaustively covers the salary sphere.

Chapter G Health and ICT

Electronic healthcare, or eHealth, is a dynamically developing area of ICT. The main purpose of eHealth is the complete computerization of processes related to the provision of healthcare. For instance, the electronic healthcare concept includes safely stored electronic health records, with the possibility of sharing between physicians, as well as electronic communication between physicians and patients. eHealth also includes telemedicine (personal portable and mobile communication systems for patient monitoring and support), or expert systems used by healthcare providers (in order to make diagnoses and prescribe drugs). The use of these tools should improve the prevention, diagnostics, treatment, monitoring, and controlling of health and lifestyle.

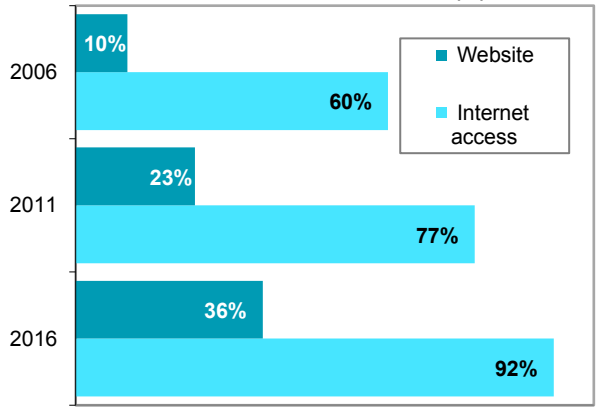
Information technology usage in healthcare is broad enough on its own, therefore, this chapter is dedicated solely to selected indicators, focused on the usage of computers and the internet, by independent physicians, in the Czech Republic, and the usage of information technologies by individuals, with respect to their health.

G.1 Practices of physicians with access to selected ICTs

Nowadays, ICTs belong to standard equipment of the majority of healthcare facilities, in the Czech Republic, and computer usage by physicians is an indispensable part of their everyday work routine. Only an insignificant percentage of physicians does not use a computer in their practices – this is due to the fact, that physicians need computers in order to fulfil their obligations arising out of specific legal regulations. These include, for instance, reporting to the Register of Healthcare Providers and to the Register of Healthcare Professionals. By means of the internet, however, physicians are also provided with other information relevant to the operation of their practice. Therefore, the blanket usage of computers will be inevitable.

- In 2016, 96% of **independent physician's practices** in the Czech Republic were equipped with a **desktop computer**. More than 92% of them had **internet** access, and more than a third (36%) of practices had **a website**. Opposed to this, in 2006, only six out of ten physicians had internet access in their practices, and only every tenth practice had its own website.
- The percentage of medical facilities, with their own website, is significantly lower in comparison with other entities (enterprises or authorities), since in 2016, the aforementioned 36% of independent physician's practices had a website, as opposed to more than 80% of enterprises, or 100% of public administration organisations, including the individual municipal authorities.
- In regard to the individual **types of practices**, we find a significant difference in the occurrence of websites: for instance, in 2016, a website was already owned by 56% of gynaecological practices, 51% of paediatric practices, but only 34% of general practitioner's surgeries or 23% of dentists.

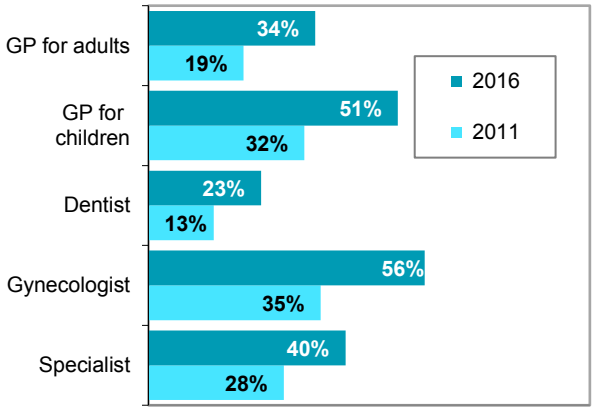
Figure G1 Independent physicians in the Czech Republic with access to the internet in their medical office and with a website (%)*



* as a percentage of all independent physicians

Source: Institute of Health Information and Statistics. 2018

Figure G2 Independent physicians in the Czech Republic with a website by type of practice (%)*



* as a percentage of all independent physicians of a given practice

Source: Institute of Health Information and Statistics. 2018

- Despite the fact that a third of physician's practices has a website, compared to pharmacies, the percentage is still very low. 62% of pharmacies have their own website, however, this may be due to the fact, that they often belong to one of the commercial pharmacy networks.

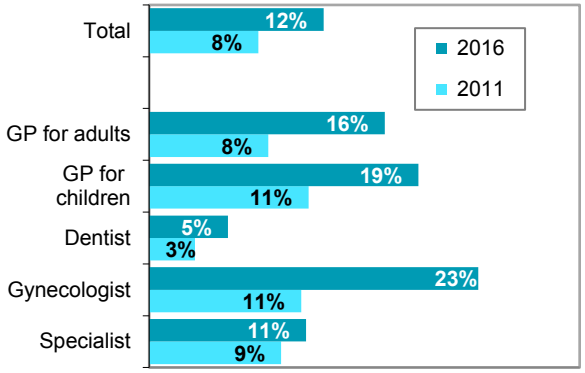
G.2 Online services offered by independent physicians on their website

Apparently, the most commonly used means of medical facilities presentation is their own website. Besides basic contact details and opening hours, physicians also present the types of services provided, publish the price list for individual procedures, news, and in some cases the websites provides other online services for patients, such as online consultations or appointment-booking[65]. Within the scope of the Selective Survey on ICT usage in households (VŠIT), the Czech Statistical Office ascertains the usage of such services by the individual.

- Whereas in 2006, patients could **make an appointment through an online form** merely in 3% of practices, in 2016, this option was offered by 12% of independent physician's practices. The online appointment form is sent directly from the given practice website or via an electronic appointment system. In 2016, online appointment system was used by 8% of Czech citizens, out of which the number of women was twice as high (11%), compared to the number of men (5%). In 2016, online appointment-booking, with a physician, was more frequently offered to gynaecological patients (23%) or to paediatric patients (19%). Online appointment-booking was the least frequently offered by dentists (4%).
- As the percentage of practices enabling online appointment-booking has grown, there is also an increase in the percentage of practices offering **consultations via online forms**, i.e. from 3.5% in 2006, to 12% of practices in 2016. Despite this fact, the number of individuals, using this consultation option, is still low. In 2016, this service was solely used by 4% of Czech citizens; as well as in the case of online appointment-booking, it was used by women (5%) more frequently than by men (3%). Online consultation services were the most frequently provided by gynaecologists (29%) and paediatricians (21%).
- In 2016, the option to **write a prescription** based, on a request via the practice's website, was offered by 9% of physician's practices in the Czech Republic; the most frequently by gynaecologists (22%), and the least frequently by dentists (1%). Dentists are the ones, who disagree with the obligation to prescribe drugs electronically, as they solely write several tens of prescriptions, the majority of which concerns antibiotics. With respect to the low number of prescribed drugs, the purchase of this system would not pay off.

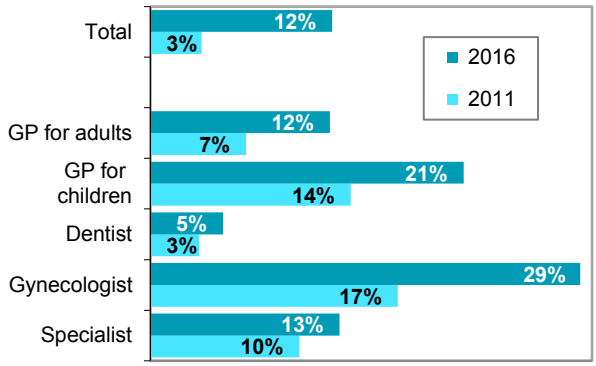
[65] Online consultation with a physician via website is one of the alternatives provided in order to seek freely available information on the internet. Individuals may ask questions via the physician's or the medical facility's website with respect to their health, followed by the physician's email response or in certain case by publishing the response on his or her website. Besides the possibility of online consultations, some physicians also provide the possibility to make appointments to examinations or medical procedures through an online form. Certain practices offer to their patients the possibility to ask for a repeated prescription issuance via the internet, in which case the patient receives an electronic prescription by email or by means of an SMS code that will provide the identification to the pharmacist.

Figure G3 Independent physicians in the Czech Republic with a website application for making online appointment by type of practice (%)*



Source: Institute of Health Information and Statisticsc, 2018

Figure G4 Independent physicians in the Czech Republic with a website application for making online consultation by type of practice (%)*



Source: Institute of Health Information and Statisticsc, 2018

* as a percentage of all independent physicians of a given practice

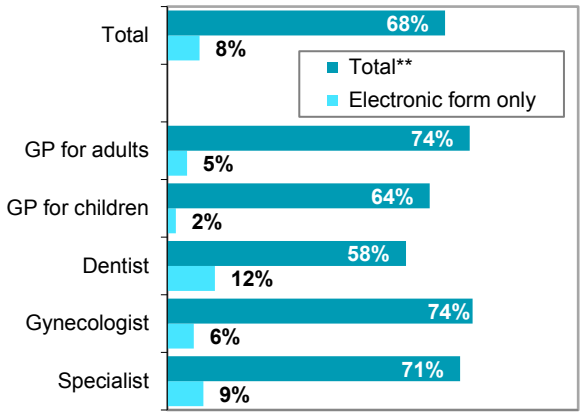
G.3 Keeping electronic health records

In the Czech Republic, a part of physicians keeps their records electronically in their computers and a part of them still keeps them in paper form written by hand or on a typewriter. Even if physicians keep their medical documentation electronically, they often receive results and reports from other physicians in paper form. Both methods of recording documents are most likely to be operating in parallel with each other, as the rewriting of existing paper records into the electronic version is not a desired task for many physicians[66].

- In 2016, health records were, at least partially, kept **electronically** on computers by 68% of independent physician's practices in the Czech Republic. These included the most frequently gynaecologists (74%), general practitioners (74%), and medical specialists (71%).
- A large part of practices, however, still keeps the documentation at least partially **in paper form** (91%), 31% of them uses this form exclusively. The situation is paradoxical with respect to dentists, who on one hand keep their documentation in paper form the most frequently out of all physicians (41%), but who on the other hand also keep their documentation exclusively electronically (12%). The paper form is the least frequently used by gynaecologists (25%).

[66] Health records form an important clinical document, they are used as information support created by teams of healthcare professionals, and serve for the transfer of information on patients and their medication between various team members who treat patients at various places or various times. However, health records serve not only as a work tool for treatment, but also as evidence of potential forensic investigation of a physician's treatment procedure. Health records may be kept in paper or electronic version, or alternatively physicians may combine the two means as required. Electronic health records are obtained, processed, stored, and mediated digitally by means of information technologies.

Figure G5 Independent physicians in the Czech Republic keeping health records electronically; 2016 (%)*

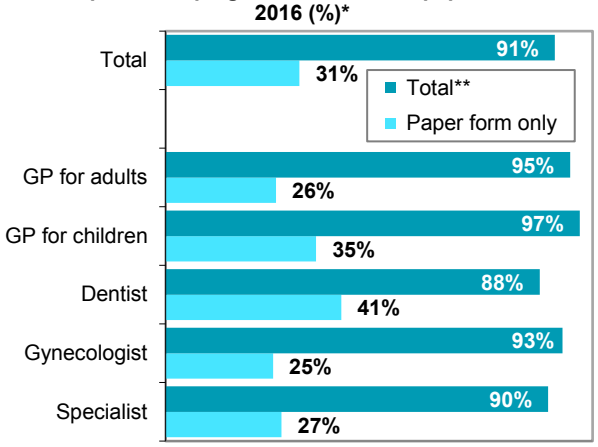


* as a percentage of all independent physicians of a given practice

** Includes independent physicians keeping at least part of health records (medical patient data) in electronic form on their computers or the internet

Source: Institute of Health Information and Statistics, 2018

Figure G6 Independent physicians in the Czech Republic keeping health records in paper form; 2016 (%)*



* as a percentage of all independent physicians of a given practice

** Includes independent physicians keeping at least part of health records (medical patient data) in paper form.

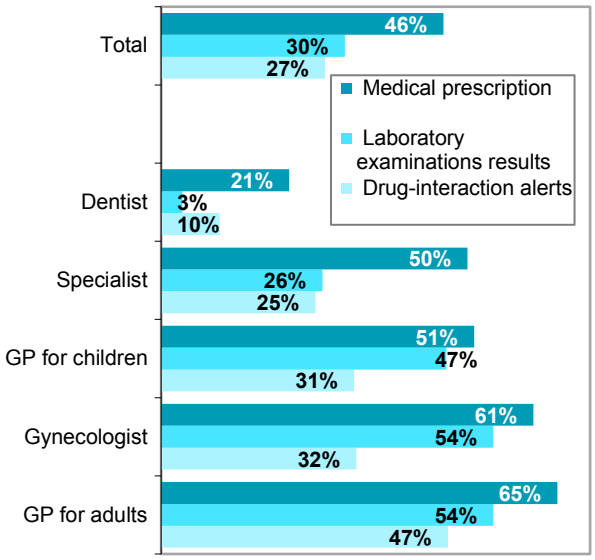
Source: Institute of Health Information and Statistics, 2018

G.4 Electronic information healthcare systems

In many aspects, electronic information healthcare systems may make the work of physicians much easier. Physicians may easily access laboratory test results, health records, medical images, or drug-related information. For instance, the electronic information healthcare system may inform the physician, by means of drug interaction alerts, whether or not the drugs, the physician is about to prescribe to the patient, interact with each other. Physicians may also get a statement of electronic records of all patients, within a monitored healthcare facility, monitoring a specific criterion.

- Physicians may use their information healthcare systems electronically (so called **e-systems**) for various activities. In 2016, nearly a half of all physicians in the Czech Republic (46%) used the systems to **prescribe drugs**; less than a third of physicians (30%) viewed the **laboratory examination** results in the e-systems. This was mainly done by gynaecologists and general practitioners (54%), as opposed to 3% of dentists. Nevertheless, this is a predictable result; similarly, to the case of prescriptions, dentists do not send their patients to as many laboratory examinations as other medical professionals.
- More than a quarter of physicians (27%) used the **drug interaction** alerts, by means of these systems, where the electronic system informed them, that the drug they were about to prescribe to the patient, may have negative interaction with other drugs, already being taken by the given patient. In practice, this function is the most frequently found with general practitioners (47%) and gynaecologists (32%), and the least frequently by dentists (solely 10%).

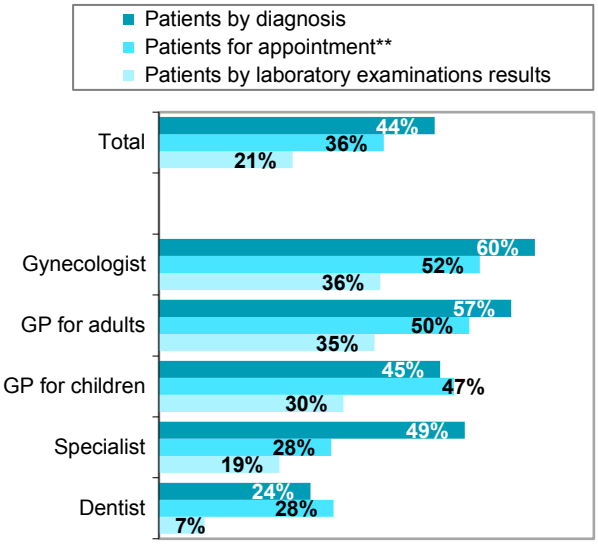
Figure G7 Independent physicians in the Czech Republic using selected functions of their electronic health systems; 2016 (%)*



* as a percentage of all independent physicians of a given practice

Source: Institute of Health Information and Statistics, 2018

Figure G8 Independent physicians in the Czech Republic with electronic health system enabling to generate selected patient records; 2016 (%)*



* as a percentage of all independent physicians of a given practice

** List of patients for general medical examination, tests etc.

Source: Institute of Health Information and Statistics, 2018

- Furthermore, within the healthcare e-systems, physicians are provided with **selected medical statements concerning their patients.** Nearly a half of all practices are provided with medical statements concerning the patients according to their diagnoses. By means of the e-systems, a third of practices may generate a list of patients, who might need to have a check-up, and a fifth of Czech practices may obtain a list of patients based on laboratory results. These selected medical statements are mostly available for gynaecologists and general practitioners. Paediatricians use the notification for which patients are expected to have a check-up, more frequently than other physicians.

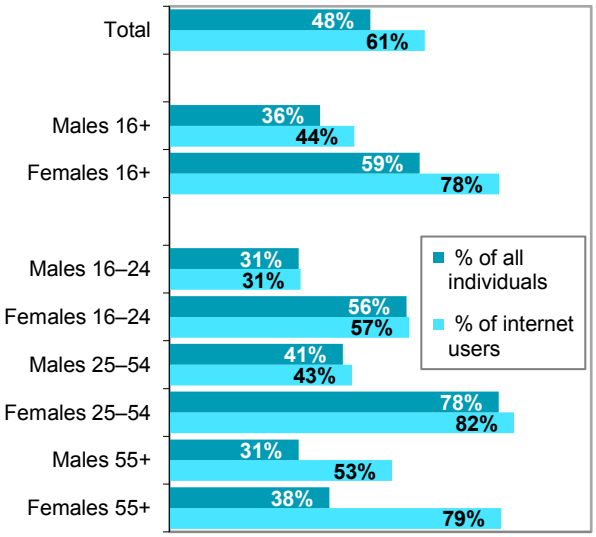
G.5 Internet usage by individuals with respect to health[67]

The internet has become a place, where people tend to seek help, when they are not feeling well. As the internet becomes more and more available, patients may quickly and easily access health-related information and consultations; individuals use the internet for information seeking with respect to diseases, treatment, diagnostics, prevention, health food, etc.

Health-related information seeking

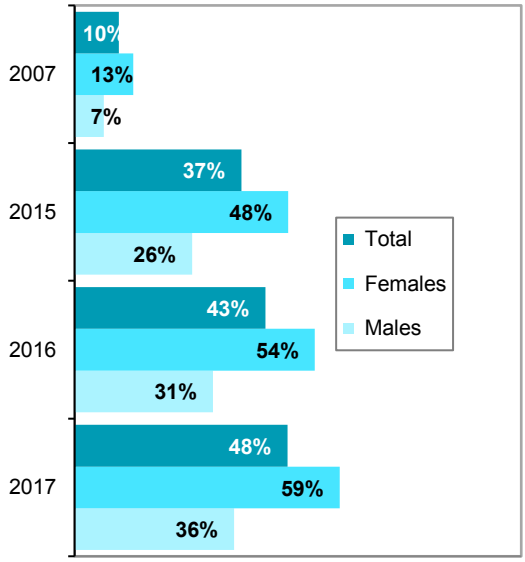
- In 2017, nearly a half (48%) of individuals aged 16+ (61% of internet users) used the internet, in order to **seek health-related information**. In comparison, in 2007, only a tenth (10%) of all individuals used the internet for these purposes.

Figure G9 Individuals in the Czech Republic using the internet for seeking health-related information; 2017 (%)



Source: Czech Statistical Office, ICT use survey in households, 2018

Figure G10 Individuals in the Czech Republic looking for health related information (%)

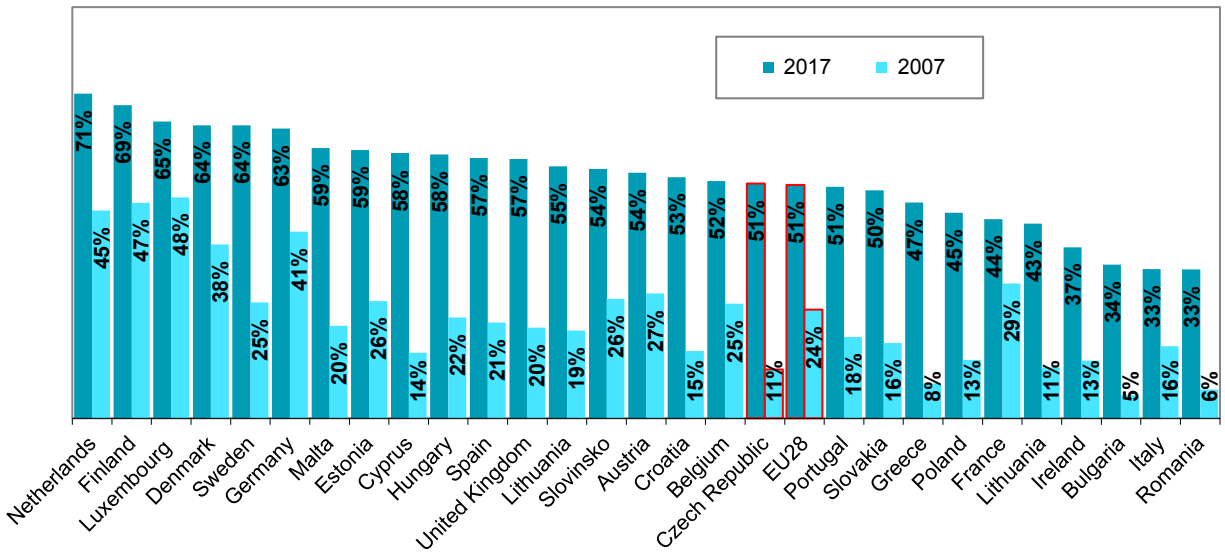


Source: Czech Statistical Office, ICT use survey in households, 2018

- **Women** seek out this kind of information significantly more than **men**. In 2017, nearly 60% of Czech women consulted their medical condition on the internet; the number of men was much lower, the internet was used solely by 36% of them for this purpose. Within the group of internet users, it is, in fact, 78% of women, but solely 44% of men.
- Health-related questions are most frequently asked by individuals aged 35–44 (62%). In contrast, the representatives of the two highest age groups **– aged 65–74 and over the age of 75 –** rarely tend to seek online advice (31% and solely 10%). Should we, however, focus solely on pensioners, who also belong among internet users, they are the most active ones (70% and 66%) out of all age groups, with respect to health-related information seeking.

[67] Data concerning the internet usage with respect to health by individuals is obtained from the Selective Survey on ICT usage in households (VŠIT). The survey is carried out by means of personal interviews with a survey sample of approx. 10 thousand individuals. The ascertained data is available to a wide range of demographic and social characteristics of persons living in the monitored households, such as sex, age, highest attained education, etc. Since 2006, the survey is carried out yearly in the 2nd quarter of the monitored year in all EU countries as a mandatory survey stipulated by the Regulation (EC) No. 808/2004 of the European Parliament and of the Council concerning Community statistics on the information society. For more details see Chapter C.

Figure G11 Individuals in EU countries looking for health related information via the internet (%)*

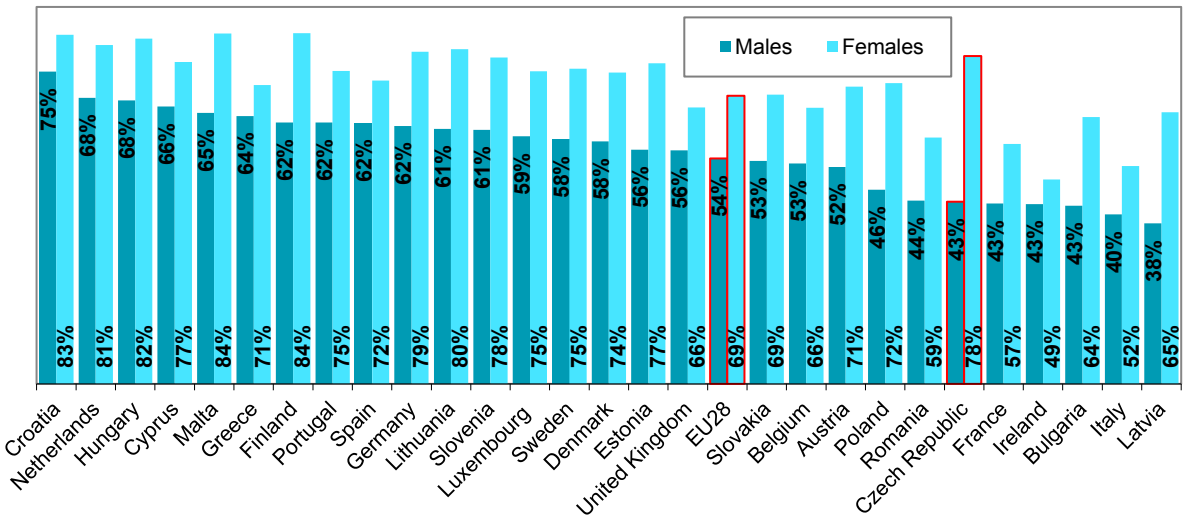


* as a percentage of all individuals aged 16 to 74 in a given country

Source: Eurostat 2018

- The seeking of health-related information, treatment, diagnostics, prevention, health food, etc. via the internet is not only common in the Czech Republic, but also abroad. In 2017, Czech citizens did not differ much from the rest of Europe, as the number of them was equal to the EU average, which formed 51% of inhabitants aged 16–74. In general, health-related information was mainly sought after by the inhabitants of the Netherlands, Luxembourg, Germany, and Scandinavia. Opposed to this, the lowest number was found in Bulgaria, Romania, and, surprisingly, Italy – in all of these cases, it was approximately a third of individuals.
- Among the internet users of all countries, health-related information seeking is dominated by women. Czech women seek health-related information over the internet even more frequently than the **EU average**. In this respect, Czech men stand below the European average. Seeking health-related information in the Czech Republic is very common with women on parental leave, and also by internet users aged 55–74, on the other hand, the age group 16–29 is below the EU average.

Figure G12 Internet users in EU countries using the internet for seeking health-related information by sex; 2017 (%)*



* as a percentage of all female and male internet users aged 16 to 74 in a given country

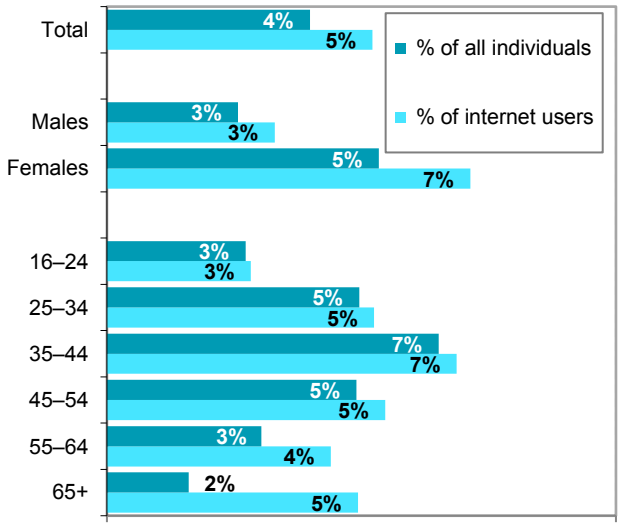
Source: Eurostat 2018

Using online consultation and appointment system with a physician

Not everyone trusts information freely available on the internet. A safer alternative to using information from the internet may be an online consultation with a physician or with a healthcare facility, through their websites. Using electronic services in healthcare could be as comfortable for individuals as it is, for instance, for online banking or e-shops.

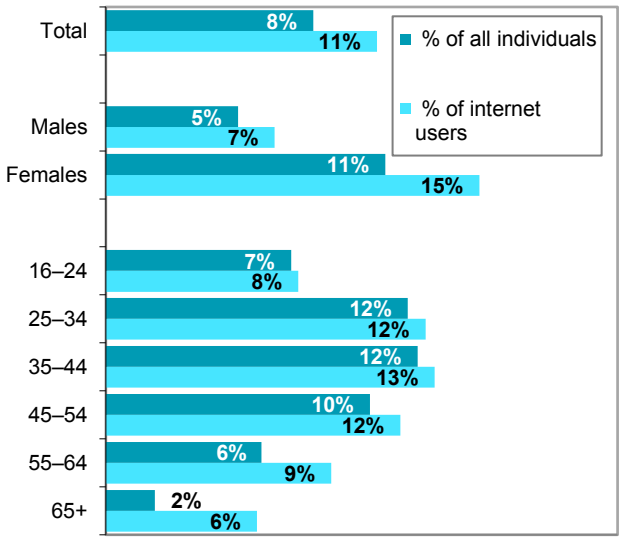
- In 2016, an **online consultation with a physician** was realised solely by 4% of adults in the Czech Republic. Similarly, to seeking health-related information on the internet, the possibility to make an online consultation was also used more frequently by women than men (5.3% of women and 2.6% of men within the population; 7.1% and 3.3% among internet users).
- With respect to the age group division, the leading one is the age group 35–44 (6.5% or 6.9% among internet users) followed by the 45–54 age group). Opposed to this, the possibility to make an online consultation was the least used by individuals over the age of 65 (solely 1.6%), and those under the age of 24 (2.7%), where the percentage is the lowest, even if we solely consider internet users (2.8%). When comparing graphs G9 and G13, it is evident, that older people, who are also internet users, may be actively seeking freely available information, however, they rarely use the possibility of a formal consultation with a professional.

Figure G13 Individuals in the Czech Republic, who consulted a practitioner online via the website application; 2016 (%)



Source: Czech Statistical Office, ICT use survey in households, 2018

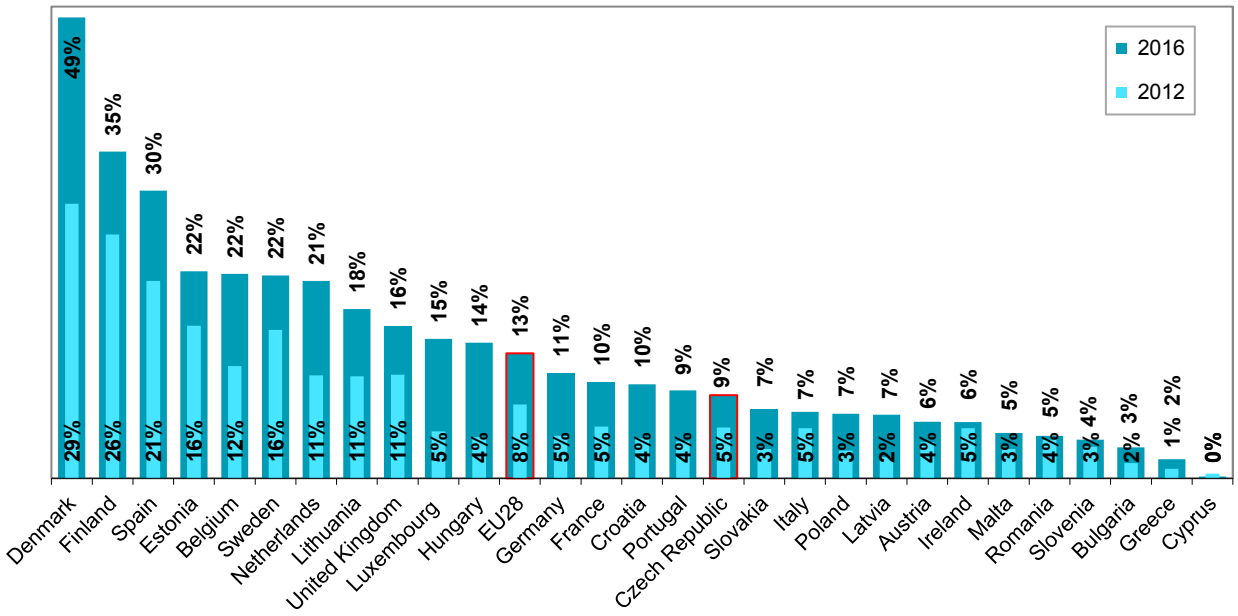
Figure G14 Individuals in the Czech Republic, who made an online appointment with a practitioner via the website application; 2016



Source: Czech Statistical Office, ICT use survey in households, 2018

- The possibility to make an **online appointment with a physician via website** from the comfort of one's home may present a pleasant benefit. In 2016, this option was used by 8% of individuals over the age of 16 in the Czech Republic. The results of individual socio-demographic groups are similar to the ones concerning online consultations. They are realised by women more frequently, especially the ones on parental leave.

Figure G15 Individuals in EU countries, who made an online appointment with a practitioner via the website application (%)*



* as a percentage of all individuals aged 16 to 74 in a given country

Source: Eurostat 2018

- With respect to making online appointments with a physician, the Czech Republic stands below the **EU28** average, which is 13%. The most active ones, in this respect, were the citizens of Denmark (49%); a little less active were the citizens of Finland (35%) and Spain (30%). Opposed to this, Cyprus (0.2%), Greece (2%), and Bulgaria (3%) belong among the countries recording the lowest percentage of internet usage for making online appointments with a physician. Also, in these countries, the percentage of individuals making online appointments has not grown much, in comparison with the year 2012; opposed to this, the usage in Denmark has increased by 20%.

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