

C ICT research and development

Research and experimental development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new applications of available knowledge. **Research** is original investigation undertaken to acquire new knowledge; **Experimental development** builds upon research to produce new or improved products or processes.

Data for this chapter comes from the results of the **Czech annual questionnaire on research and development**, which includes questions on human and financial resources determined for R&D activities realized on the territory of the Czech Republic. The statistical survey fully complies with methodological principles of the EU and the OECD mentioned in the Frascati Manual (OECD, Paris 2015) and Commission Implementing Regulation (EU) No 995/2012.

Further information on the **Czech R&D statistics** can be found at: https://www.czso.cz/csu/czso/vysledky_vyzkumu_a_vyvoje

Expenditures on R&D in ICT products

This sub-chapter presents data on the total **financial resources invested in research and development in ICT equipment and software (ICT products)** in the Czech Republic regardless of main economic activity and sector of R&D performers.

ICT products are classified into two main categories based on the following CPA divisions and groups:

- **ICT equipment** (CZ-CPA 261-4 a 268)
- **Software** (CZ-CPA 62)

Software-related activities of a routine nature which do not involve scientific and/or technological advances or resolution of technological uncertainties are not to be included in R&D.

Data on expenditures related to the research and development in ICT equipment and software (**ICT R&D expenditures**) are based on the results of the special module that is included in the **Czech annual questionnaire on research and development**.

International comparison is not available for this data set.

R&D expenditures and personnel in the ICT sector

This sub-chapter focuses on R&D expenditures and R&D personnel in enterprises with the main economic activity that belongs to the **ICT sector**. In general, the term ICT sector includes both: **ICT manufacturing** and **ICT services** which are associated with the production and/or distribution of information and communication technologies (ICT) and a provision of related services.

ICT sector is divided into the **two main categories**: ICT manufacturing and ICT services. **For more information see Chapter E ICT sector.**

Data on Business R&D expenditure and R&D personnel in the ICT sector have less predictive value than the figures for the total ICT R&D expenditures included in first sub-chapter. Enterprises within the ICT sector can perform their R&D activities in areas other than ICT and vice versa enterprises outside the ICT sector can exercise their R&D activities in the ICT field.

Data for international comparisons refer to the reported or nearest available year.

Further information on ICT sector can be found at (only in Czech):

<https://www.czso.cz/csu/czso/odvetvi-informacni-ekonomiky>

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Table C1 R&D expenditures in ICT in Czechia

CZK million

	2016	2017	2018
Total	12 477	15 448	18 720
financed from government funds	1 579	1 452	1 924
Type of ICT product			
ICT equipment	4 295	5 024	5 594
Software	8 182	10 424	13 125
Type of R&D performer			
Enterprises, total	11 234	14 330	17 101
National enterprises	3 601	4 510	5 203
Foreign-controlled enterprises	7 632	9 820	11 898
Public universities	1 193	1 060	1 535
Other R&D performers	50	58	84

Figure C1 R&D expenditures in ICT

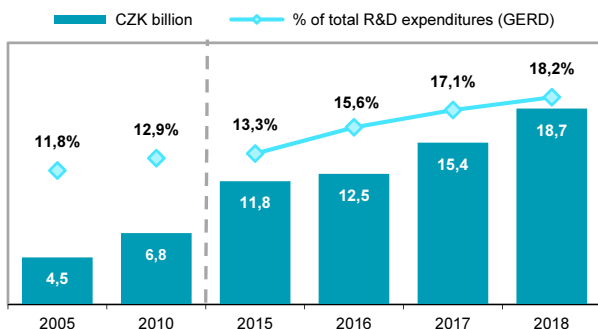


Figure C2 R&D expenditures in ICT, by type of product

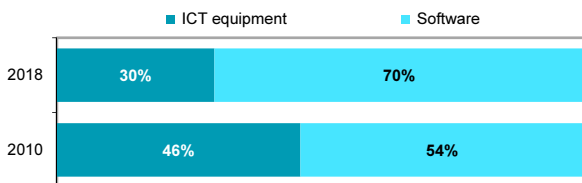
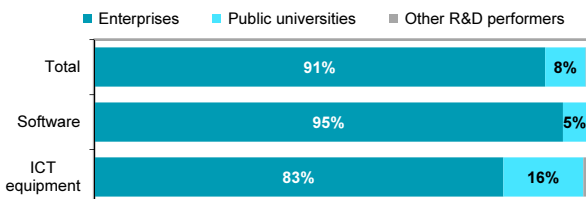


Figure C3 R&D expenditures in ICT, by type of performer; 2018



Source: CZSO, Annual R&D survey

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Table C2 R&D expenditures in software in Czechia

CZK million

	2016	2017	2018
Total	8 182	10 424	13 125
financed from government funds	425	489	751
Type of R&D performer			
Enterprises, total	7 830	10 029	12 464
National enterprises	2 213	2 899	3 597
Foreign-controlled enterprises	5 617	7 130	8 867
Public universities	327	367	630
Other R&D performers	24	27	32

Figure C4 R&D expenditures in software

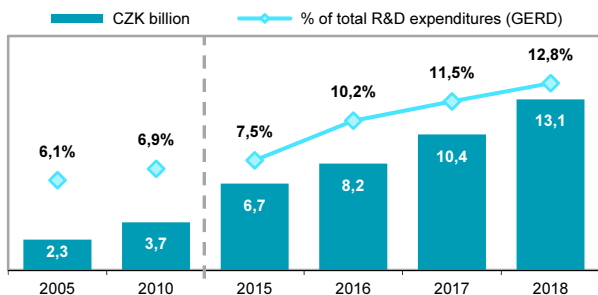


Figure C5 Software R&D expenditures, by performer; 2018

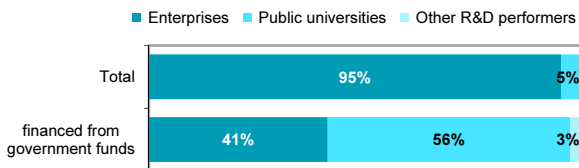
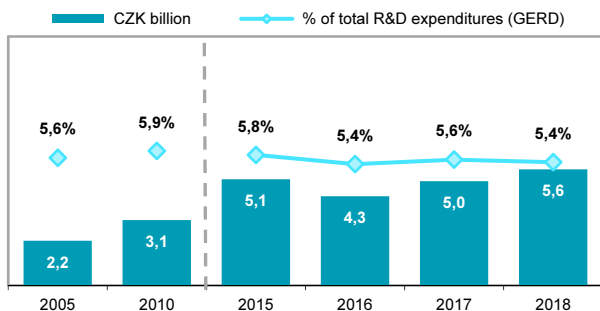


Figure C6 R&D expenditures in ICT equipment



Source: CZSO, Annual R&D survey

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Table C3 Business R&D expenditures in ICT in Czechia

CZK million

	2016	2017	2018
Total	11 234	14 330	17 101
financed from government funds	531	646	861
Type of ICT product			
ICT equipment	3 403	4 301	4 637
Software	7 830	10 029	12 464
Enterprise size group			
Small (0-49 employees)	1 260	1 480	1 674
Medium (50-249 employees)	2 691	3 899	3 677
Large (250+ employees)	7 283	8 952	11 749
Ownership of enterprises			
National enterprises	3 601	4 510	5 203
Foreign-controlled enterprises	7 632	9 820	11 898
Industry of enterprises (CZ-NACE)			
ICT sector industries, total	8 135	10 035	12 644
ICT manufacturing (261-264)	262	245	295
Telecommunications (61)	672	724	794
IT services (465+582+62+631+951)	7 202	9 066	11 555
Other industries	3 098	4 296	4 457

Figure C7 Business R&D expenditures in ICT

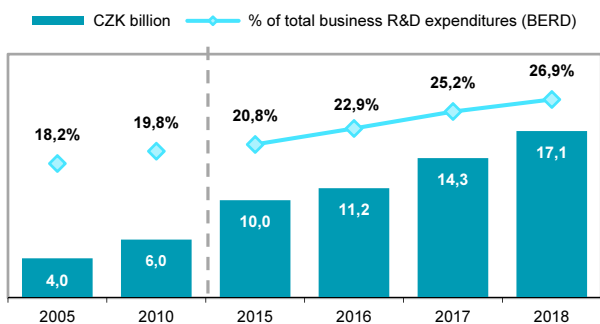
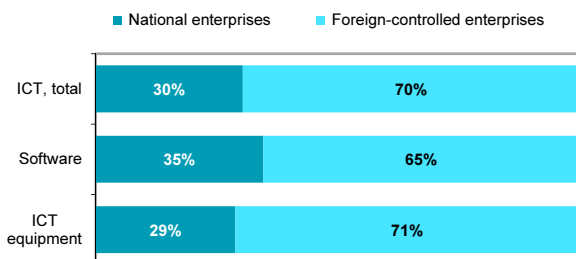


Figure C8 Business R&D expend. in ICT, by ownership; 2018



Source: CZSO, Annual R&D survey

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Table C4 Business R&D expenditures in ICT in Czechia; 2018

CZK million

	Total	ICT equipment	Software
Total	17 101	4 637	12 464
financed from government funds	861	551	310
Enterprise size group			
Small (0-49 employees)	1 674	455	1 220
Medium (50-249 employees)	3 677	875	2 802
Large (250+ employees)	11 749	3 307	8 442
Ownership of enterprises			
National enterprises	5 203	1 606	3 597
Foreign-controlled enterprises	11 898	3 031	8 867
Industry of enterprises (CZ-NACE)			
ICT sector industries, total	12 644	1 802	10 842
ICT manufacturing (261-264)	295	181	114
Telecommunications (61)	794	411	383
IT services (465+582+62+631+951)	11 555	1 210	10 345
Other industries	4 457	2 835	1 622

Figure C9 Business R&D expenditures in ICT, by type of product

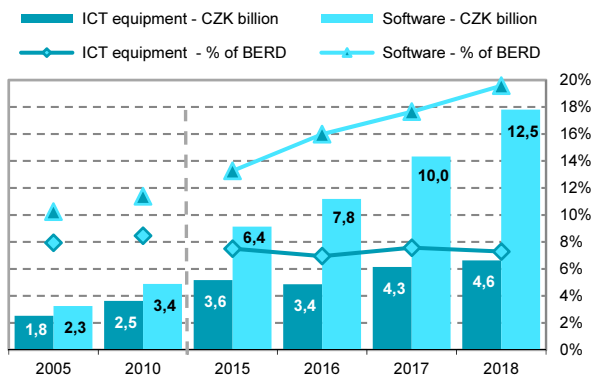
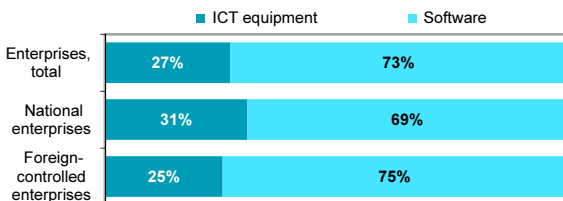


Figure C10 Business R&D expenditures in ICT, by type of product and ownership of enterprises; 2018



Source: CZSO, Annual R&D survey

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Table C5 R&D expenditures in the ICT sector in Czechia

CZK million

	2016	2017	2018
Total	9 421	11 190	13 495
financed from government funds	652	886	1 066
Type of product			
ICT equipment	1 538	1 712	1 802
Software	6 597	8 322	10 842
Other non ICT related products	1 285	1 155	851
Enterprise size group			
Small (0-49 employees)	1 147	1 439	1 568
Medium (50-249 employees)	2 391	3 768	3 187
Large (250+ employees)	5 883	5 982	8 740
Ownership of enterprises			
National enterprises	2 929	3 800	4 306
Foreign-controlled enterprises	6 491	7 390	9 189
Industry of enterprises (CZ-NACE)			
ICT manufacturing (261-264)	532	512	591
ICT services, total	8 889	10 677	12 903
Telecommunications (61)	685	727	801
Computer programming (582+6201)	6 534	8 017	10 052
Data processing and hosting (631)	938	1 252	1 101
Other IT services (465+951+62 without 6201)	731	682	949

Figure C11 R&D expenditures in the ICT sector industries

■ ICT manufact. - CZK billion ■ ICT services - CZK billion
◆ ICT manufact. - % of BERD ◆ ICT services - % of BERD

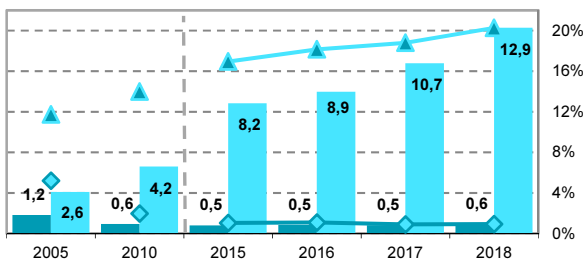
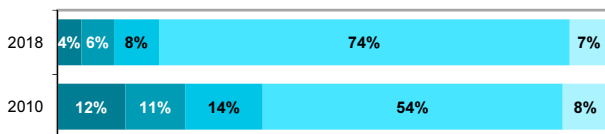


Figure C12 R&D expenditures in the ICT sector, by industry

■ ICT manufacturing ■ Telecommunications
■ Data processing and hosting ■ Computer programming
■ Other IT services



Source: CZSO, Annual R&D survey

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**Figure C13 R&D expenditures in the ICT sector; 2017
(% of GDP)**

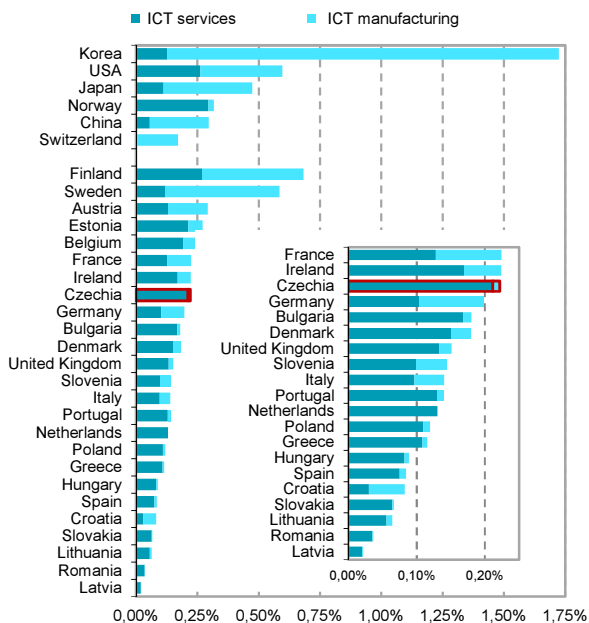
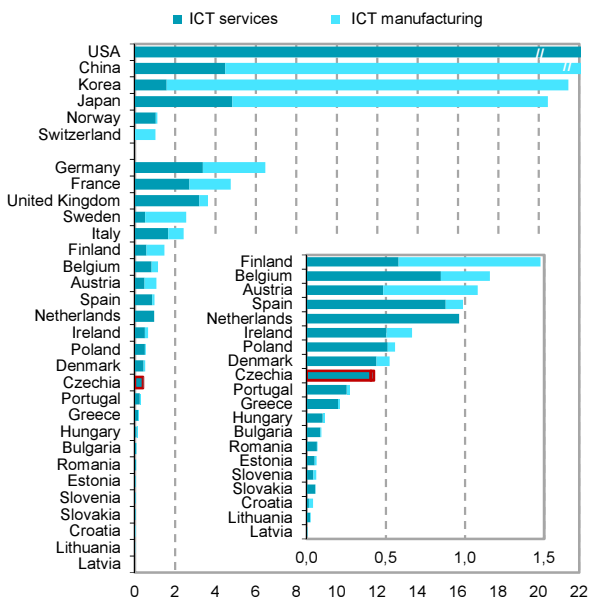


Figure C14 R&D expenditures in the ICT sector; 2017 (bilion €)



Source: CZSO calculations based on Eurostat and OECD data

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Table C6 R&D personnel in the ICT sector in Czechia

R&D personnel (Full Time Equivalent Numbers - FTE)

	2016	2017	2018
Total	8 339	9 130	10 196
By occupation			
Researchers	5 300	5 828	6 378
Technicians and equivalent staff	2 323	2 477	3 062
Other supporting and administrative staff	716	825	756
Enterprise size group			
Small (0-49 employees)	1 470	1 709	1 857
Medium (50-249 employees)	2 408	3 214	2 891
Large (250+ employees)	4 462	4 207	5 449
Ownership of enterprises			
National enterprises	3 213	4 094	4 428
Foreign-controlled enterprises	5 126	5 037	5 768
Industry of enterprises (CZ-NACE)			
ICT manufacturing (261-264)	546	553	623
ICT services, total	7 793	8 578	9 573
Telecommunications (61)	210	234	352
Computer programming (582+6201)	5 923	6 629	7 489
Data processing and hosting (631)	888	967	852
Other IT services (465+951+62 without 6201)	771	746	880

Figure C15 R&D personnel in the ICT sector industries

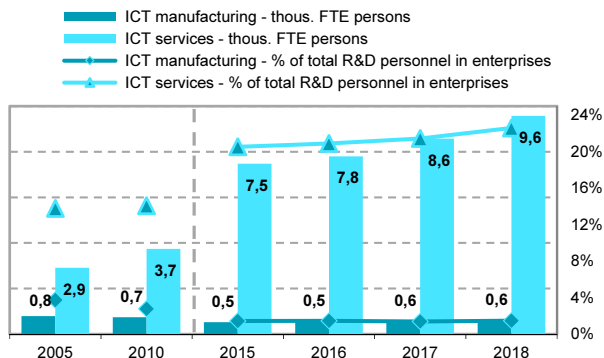
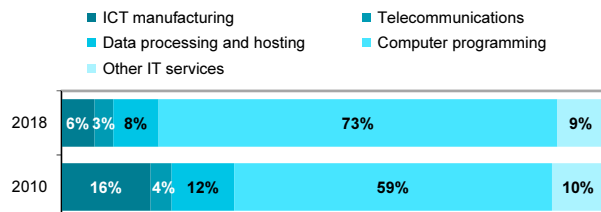


Figure C16 R&D personnel in the ICT sector, by industry



Source: CZSO, Annual R&D survey