

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

C. 1 Expenditures on R&D of ICT products

This sub-chapter presents data on the total **financial resources invested in research and development of 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 of 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.

C. 2 R&D expenditures and personnel in the ICT sector industries

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 industries** 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 R&D expenditure (BERD) and R&D personnel in 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.

Further information on ICT sector can be found at (only in Czech): <https://www.czso.cz/csu/czso/odvetvi-informacni-ekonomiky>

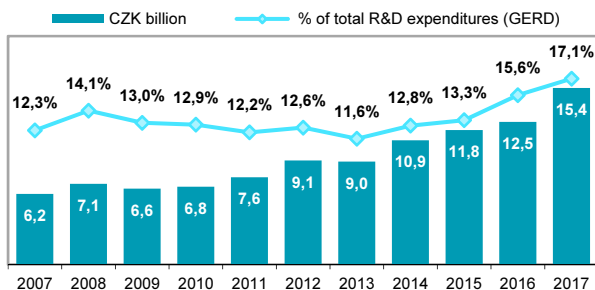
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Table C1 Total ICT R&D expenditures in the Czech Republic

CZK million

	2015	2016	2017
Total	11 763	12 477	15 448
financed from government funds	1 742	1 579	1 452
ICT products for which R&D is carried out			
ICT equipment	5 112	4 295	5 024
Software	6 651	8 182	10 424
Type of R&D performers			
Enterprises, total	10 000	11 234	14 330
National enterprises	3 600	3 601	4 510
Foreign-controlled enterprises	6 400	7 632	9 820
Public universities	1 704	1 190	1 052
Other R&D performers	59	53	65

Figure C1 Total ICT R&D expenditures



GERD - Gross Domestic Expenditure on Research and Development

Figure C2 ICT R&D expenditures by type of ICT products

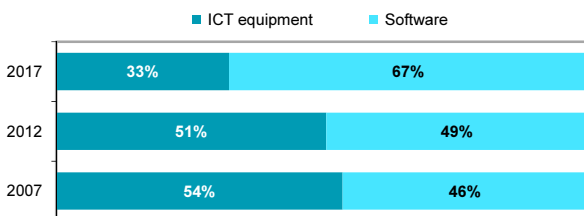
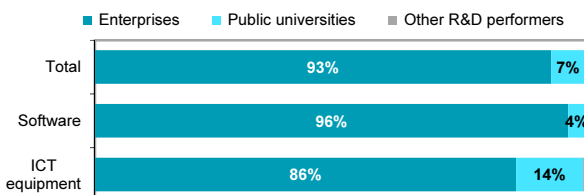


Figure C3 ICT R&D expenditures by R&D performers; 2017



Source: CZSO, Annual R&D survey

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Table C2 Software R&D expenditures in the Czech Republic

CZK million

	2015	2016	2017
Total	6 651	8 182	10 424
financed from government funds	400	425	489
Type of R&D performers			
Enterprises, total	6 388	7 830	10 029
National enterprises	2 086	2 213	2 899
Foreign-controlled enterprises	4 302	5 617	7 130
Public universities	222	326	367
Other R&D performers	41	26	28

Figure C4 Software R&D expenditures

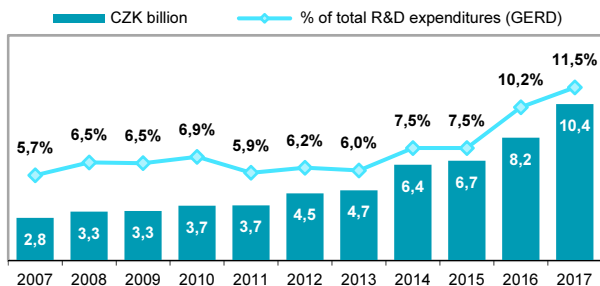


Figure C5 Software R&D expenditures by R&D performers; 2017

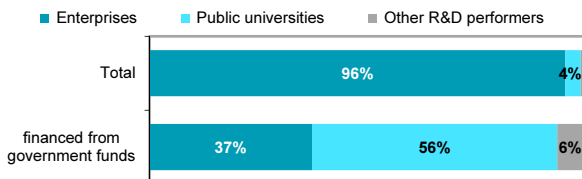
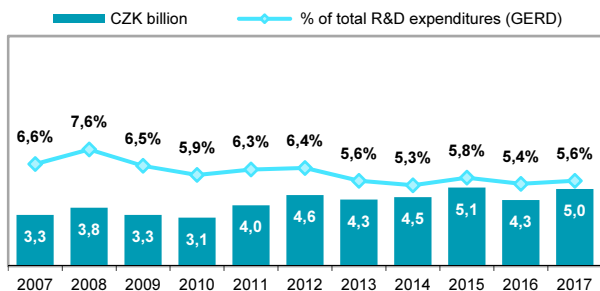


Figure C6 ICT equipment R&D expenditures



GERD - Gross Domestic Expenditure on Research and Development

Source: CZSO, Annual R&D survey

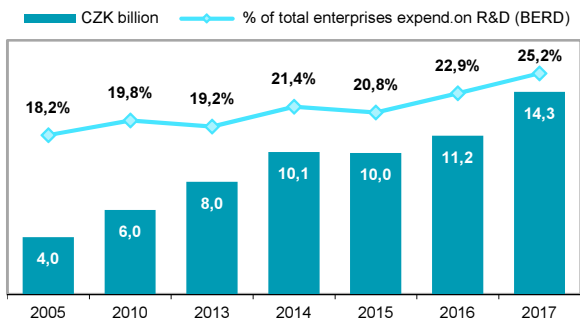
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Tab. C3 ICT R&D expenditures of enterprises in the Czech Rep.

CZK million

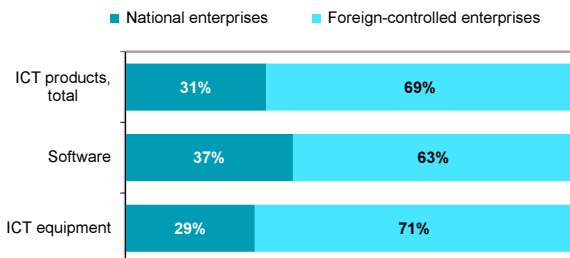
	2015	2016	2017
Total	10 000	11 234	14 330
financed from government funds	789	531	646
ICT products for which R&D is carried out			
ICT equipment	3 612	3 403	4 301
Software	6 388	7 830	10 029
Enterprise size group			
Small (0-49 employees)	1 169	1 260	1 480
Medium (50-249 employees)	3 416	2 691	3 899
Large (250+ employees)	5 415	7 283	8 952
Ownership of enterprises			
National enterprises	3 600	3 601	4 510
Foreign-controlled enterprises	6 400	7 632	9 820
Main economic activity of enterprises (CZ-NACE)			
ICT sector industries, total	7 302	8 132	10 025
ICT manufacturing (261-264)	167	262	245
Telecommunications (61)	622	668	714
IT services (465+582+62+631+951)	6 514	7 202	9 066
Other industries	2 698	3 102	4 305

Figure C7 ICT R&D expenditures of enterprises



BERD - Total intramural R&D expenditure in the business enterprise sector

Figure C8 ICT R&D expend. by ownership of enterprises; 2017



Source: CZSO, Annual R&D survey

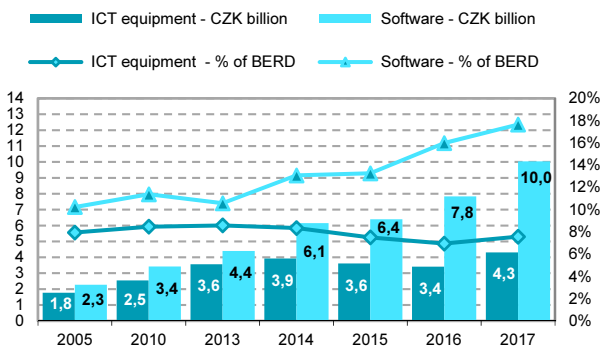
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Table C4 ICT R&D expenditures of enterprises in the Czech Republic by type of ICT products; 2017

CZK million

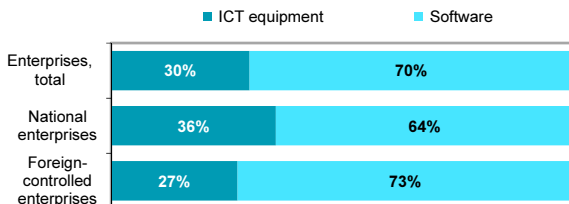
	Total	ICT equipment	Software
Total	14 330	4 301	10 029
financed from government funds	646	454	192
Enterprise size group			
Small (0-49 employees)	1 480	412	1 067
Medium (50-249 employees)	3 899	798	3 100
Large (250+ employees)	8 952	3 091	5 861
Ownership of enterprises			
National enterprises	4 510	1 610	2 899
Foreign-controlled enterprises	9 820	2 691	7 130
Main economic activity of enterprises (CZ-NACE)			
ICT sector industries, total	10 025	1 709	8 316
ICT manufacturing (261-264)	245	152	93
Telecommunications (61)	714	414	301
IT services (465+582+62+631+951)	9 066	1 144	7 922
Other industries	4 305	2 592	1 713

Figure C9 ICT R&D expenditures of enterprises by type of ICT products



BERD - Total intramural R&D expenditure in the business enterprise sector

Figure C10 ICT R&D expenditures by type of ICT products and ownership of enterprises; 2017



Source: CZSO, Annual R&D survey

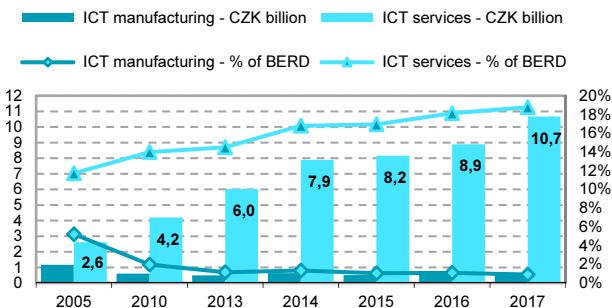
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Table C5 R&D expenditures in the ICT sector in the Czech Rep.

CZK million

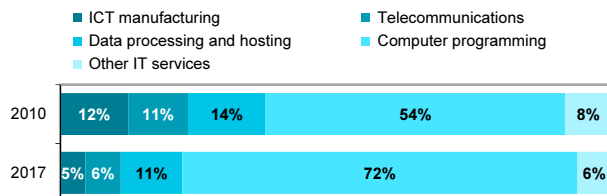
	2015	2016	2017
Total	8 659	9 417	11 180
financed from government funds	1 052	655	888
Products for which R&D is carried out			
ICT equipment	1 886	1 538	1 709
Software	5 416	6 594	8 316
Other non ICT related products	1 357	1 285	1 155
Enterprise size group			
Small (0-49 employees)	1 065	1 144	1 430
Medium (50-249 employees)	3 491	2 391	3 768
Large (250+ employees)	4 103	5 883	5 982
Ownership of enterprises			
National enterprises	3 095	2 926	3 790
Foreign-controlled enterprises	5 564	6 491	7 390
Main economic activity of enterprises (CZ-NACE)			
ICT manufacturing (261-264)	500	532	512
ICT services, total	8 159	8 885	10 668
Telecommunications (61)	630	682	717
Computer programming (582+6201)	5 643	6 534	8 017
Data processing and hosting (631)	1 080	938	1 252
Other IT services (465+951+62 without 6201)	806	731	682

Figure C11 R&D expenditures in the ICT sector



BERD - Total intramural R&D expenditure in the business enterprise sector

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



Source: CZSO, Annual R&D survey

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Figure C13 R&D expenditures in the ICT sector; 2015*
(% of GDP)

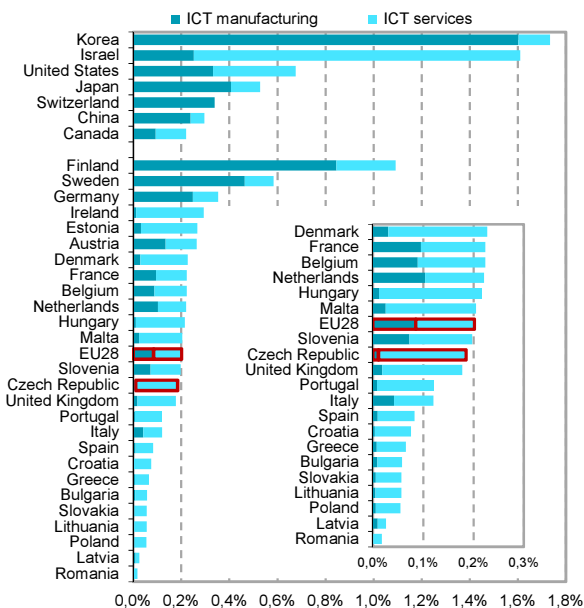
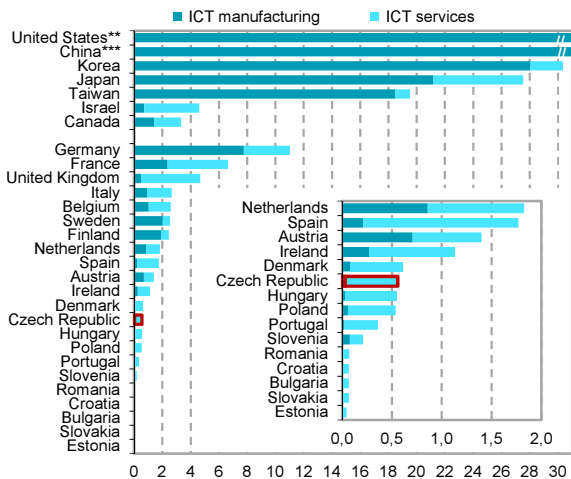


Figure C14 R&D expenditures in the ICT sector; 2015*
(USD billion PPP)



* or the latest year available

** United States: ICT manufacturing 57,9 , ICT services 59,9 USD billion PPP

*** China: ICT manufacturing 40,8 , ICT services 9,5 USD billion PPP

Source: CZSO calculations based on Eurostat and OECD data, 2018

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Table C6 R&D personnel in the ICT sector in the Czech Republic

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

	2015	2016	2017
Total	7 988	8 329	9 116
By occupation			
Researchers	4 829	5 291	5 816
Technicians and equivalent staff	2 637	2 323	2 476
Other supporting and administrative staff	522	715	825
Enterprise size group			
Small (0-49 employees)	1 356	1 459	1 696
Medium (50-249 employees)	3 062	2 408	3 214
Large (250+ employees)	3 570	4 462	4 207
Ownership of enterprises			
National enterprises	3 202	3 203	4 080
Foreign-controlled enterprises	4 786	5 126	5 037
Main economic activity of enterprises (CZ-NACE)			
ICT manufacturing (261-264)	523	546	553
ICT services, total	7 465	7 783	8 564
Telecommunications (61)	197	200	220
Computer programming (582+6201)	5 434	5 923	6 629
Data processing and hosting (631)	762	888	967
Other IT services (465+951+62 without 6201)	1 072	771	746

Figure C15 R&D personnel in the ICT sector industries

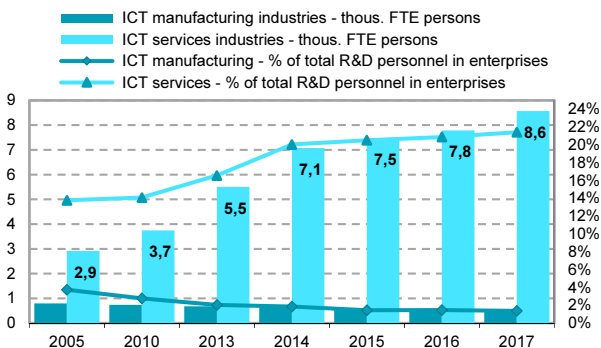
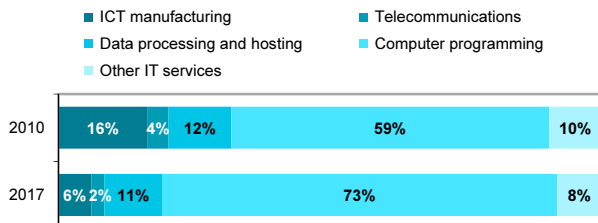


Figure C16 R&D personnel in the ICT sector by industry



Source: CZSO, Annual R&D survey