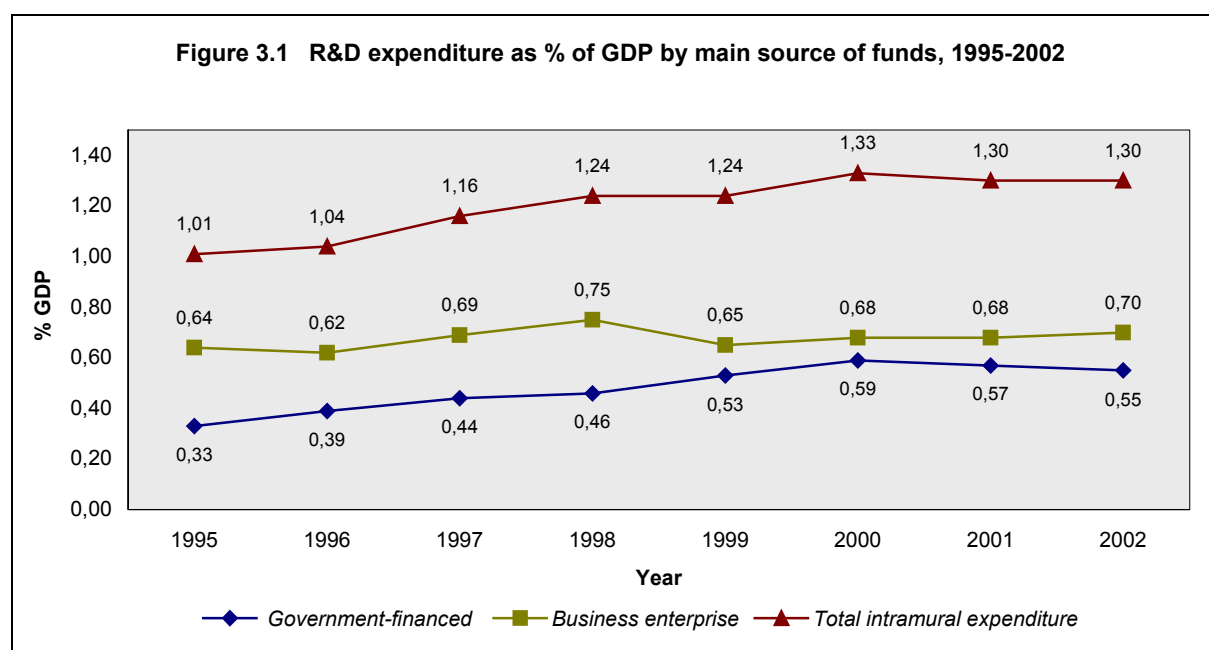


## Chapter 3 Investment in R&D

### 1. R&D by source of funds

The most frequently used indicator for measuring research and development activities is R&D (intramural) expenditure. The total R&D expenditure reached 29 552 million CZK in the Czech Republic in 2002. In comparison with the previous year, R&D expenditure increased of 4,3%, from 28 337 million CZK in 2001. R&D expenditure in relation to GDP was 1,3 %. In order to support R&D activities, the government provided 12 433 million CZK from public budgets. In line with the government concept of R&D financing in the Czech Republic, the government spent only 0,55% of GDP on R&D. With regard to the above-mentioned low ratio, the Czech government still has not met the set goal of devoting 0,7 % of GDP to R&D. According to the European Union, the government appropriations and outlays on R&D should reach 1% of GDP and the total expenditure on R&D 3% of GDP by 2010.



Source: the questionnaire VTR 5-01

Figure 3.1 shows that the highest share of R&D expenditure in relation to GDP was recorded in 2000. In 2001, R&D expenditure decreased slightly due to a cut in public funds from the government sector. Subsequently, it stagnated in 2002. The reason was the different growth rate of R&D expenditure and the growth of GDP, because GDP increased more than R&D expenditure in 2001. In 2002, the growth rate was identical. In the case of government-financed expenditure provided from public budgets, its percentage of GDP decreased again between years 2001 and 2002, from 0,57% to 0,55% respectively. The ratio of R&D expenditure financed from the business enterprise sector in relation to GDP increased from 0,68 % in 2001 to 0,70 % in 2002.

Currently, the Czech Republic with its 0,54% ratio of GDP falls behind the average of EU-15 countries that reached the ratio of 0,77% of GDP in 2001. For example, the US reported 0,8 % and Japan 0,64 % in 2000.

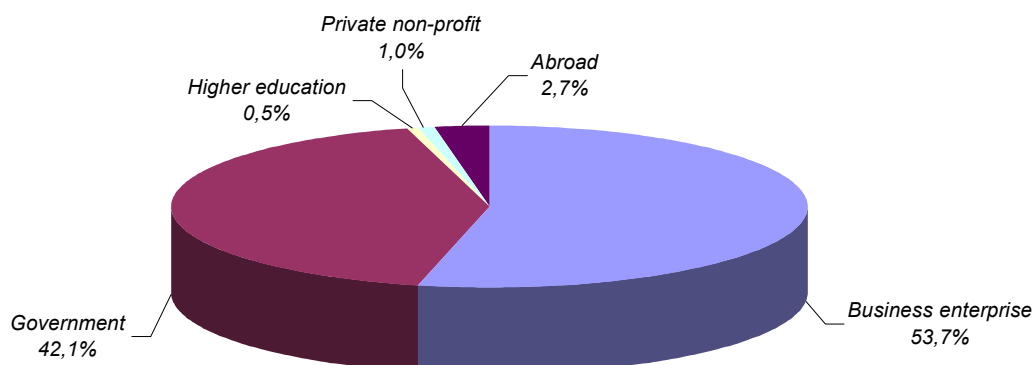
#### GDP in the Czech Republic, 1995-2002 (in million CZK)

Year	1995	1996	1997	1998	1999	2000	2001	2002
GDP	1 381 049	1 566 968	1 679 921	1 839 088	1 902 293	1 984 833	2 157 828	2 275 600

Source: the Czech Statistical Office (valid at 3.10. 2003)

In 2002, the major part of the total R&D expenditure was financed by the business enterprise sector. The share of the business enterprise expenditure on R&D (BERD) made up 53,7 % of the total R&D expenditure. The second most important provider of financial sources on R&D was the government sector with a 42,1 % share. The rest of the other sectors, including abroad, reached only a 4,2 % share of total R&D expenditure. The following figure illustrates the proportions of sectors on total R&D expenditure.

**Figure 3.2 Share of R&D expenditure by source of funds in 2002**



Concerning the share of business enterprise sector investment in R&D, the Czech Republic approached the EU average with a 56,2% share in 2000. In the Member States, Finland reported the highest share (70,3%) and Portugal the lowest share (21,3%) in 2000. In the US (68,2%) and Japan (72,4%), the business enterprise sectors are evidently the greatest financiers of R&D activities. The amount of money devoted to R&D from public budgets is higher in the Czech Republic than in EU-15 which recorded a 34,5% share in 2000. In the case of R&D expenditure financed from abroad, EU-15 reported a 7,1% share in 2000. In 2001, the highest share (18,0%) was recorded in the UK and the lowest share (2,1%) was recorded in Germany.

**R&D expenditure by source of funds in 2001 and 2002 (in million CZK and %)**

Sector	2001		2002		Index 2002/2001 Expenditure
	mil. CZK	share %	mil. CZK	share %	
Business enterprise	14 866	52,5	15 876	53,7	1,068
Government	12 351	43,6	12 433	42,1	1,007
Higher education	203	0,7	137	0,5	0,675
Private non-profit	290	1,0	304	1,0	1,048
Abroad	627	2,2	802	2,7	1,279
<b>Total</b>	<b>28 337</b>	<b>100,0</b>	<b>29 552</b>	<b>100,0</b>	<b>1,043</b>

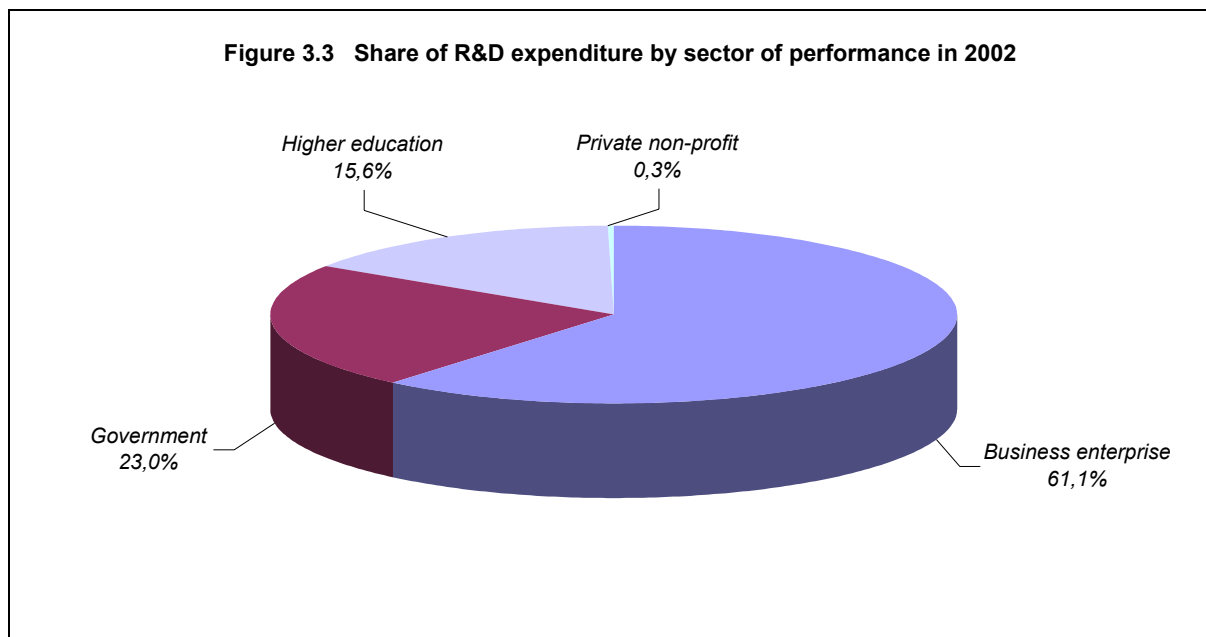
Compared with the previous year, there were increases in all sectors, except for the higher education sector. The highest increase of R&D expenditure was recorded in R&D financed by abroad (27,9 %). The share of R&D expenditure financed by abroad increased from 2,2 % to 2,7 %. A sharp decline of R&D expenditure was recorded in the higher education sector (33 %).

## 2. Using of financial sources in R&D

### By sector of performance

With regard to all R&D activities, the business enterprise sector is the dominant performer of R&D. In 2002, it spent 18 051 million CZK from a total amount of 29 552 million on R&D. As a percentage share, this equals 61,1 %. The second most important performing sector, based on the R&D efforts criteria, was the government sector with an expenditure of 6 787 million CZK. This accounted for a 23 % share of total funds spent on R&D.

The higher education sector reported spending 4 619 million CZK which accounted for a 15,6 % share. In this performing sector, in line with the system of financing of R&D at universities, the major part of funds come from the government sector. In 2002, it was 93,8 % of funds. See Figure 3.3 for further information.



In comparison with the average EU-15, the share of business enterprise sector as the dominant performing sector is less about 4 % in the Czech Republic than in EU-15. In 2001, the share of R&D expenditure performed in the business enterprise sector in relation to total R&D expenditure was 64,5 % in EU-15. For example, in the US, the share of performing BERD is on high-level (75 %). In EU-15, the highest share was reported by Sweden (77,6 %). On the contrary, among countries with the lowest share of performing BERD belonged Portugal (only 32,6 %) in 2001. From this point of view, the Czech Republic currently approached to the average rate of EU-15. To compare the Czech Republic with neighbouring countries of the V4<sup>1</sup>, the highest share was recorded in the Slovak Republic (67,3 %) and the lowest share in Poland (35,8 %) in 2001. In Hungary, above-mentioned share was at around 40,1 % level.

Concerning R&D expenditure performed in higher education sector, in terms of financial sources spent on R&D performed by universities, the Czech Republic with the share of 15,6 % fell behind the average of EU-15 about 5 percent. And finally, the share of R&D expenditure performed in the government sector made up 13,5 % in EU-15 in 2000.

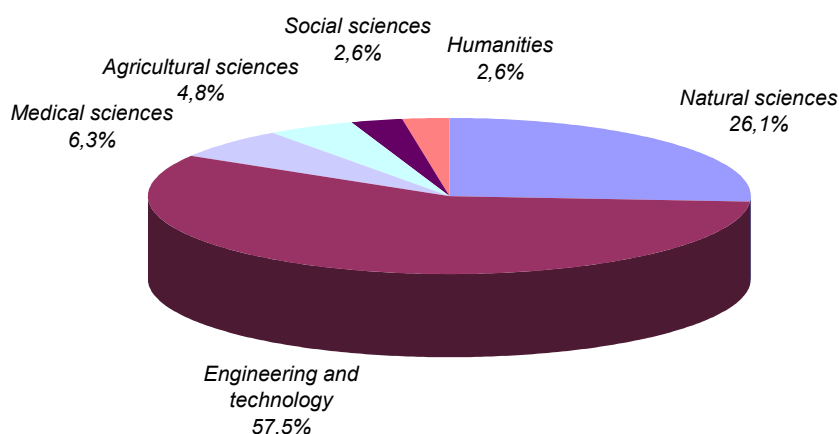
### By fields of science

In the Czech Republic, the major part of R&D expenditure in 2002 was realized in engineering and technology. R&D expenditure in this field of science amounted 16 998 million CZK, which was the 57,5 % share of total R&D expenditure. The second most important field of science, where was realized 7 723 million CZK, were natural sciences. Their share of total R&D expenditure made up 26,1 %. Engineering and technology have different amount of funds provided from public budgets, financial sources coming from the government sector makes up only 23,9 %. Other fields of science exceed 50 % of this share.

<sup>1</sup> The Visegrad four countries (V4) associated: the Czech Republic, Hungary, Poland and the Slovak Republic.

In the higher education sector, the major part of R&D activities are financed by the government sector. Figure 3.4 shows that the highest percentage of R&D expenditure was realized in engineering and technology (57,5 %).

**Figure 3.4 Share of R&D expenditure by fields of science in 2002**



**R&D expenditure by fields of science in 2001 and 2002 (in thousand CZK and %)<sup>2</sup>**

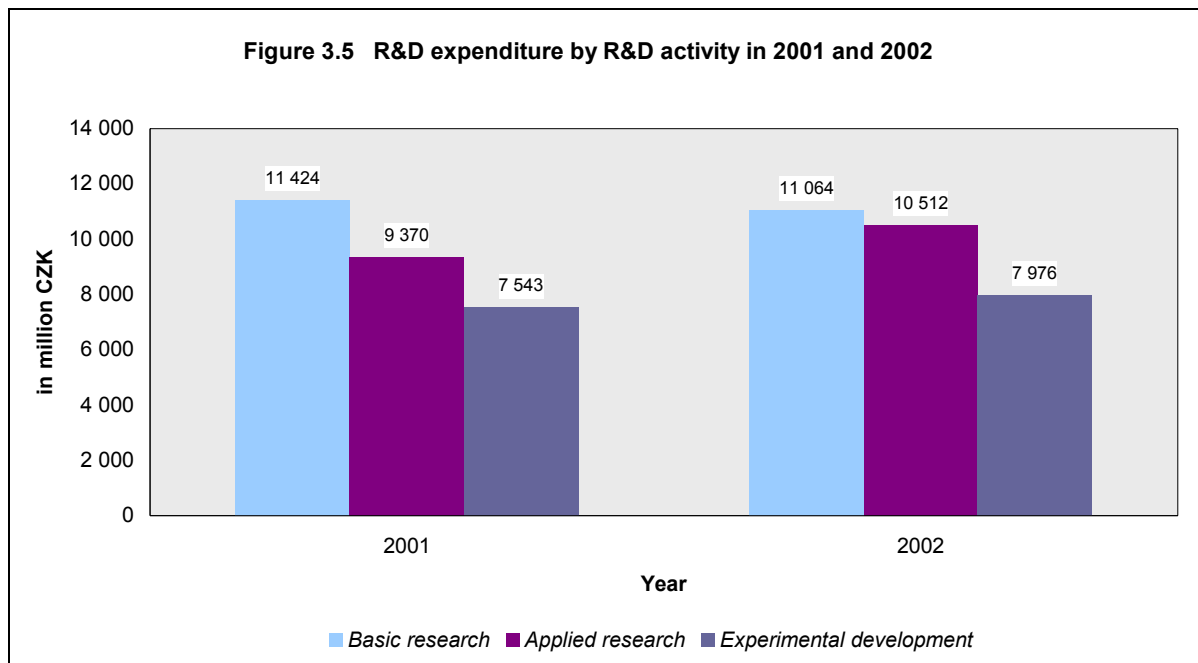
Field of science	2001		2002		Index 2002/2001
	thous. CZK	share %	thous. CZK	share %	Expenditure
Natural sciences	6 550 847	23,1	7 723 629	26,1	1,179
Engineering	17 036 722	60,1	16 998 663	57,5	0,998
Medical sciences	1 788 716	6,3	1 863 514	6,3	1,042
Agricultural sciences	1 399 438	4,9	1 428 348	4,8	1,021
Social sciences and Humanities	1 561 270	5,5	1 538 042	5,2	0,985
<b>Total</b>	<b>28 336 993</b>	<b>100,0</b>	<b>29 552 196</b>	<b>100,0</b>	<b>1,043</b>

### By R&D activity

Concerning basic research, 11 064 million CZK was devoted to research and development activities. This equates to a 37,4 % share of total R&D expenditure. The amount spent on applied research was 10 512 million CZK. As a percentage share, this equals 35,6%. And finally, the rest of R&D expenditure (27,0 %) was devoted to experimental development. Although generally the most important type of research and development activity is basic research, in the business enterprise sector the situation is opposite. The largest share of total R&D expenditure was in applied research (39,4 %) followed by experimental development (37,0 %). Basic research comprised only 23,6 % of total R&D expenditure. In the government sector and in the higher education sector, the largest share of total R&D expenditure was in basic research. Particularly, in the government sector, the share of basic research reached 64,4 % and in the higher education sector 52,3 %.

<sup>2</sup> From year 2002 onwards, more precise definition of fields of science has been adopted, which has mainly influenced social sciences and humanities. For that reason, data on social science and humanities were merged together to avoid break in time series.

In 2002, R&D expenditure realized in basic research made up 0,49 % of GDP. Compared to other countries in the V4 fellowship, the Czech Republic reported a higher percentage of GDP spent on basic research. In contrast, the Slovak Republic recorded a ratio of 0,16 %, Poland 0,20 % and Hungary 0,24 %. In EU-15, the average ratio is 0,5 % of GDP. The US recorded a 0,59 % ratio and Japan 0,38 % ratio in 2001.



#### By region (NUTS3)

From this perspective, the highest R&D expenditure was recorded in the capital city, Prague, which allocated 34,5 % of the total R&D expenditure. The lowest R&D expenditure came from the Karlovarský region (0,3 %). For further information, see Figure 3.6.