

Performance of the Czech Research and Innovation System – a summary of main findings

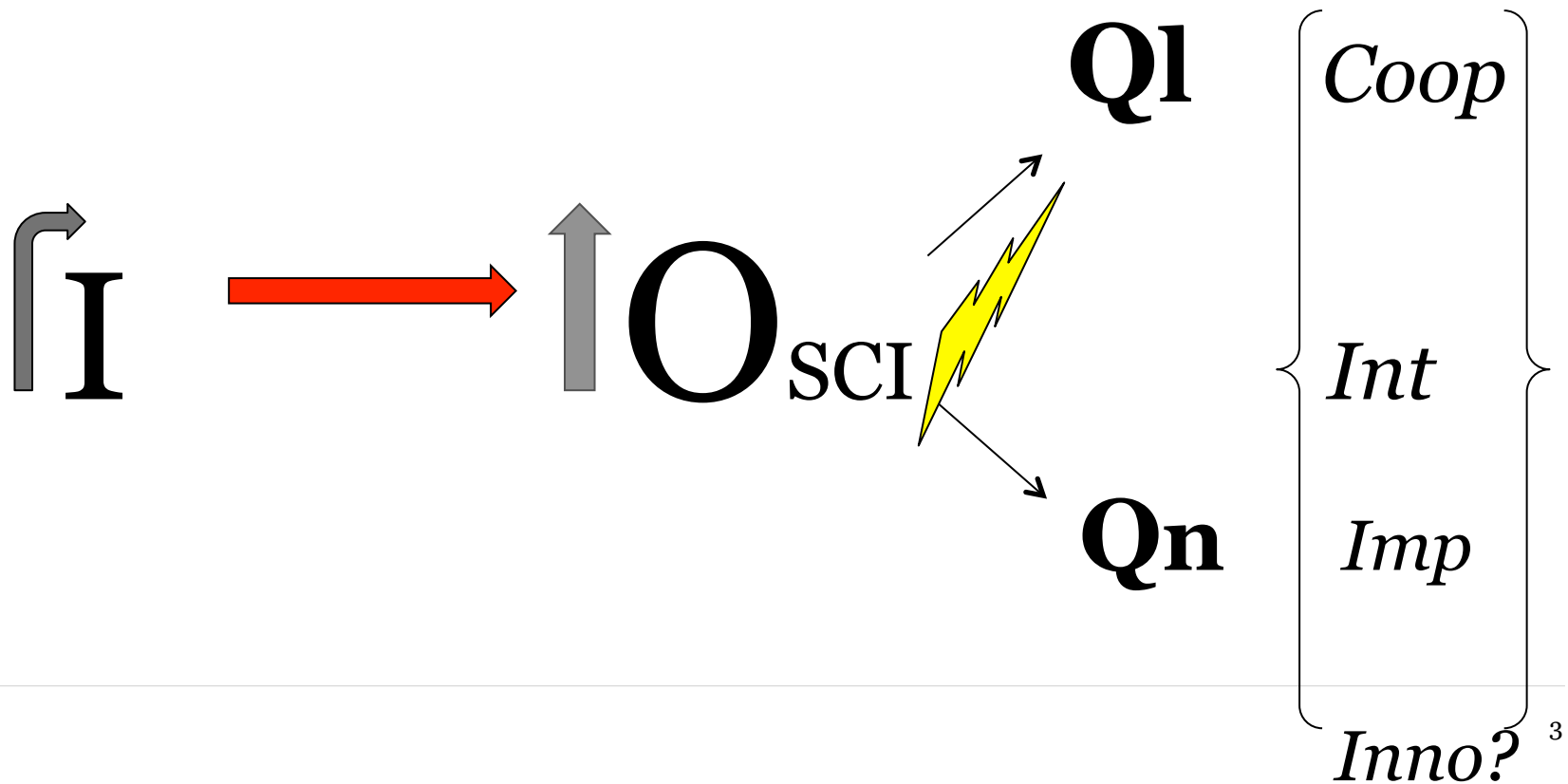
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Dimensions of Performance

- Publications
- International cooperation
- Research management
- HR development
- Science-Industry Links
- Business Sector
- IPR

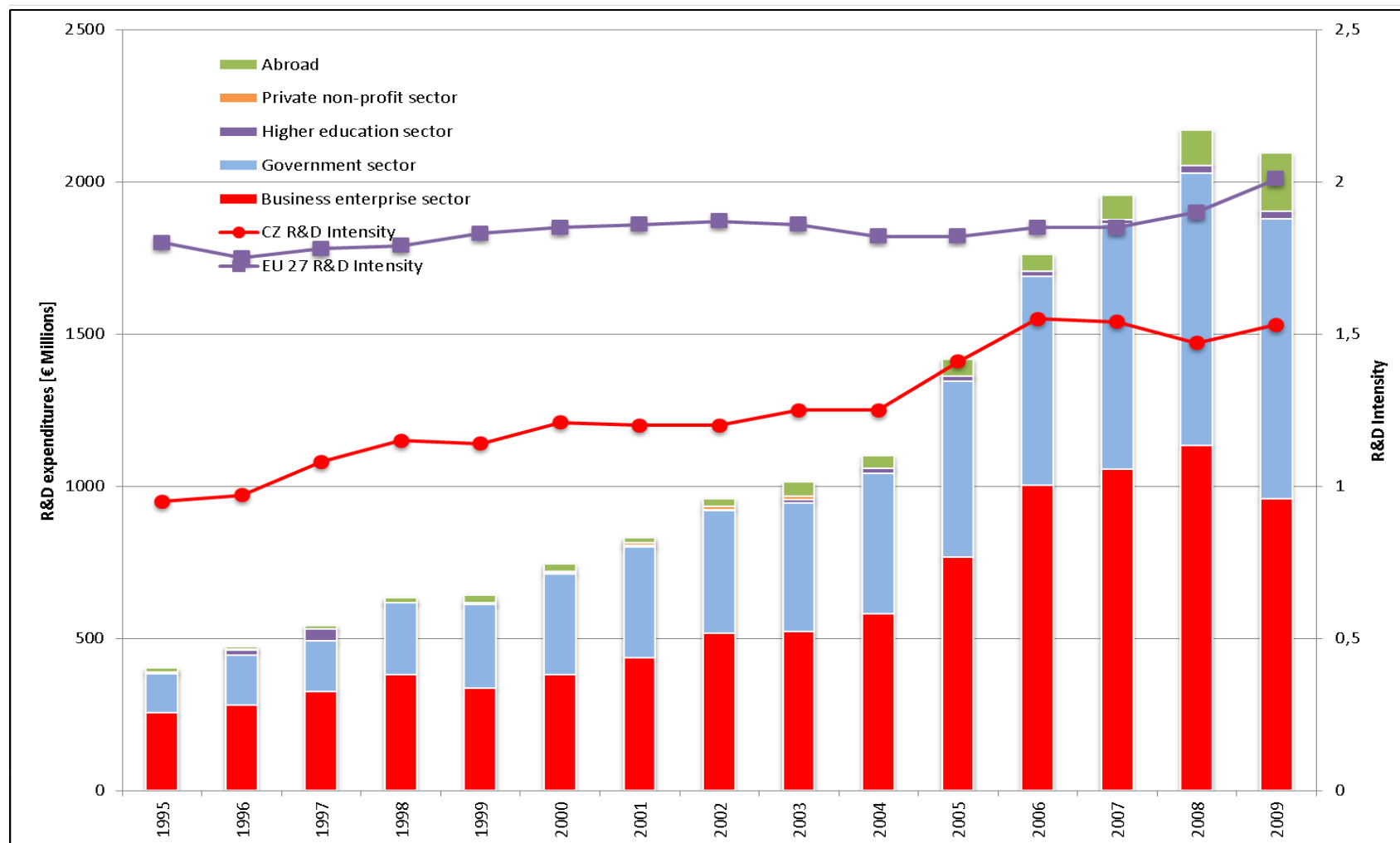
The synthetic formula of the performance of the Czech Research System



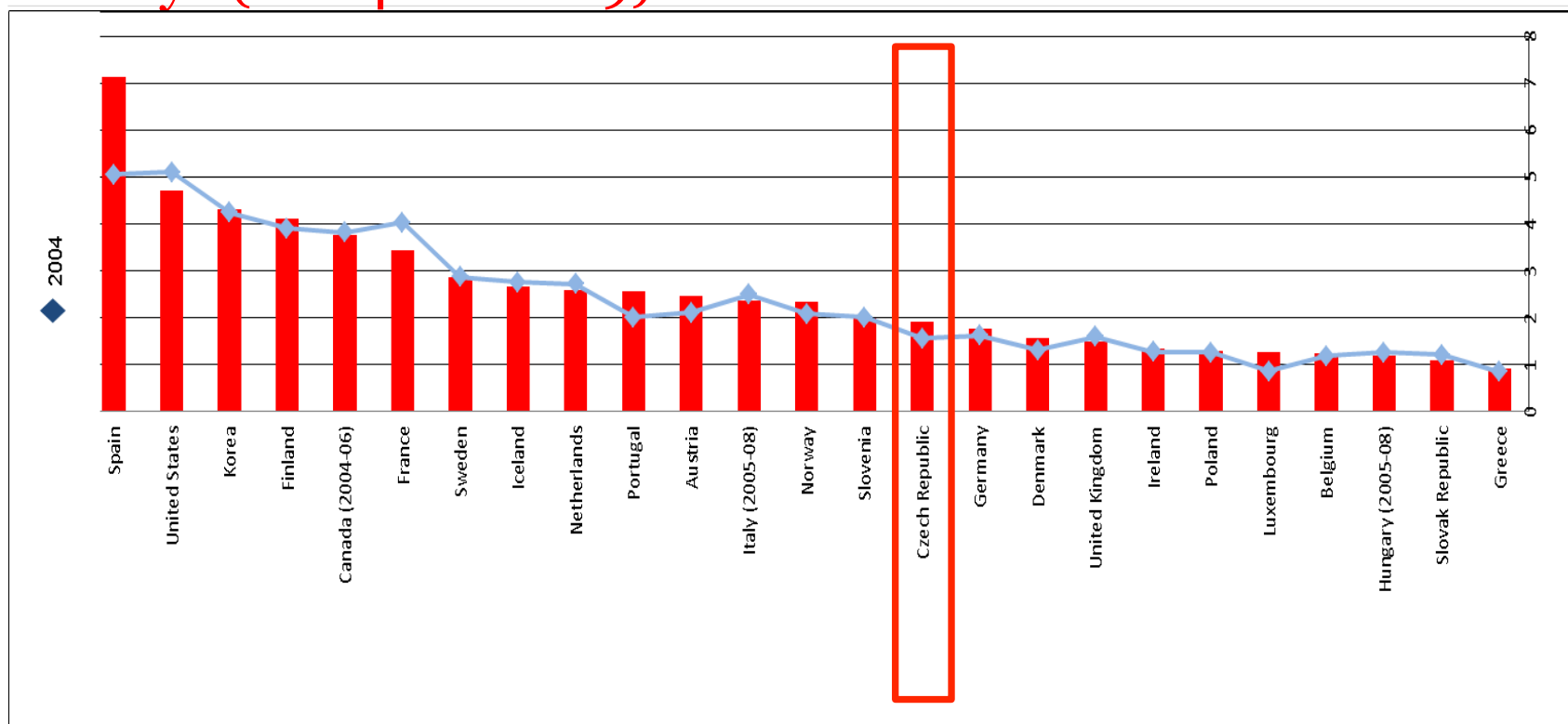
Distribution of Public R&D support

- All R&D performing sectors receive substantial public support:
 - *Higher Education Sector: 90% of R&D activities financed from national public sources*
 - *Government Sector: 87% of R&D activities financed from national public sources*
 - *Business Enterprise Sector 14% of R&D activities financed from national public sources*
- R&D funding level of Business Sector is high in international comparison but can be explained by institutional factors:
 - *Some RTOs having form but not function of private enterprises, receiving also institutional financing*

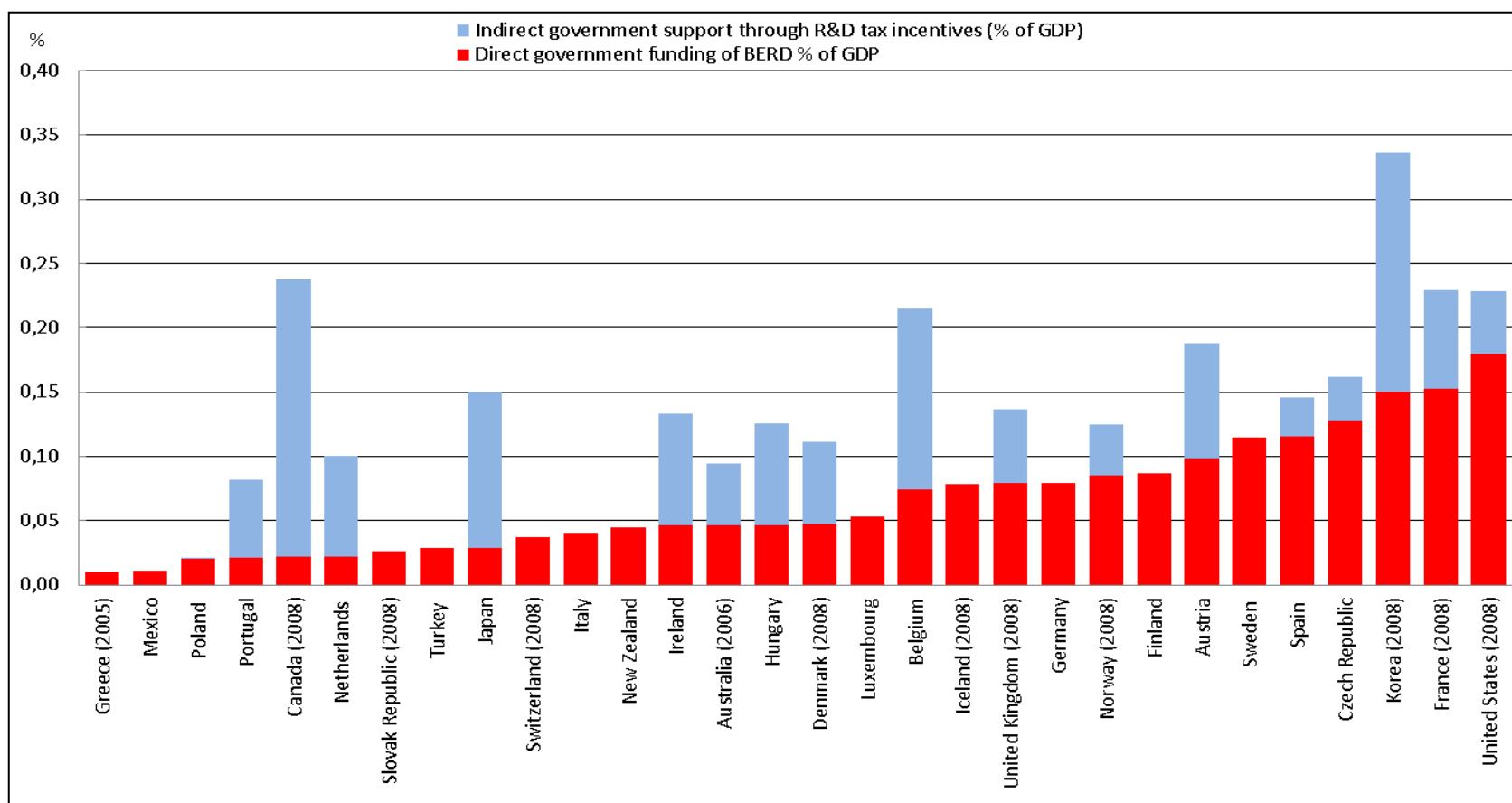
Development of R&D financing in the Czech Republic



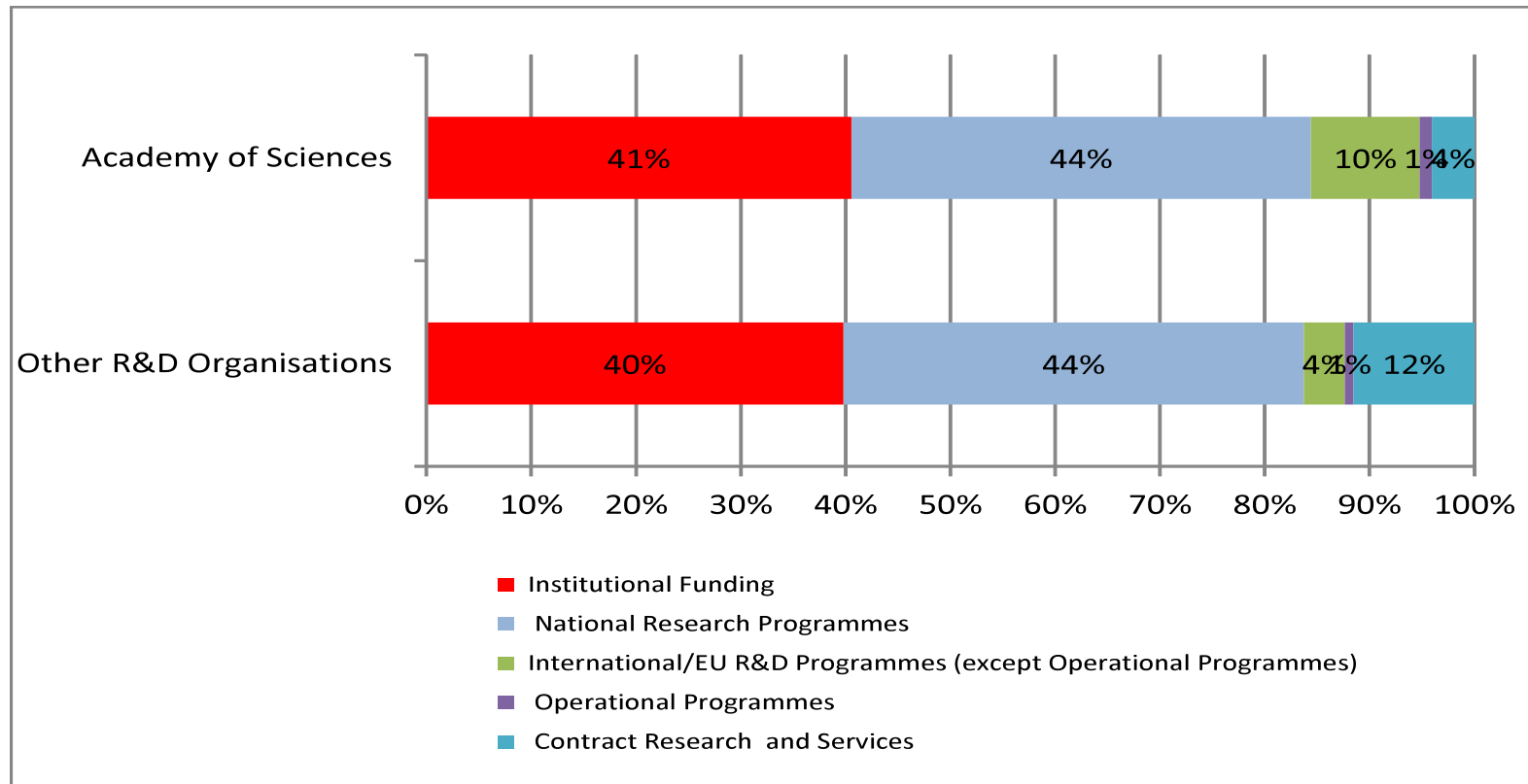
Government R&D expenditures as % of total government outlays (2004 vs. 2009)



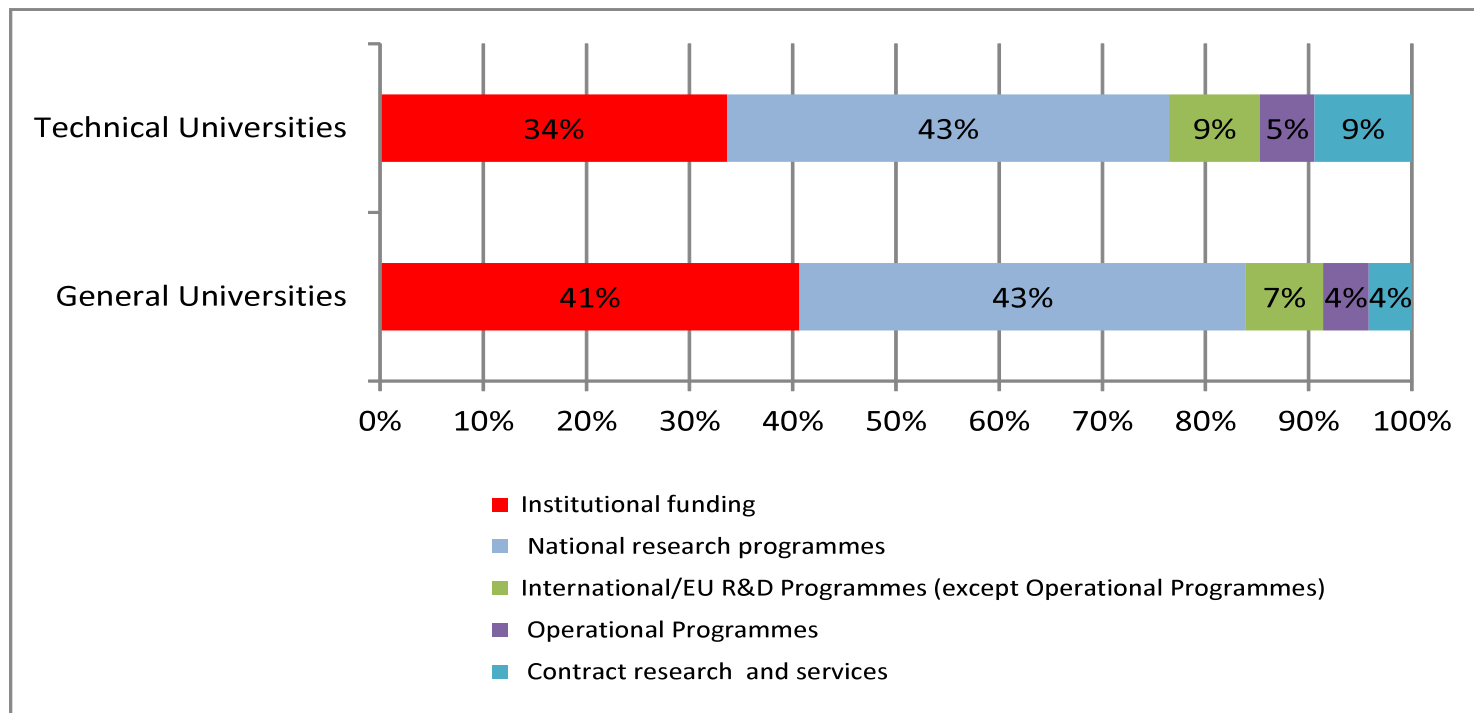
R&D support to industry (2009)



R&D support for the Government Sector: Institutional Funding vs. Project Funding



R&D support for the Higher Education Sector: Institutional Funding vs. Project funding



R&D Performance: The Public Sector

- The Higher Education Sector:
 - *Increased R&D capacities since the transformation process in the mid nineties: 18.1% of total R&D expenditures*
 - *Relative specialisations in Engineering, Agricultural Sciences*
 - *Low interactions with the Business Enterprise Sector*
- The Government Sector:
 - *Strong decline in the early nineties, stabilized since then: 21.4% of total R&D expenditures*
 - *Dominated by the Academy of Sciences, small RTO/PRO sector*
 - *Relative specialisations in Natural Sciences, Humanities, Social Sciences*
 - *Low-moderate interactions with Business Enterprise Sector, but high licences revenues through some R&D results with high commercial relevance*
- The Public Sector overall:
 - *Increasingly complementary specialisations of the Higher Education Sector and the Government Sector, but low level of structural interaction with Business Enterprise Sector*
 - *Large share of R&D services to be found in the Business Enterprise Sector, for which no overview on relevance and tasks, and no public strategy for future development exists*

Publications at international level

- Performance of Czech research has been steadily improving (as measured by number and quality of publications)
 - ...though it still remains below (world/EU) average levels
 - Traditionally strong focus on natural sciences & mathematics
 - Increasingly larger role (bio)medicine & health sciences, but coming from comparatively low level of performance internationally
 - International collaborative papers –highly concentrated:
 - *4/5 with European countries – also US major partner*
 - *Dominated by ASCR and Charles University*
 - Internationally collaborative papers tend to be of distinctly higher quality
- **Highly important to improve performance in EU FP & increase international collaboration throughout the system**

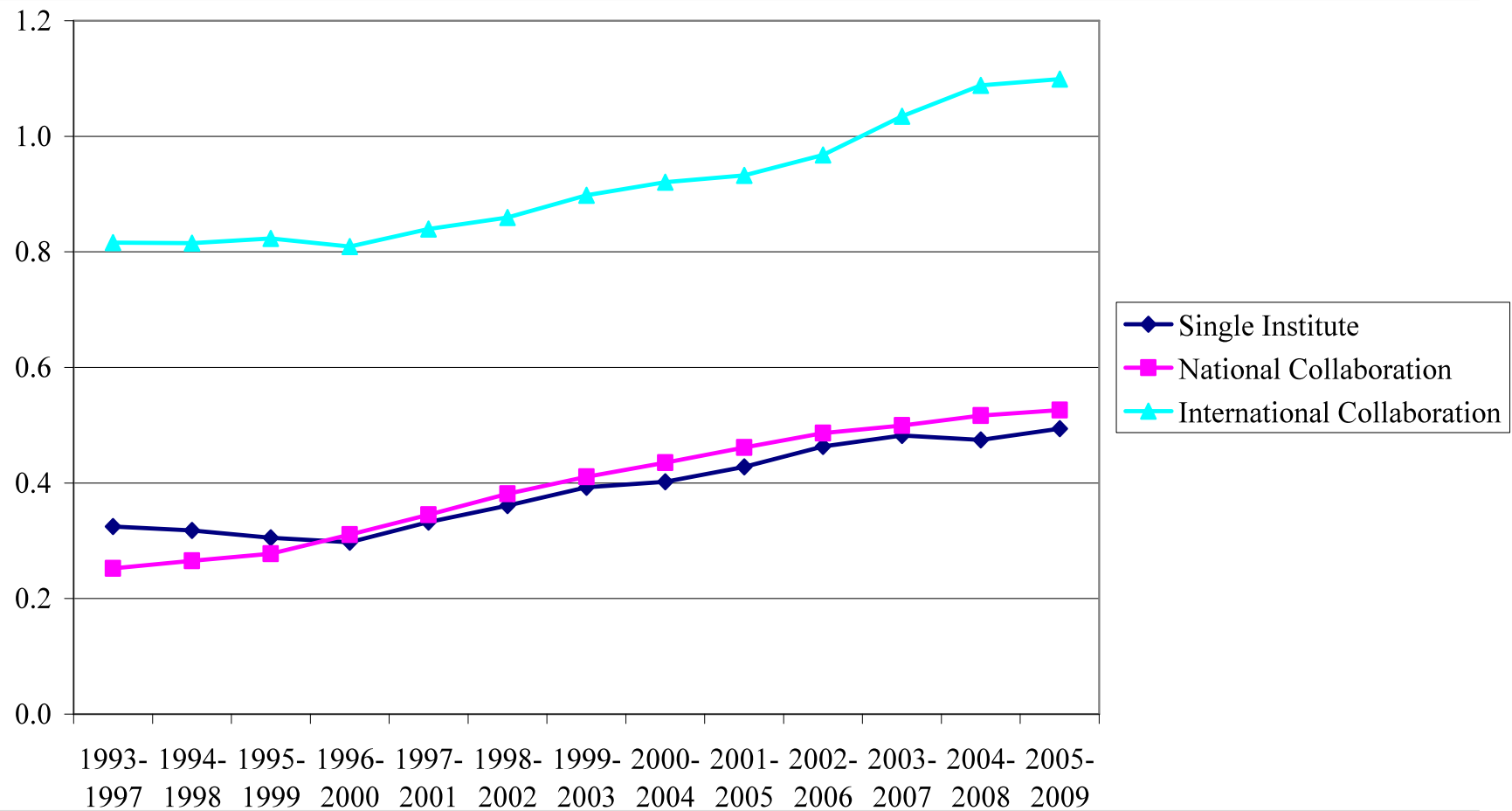
Bibliometric statistics for Czech Republic and the eight benchmark countries, 1993-2009

	Productivity 93-09	CPP/FCSm 93-09	Productivity 05-09	CPP/FCSm 05-09	Delta P	Delta I
AUSTRIA	0.0010	1.05	0.0012	1.18	27.07	11.91
CZECH REPUBLIC	0.0005	0.64	0.0007	0.79	47.95	24.94
DENMARK	0.0016	1.27	0.0019	1.36	20.36	7.86
FINLAND	0.0015	1.19	0.0018	1.20	19.03	0.32
GERMANY	0.0009	1.06	0.0010	1.16	18.56	9.50
HUNGARY	0.0005	0.78	0.0007	0.92	58.03	18.77
NETHERLANDS	0.0014	1.30	0.0017	1.34	22.58	3.83
SLOVENIA	0.0008	0.72	0.0013	0.78	58.97	8.10
SWEDEN	0.0018	1.20	0.0020	1.25	14.11	4.29

CPP/FCSm indicates the (field-normalised)
impact of the institute's/groups articles compared to world average

Development of Impact of Publications by Collaboration Type

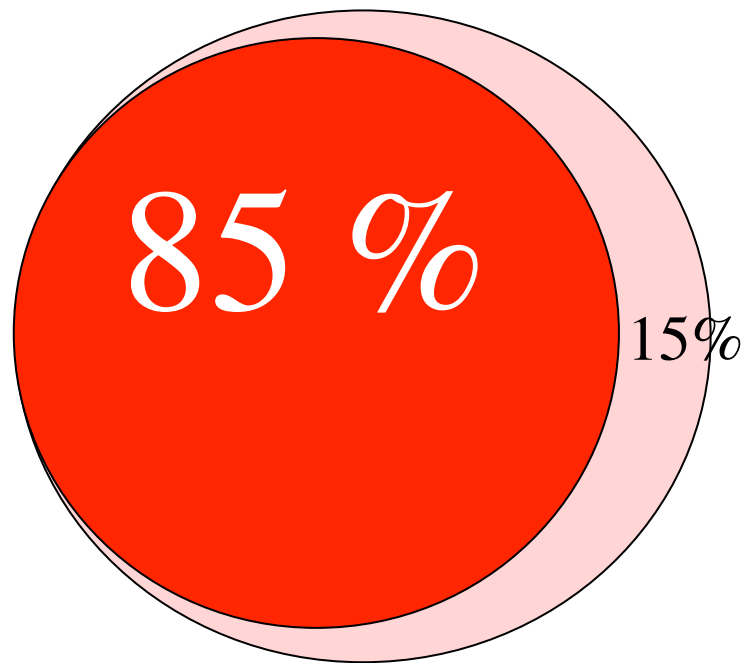
CPP/FCSm evolution by Collaboration



International co-operation

- ...signs of a lack of “a culture of openness”...
- Less than 10% of researchers in CR are foreign, and half is Slovak
 - *Barriers: teaching language requirements & immigration requirements*
- Poor return from the Framework Programme – few coordinators
 - *Easier to get national funding & no career or funding incentives*
 - *Lack of an overall internationalization strategy*

HR and R&D management – some other telling relations



96 : 0

percent of directors claiming to have a gender policy vs. # of female scientist our team encountered at site visits

**In-bred vs. external/international
recruiting of scientific staff**

Problematic research management at the institutional level (1)

- Small size of research groups:
 - Often dependent upon single director, sometimes as result of comparatively fragmented university organisation with highly autonomous professors
 - *Limited interdisciplinarity*
 - *Tended to lock groups into existing research trajectories*
- Little awareness of HR issues
 - *Succession often not tackled*
 - *Many were in-bred*
 - *Low international mobility*
 - *Under-exploitation of opportunities for collaboration Academy-universities (even though improving)*

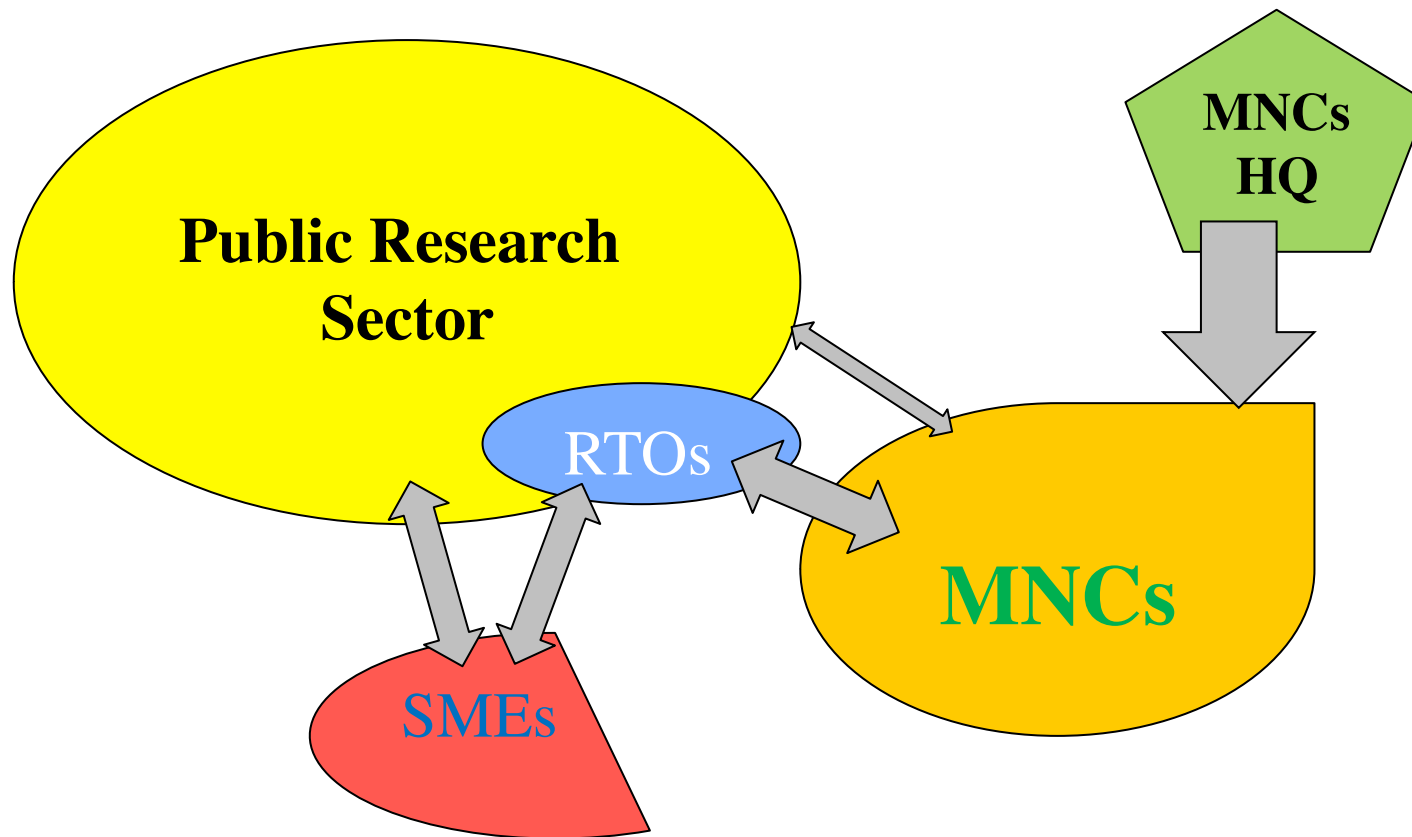
Problematic research management at the institutional level (2)

- Reduced fragmentation & boosting of output if
 - *Better HR planning*
 - *More explicit strategies*
 - *Key for improvement: reduction in funding uncertainties, to allow institutions to set & deploy longer-term strategies*
 - *Implies reforming the EM*

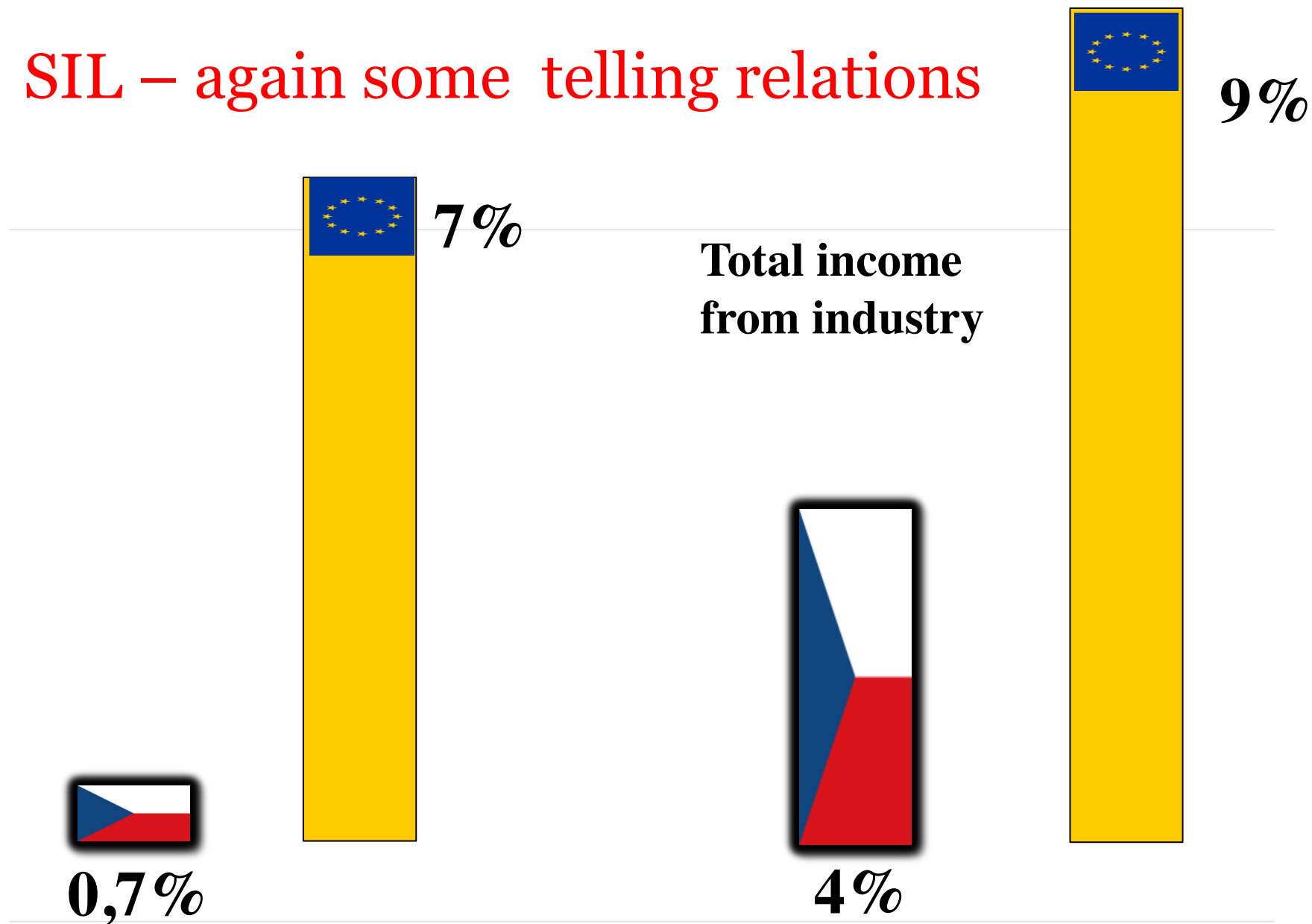
Human Resources management

- Old-fashioned style of institutional governance & organisation promotes fragmentation of research
- Need for stronger central responsibility for HR management taken by public research organisations
 - *Enabling career pathways to become more flexible (e.g. joint appointments)*
 - *Make use of career development plans*
 - *Reducing degree of in-breeding*
 - *Reducing fragmentation through devices such as local and international graduate schools*
 - *Correct imbalances related to career progression (50% of senior scientists is over 50)*
- *Correct imbalances related to proportion of women (half the EU 27 average)*

The landscape of Science-Industry-Links (SIL) in the Czech Innovation System



SIL – again some telling relations



HERD financed from industry

Science-Industry Links

- A number of informal but little formal linkage science-industry
- HERD funded from industry is low in international comparison
- Current incentive system works against SIL, support measures are small or in their infancy

Background:

- Low-value activities of many MNC - little embedded in the Czech NRIS
- Many existing links are with medium-sized firms, many are through RTOs
- Lack of skilled personnel = one of the factors hampering innovation
 - *OP R&D&I = opportunity to support development in regions outside core region of Prague*

Measures needed

- *Better to embed the multinational in the Czech research system*
- *To provide the appropriate level of coordinated support to less capable firms at national & regional levels*

R&D Performance: The Business Enterprise Sector

- Accounts for 60% of R&D performance in the Czech Republic, characterised by high levels of experimental development, low applied and basic research activities:
 - *Innovation activities based upon adaption of knowledge developed abroad, technology upgrading through purchase of machinery etc.*
 - Large enterprises with 500 and more employees account for 55% of total R&D expenditures in the sector
 - R&D activities concentrated in the Manufacturing Sector: Motor vehicle industry: SKODA-Volkswagen and first and second tier suppliers (23.2%), Machinery and equipment (8.1%), Precision instruments (4.7%) of total
 - R&D activities in the Service Sector, dominated by former and partly state owned institutes (16.6%), i.e. the atomic research institute owned by CEZ
-

The largest R&D spenders in the CR 2005-2009

	Million Euro				
Company	2009	2008	2007	2006	2005
Skoda Auto AS **	...	203.4	205.3	170.8	186.4
Komerční banka	7.0	...	29.9	28.1	...
Zentiva (now part of Sanofi-Aventis)	...	22.8	20.5	...	...
Cez	20.6	0.8	21.8	12.2	8.0
AERO Vodochody **	...	2.5	5.4	5.2	...
Trinecke Zelezarny	...	2.2	3.4	4.6	4.1
Unipetrol **	...	0.8	4.6	4.4	0.4
Spolchemie (Spolek Pro Chemickou a hutní výrobu)	...	0.7	0.7	1.0	0.8
Paramo As **	...	0.3	0.3	...	...
Ceske drahy	...	...	0.01	...	...
Telefonica O2 CR **	...	...	...	0.6	...
Deza	...	...	...	0.4	...
Vitkovice Steel **	...	...	...	0.3	...
Oskar Cesky Mobile **	...	...	...	...	0.3
Cesky Telecom **	...	...	...	...	0.2
NKT Cables **	...	...	...	...	0.1

Note 1: This table also includes foreign subsidiaries (marked with two stars "**"). All the rules for inclusion in the scoreboard are applied (i.e. availability of accounts and disclosure of R&D). ... = no information

Note 2: Cesky Telecom is by now merged with Telefonica O2

Source: EU Industrial R&D Investment Scoreboard 2006-2010.

National support programmes for SIL

Programmes being phased out

- TANDEM (2003-2010)
- IMPULS (2003-2010)
- Research Centres 1M (2005-2011)

Most relevant planned and newly implemented programmes

- programme TIP (2009-2017) by MIT
 - ALFA programme by Technology Agency
 - Centres of Competence by Technology Agency
-

IPR

- Little use of formal IPR instruments
 - *Consistent with importance of technology adoption & use rather generation of new-to-the-world innovations*
 - *Reflects traditions & habits & the fact that the European Patent Office and system has been irrelevant for Czech industry*
- IPR legislation is state of the art – outside small community little understanding
 - *Management in industry & research sector tend to lack knowledge & experience of IPR management*
- Technology Transfer Offices are in their infancy
- In many situations an open innovation approach or strategic partnerships can be more effective ways to obtain social returns on investment than formal mechanisms

Thank you for your attention !
