

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>

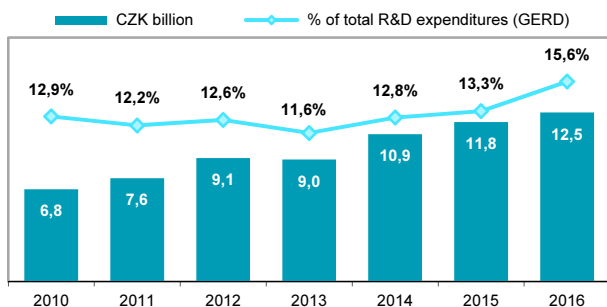
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Table C1 Total ICT R&D expenditures in the Czech Republic

CZK million

	2014	2015	2016
Total	10 868	11 763	12 477
financed from government funds	1 491	1 742	1 579
ICT products for which R&D is carried out			
ICT equipment	4 483	5 112	4 295
Software	6 385	6 651	8 182
Type of R&D performers			
Enterprises, total	10 066	10 000	11 234
National enterprises	4 330	3 600	3 601
Foreign-controlled enterprises	5 736	6 400	7 632
Public universities	759	1 704	1 190
Other R&D performers	42	59	53

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

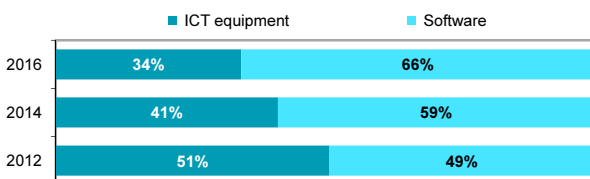
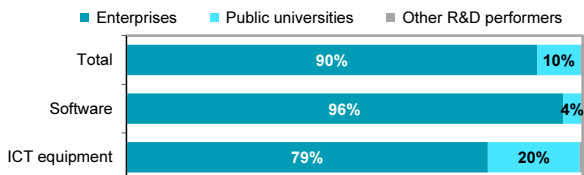


Figure C3 ICT R&D expenditures by R&D performers; 2016



Source: CZSO, Annual R&D survey

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Table C2 Software R&D expenditures in the Czech Republic

CZK million

	2014	2015	2016
Total	6 385	6 651	8 182
financed from government funds	337	400	425
Type of R&D performers			
Enterprises, total	6 146	6 388	7 830
National enterprises	2 438	2 086	2 213
Foreign-controlled enterprises	3 708	4 302	5 617
Public universities	219	222	326
Other R&D performers	20	41	26

Figure C4 Software R&D expenditures

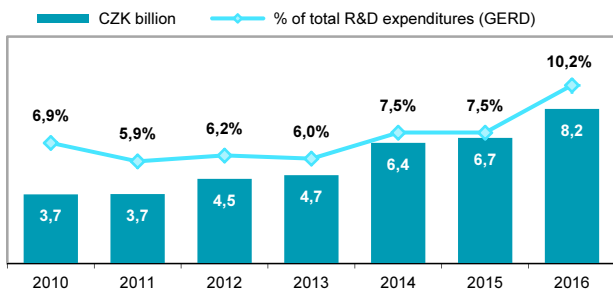


Figure C5 Software R&D expenditures by R&D performers; 2016

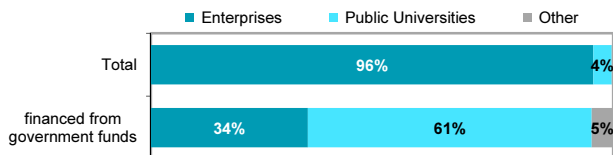
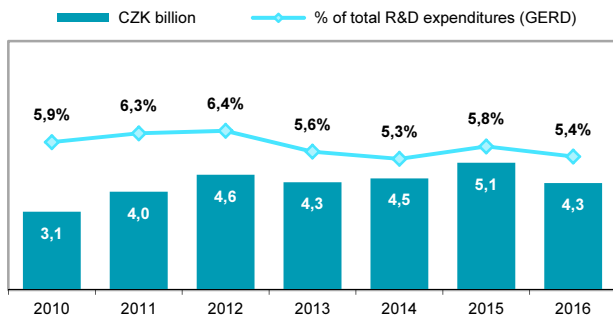


Figure C6 ICT equipment R&D expenditures



GERD - Gross Domestic Expenditure on Research and Development

Source: CZSO, Annual R&D survey

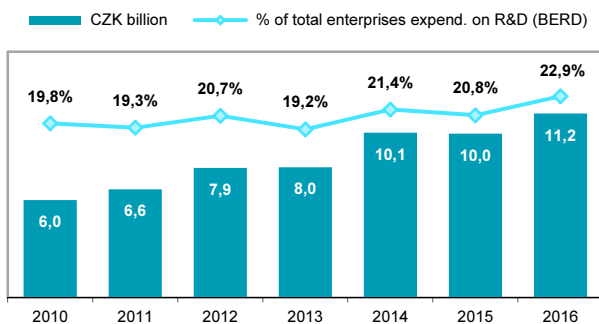
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Table C3 ICT R&D expenditures of enterprises in the Czech Rep.

CZK million

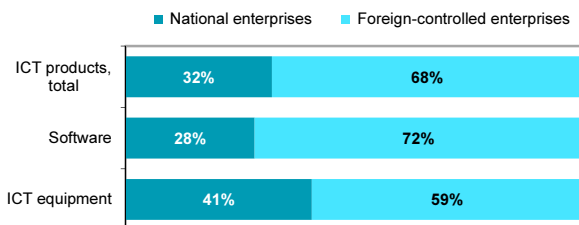
	2014	2015	2016
Total	10 066	10 000	11 234
financed from government funds	951	789	531
ICT products for which R&D is carried out			
ICT equipment	3 921	3 612	3 403
Software	6 146	6 388	7 830
Enterprise size group			
Small (0-49 employees)	1 445	1 169	1 260
Medium (50-249 employees)	3 923	3 416	2 691
Large (250+ employees)	4 698	5 415	7 283
Ownership of enterprises			
National enterprises	4 330	3 600	3 601
Foreign-controlled enterprises	5 736	6 400	7 632
Main economic activity of enterprises (CZ-NACE)			
ICT sector industries, total	7 585	7 304	8 135
ICT manufacturing (261-264)	271	167	262
Telecommunications (61)	603	624	672
IT services (465+582+62+631+951)	6 711	6 514	7 202
Other industries	2 481	2 696	3 098

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; 2016



Source: CZSO, Annual R&D survey

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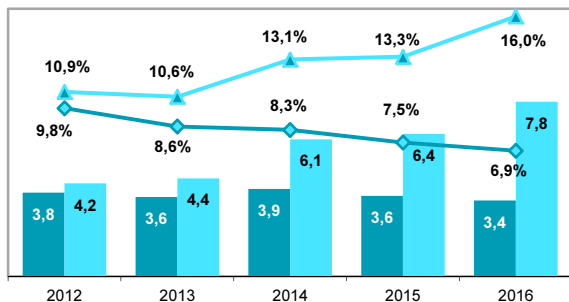
Table C4 ICT R&D expenditures of enterprises in the Czech Republic by type of ICT products; 2016

CZK million

	Total	ICT equipment	Software
Total	11 234	3 403	7 830
financed from government funds	531	386	144
Enterprise size group			
Small (0-49 employees)	1 260	363	897
Medium (50-249 employees)	2 691	719	1 972
Large (250+ employees)	7 283	2 321	4 962
Ownership of enterprises			
National enterprises	3 601	1 388	2 213
Foreign-controlled enterprises	7 632	2 015	5 617
Main economic activity of enterprises (CZ-NACE)			
ICT sector industries, total	8 135	1 538	6 597
ICT manufacturing (261-264)	262	171	91
Telecommunications (61)	672	438	234
IT services (465+582+62+631+951)	7 202	929	6 272
Other industries	3 098	1 865	1 233

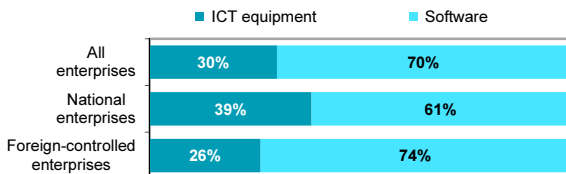
Figure C9 ICT R&D expenditures of enterprises by type of ICT products

■ ICT equipment - CZK billion ■ Software - CZK billion
◆ ICT equipment - % of BERD ◆ Software - % of BERD



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; 2016



Source: CZSO, Annual R&D survey

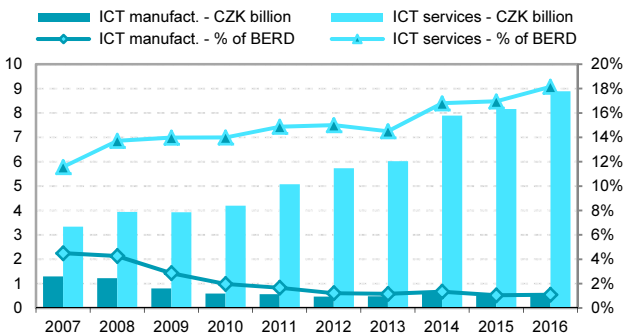
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Table C5 R&D expenditures in the ICT sector in the Czech Rep.

CZK million

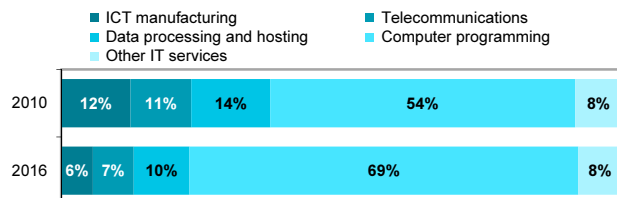
	2014	2015	2016
Total	8 515	8 659	9 421
financed from government funds	1 099	1 052	655
Products for which R&D is carried out			
ICT equipment	2 306	1 886	1 538
Software	5 279	5 416	6 597
Other non ICT related products	930	1 357	1 285
Enterprise size group			
Small (0-49 employees)	1 259	1 065	1 147
Medium (50-249 employees)	3 312	3 491	2 391
Large (250+ employees)	3 943	4 103	5 883
Ownership of enterprises			
National enterprises	3 706	3 095	2 929
Foreign-controlled enterprises	4 809	5 564	6 491
Main economic activity of enterprises (CZ-NACE)			
ICT manufacturing (261-264)	625	500	532
ICT services, total	7 889	8 159	8 889
Telecommunications (61)	603	630	685
Computer programming (582+6201)	4 879	5 643	6 534
Data processing and hosting (631)	1 580	1 080	938
Other IT services (465+951+62 without 6201)	827	806	731

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)

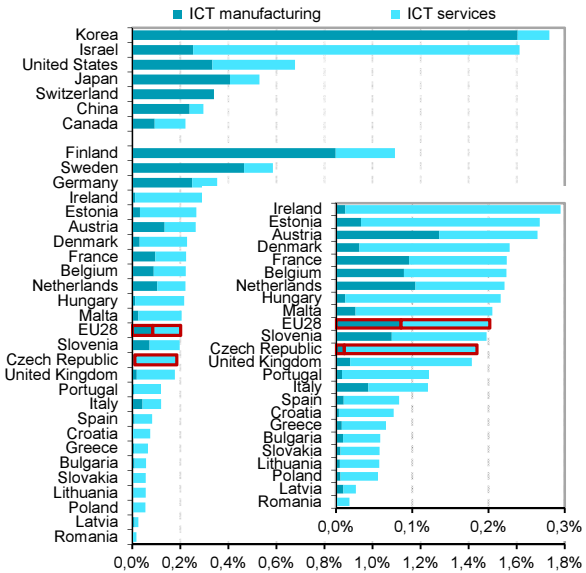
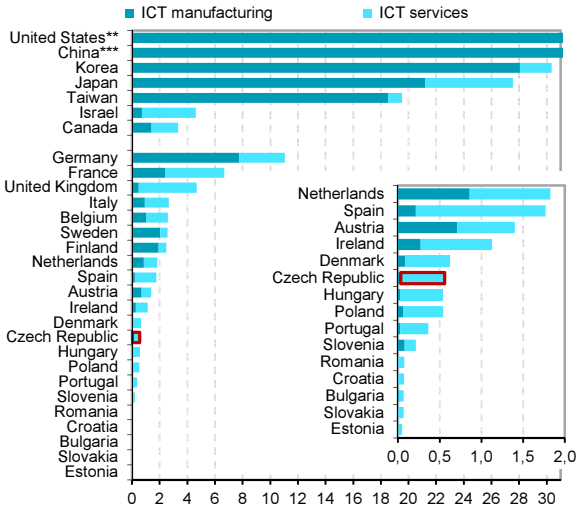


Figure C14 R&D expenditures in the ICT sector; 2015*
(USD billion PPP)



* 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, 2017

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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)

	2014	2015	2016
Total	7 725	7 988	8 339
By occupation			
Researchers	4 480	4 829	5 300
Technicians and equivalent staff	2 648	2 637	2 323
Other supporting and administrative staff	597	522	716
Enterprise size group			
Small (0-49 employees)	1 468	1 356	1 470
Medium (50-249 employees)	2 869	3 062	2 408
Large (250+ employees)	3 388	3 570	4 462
Ownership of enterprises			
National enterprises	3 431	3 202	3 213
Foreign-controlled enterprises	4 294	4 786	5 126
Main economic activity of enterprises (CZ-NACE)			
ICT manufacturing (261-264)	656	523	546
ICT services, total	7 069	7 465	7 793
Telecommunications (61)	151	197	210
Computer programming (582+6201)	4 831	5 434	5 923
Data processing and hosting (631)	843	762	888
Other IT services (465+951+62 without 6201)	1 243	1 072	771

Figure C15 R&D personnel in the ICT sector

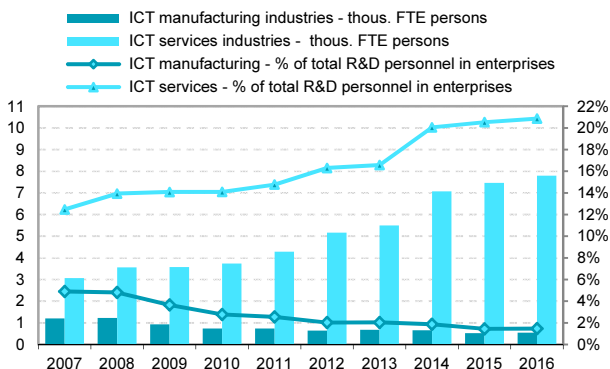
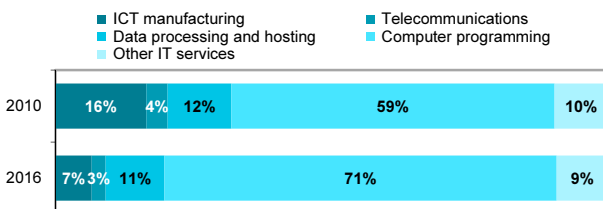


Figure C16 R&D personnel in the ICT sector by industry



Source: CZSO, Annual R&D survey