
International Co-operation in R&D Preliminary Findings

Annex 6 to the Second Interim report

Technopolis Group

Patries Boekholt

Manchester Institute of Innovation Research

MBS, University of Manchester

Jakob Edler, Kieron Flanagan, Abdullah Gok, Philip Shapira



evropský
sociální
fond v ČR



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INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

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Executive Summary

Purpose

This document contains an interim report of working package (g). This working package looks at the international dimension of the research system of the Czech Republic. Its aim is to analyse the scope and level of international activities of researchers, research organisations and policy and funding organisations, the motivations of and benefits from international activities as well as an assessment of supporting structures and incentives to help researchers to link internationally and reap benefits for the CZ system and for their own research from this activity. On that basis, it shall eventually define policy gaps and formulate recommendations.

This report is tentative, it documents progress made and delivers a first set of findings. It is based on a bibliometric analysis, relevant modules of the researcher and the director survey conducted in this study and an interview programme with research organisations, funding bodies and ministries. Next steps in this WP, reported in April 2011, will be an analysis of funding data (mainly FP 6 and 7), a thorough cross-cutting analysis of the findings, their interpretation against stated policy goals, a focus group discussion, a comparison to three other countries and overall conclusions and recommendations.

Tentative findings

The **bibliometric analysis** of the 85,600 science, social sciences, and arts and humanities journal article records from the Web of Science published between 1980 and mid-2010 reveals that Czech international R&D collaboration is strongly European and has grown more during the transitions of recent decades. Internationally collaborated Czech publications are generally of higher citation quality than purely domestic papers. Czech international R&D collaboration is greatest (by absolute numbers of papers) in the fields of physics and material science, chemistry and chemical engineering, basic life sciences, clinical medicine, biomedical sciences and biological sciences. International collaboration in several social science disciplines is weak compared to this subject group's national significance. International research collaboration through co-authorship is dominated by two institutions, the Academy of Sciences of the Czech Republic (ASCR) and Charles University (UK). These institutions are also powerful nationally in research, but there are other Czech research institutions that collaborate less internationally than their national ranking would suggest. While international institutions are also important sponsors (especially the EU) of international publications, the fact that three Czech institutions dominantly fund international collaboration suggests that there is capability (real or latent) within the Czech research system to influence the direction and nature of future Czech international R&D collaboration.

The **surveys of researchers** is based on 689 respondents, 41% ASCR, 45% University, 13% other organisations (1% industry). It found that international collaboration is an important feature of the Czech researcher community and it is not seen to be a bottleneck for better RTI activities in the Czech Republic. Two thirds of all projects that are done in collaboration have at least one international partner. The main partners are of course researchers from European countries, 92% of all researchers that collaborate internationally have done collaboration with a partner from EU 27 / EFTA, and 16% with a partner from North America.

The Czech research community appears – on the basis of the survey data – considerably mobile, 83% of all Czech researchers have been abroad in the context of their research at least once. Interestingly, more than one third of the respondents claim to have been employed by a foreign organisation, for senior staff (e.g. rectors) the share is above 50% (58%). The respondents also indicate that re-integration is not a major problem, having been abroad obviously increases attractiveness, and problems reported are of a personal rather than a systemic nature. The motivation to internationalise, in general terms, is to enlarge networks and to pursue personal research agendas, leading to a better publication profile. The researchers are, by and large, content with the achievement of the goals related to international collaboration and mobility. A reason of less importance is links to foreign firms; however those who have collaborations with foreign industry report it as being an important industry related activity. By and large, the majority of Czech researchers feel that their organisations

recognise international activities and support them. Overall, for the system, the level of support and recognition for international activities is perceived to be worse, especially as for collaboration support with European and even more with non-European partners. As researchers see a future increase in collaboration, there is a policy and support gap. Moreover, researchers regard the integration of foreign actors in national programmes as poor.

A second **survey** was geared towards **directors of research organisations** (74 respondents, 45% of which form Universities, 31% form ASCR institutes and 24% from other organisations). Less than 40% of all organisations have an explicit internationalisation strategy, but 49 % plan to have one in the next three years, indicating an overriding importance of internationalisation in the future. This corresponds very closely to the availability of dedicated funds and the plan to have those funds in the future. ASCR institutes are slightly less likely to have an explicit strategy and dedicated budgets.

International collaborations in the project portfolio of organisations as well as the share of international funding in their budgets are both of relatively low importance. There are only a few organisations that report a considerable share of projects being international, with the share in ASCR institutes being slightly higher. However, two thirds of the directors report to have strategic inter-organisational partnerships, mainly with EU 27/EFTA and the US, and this number is supposed to grow further. Those partnerships are used both to provide platforms for cooperation and to enhance visibility and reputation more generally. In terms of selection of public research partners, Universities tend to liaise mainly with other Universities, while ASCR institutes are slightly broader. Collaboration with international firms is still less common, here ASCR institutes are less active than Universities.

A further measure of internationalisation in organisations is the level of foreign staff. Compared to outward mobility, this is under-developed, the vast majority of organisations have below 10% international staff, with shares at ASCR institute being slightly higher. The share of organisations recruiting internationally is only 14%, again, ASCR institutes are more international in their recruitment than other organisations. However, there is a strong tendency to change this practice across the board, and to recruit more internationally. When it comes to advisory board membership, the picture is different, here ASCR institutes are much less likely to have international members than Universities, most of their boards are purely national, while 70% of Universities have some international membership in their boards.

The international activities in organisations are clearly driven by human resource considerations, i.e. to increase the attractiveness for Czech researchers and – more important in the future – to recruit international talent. Further, international activities are oriented towards getting additional research funds and getting access to excellence abroad. As to the latter, requiring funds, the actual importance of international funds is very low, 84% of all directors say they have zero or minimal income from international sources.

Corresponding to the assessment of researchers, the directors as well regard their organisations to be largely supportive towards international activities, especially ASCR directors are confident to provide a good environment for international activities (whereby on the level of researchers ASCR and University researchers had similar assessments of their organisations). As regards the benefits of internationalisation, overall the benefits far outweigh the costs, and the risks of international activities (knowledge loss, strengthening competitors) are perceived as being low for most organisations. The major issue of concern appears to be brain drain and the need to increase the attractiveness of the Czech system for Czech and foreign researchers alike.

In our additional **interviews with research organisations**, not surprisingly, we found that there is variation in the extent to which research and teaching activities are internationalised across subject areas and between but also within sectors. International collaboration and international mobility are increasingly accepted as necessary to ensure the excellence of Czech research. There is use of international assessment committees to periodically evaluate the research performance of ASCR institutes. Vacancies in leading institutes (and leading university departments) are increasingly open to international competition and we did find evidence that the international collaboration profile of applicants is considered, if not always systematically.

In the past the Czech Republic may have been a convenient “stopping off” point for researchers from Eastern Europe and the Former Soviet Union countries heading West. There is still much bottom-up research interaction with (and mobility from) these countries. However the Czech Republic is now a

destination of choice in itself for these researchers, and researchers increasingly come from a wider range of countries.

The most dramatic success story in recent years is probably that of infrastructure. The Czech Republic has worked to shift the emphasis in research infrastructure planning eastwards towards the new member states, and as a result has successfully mobilised structural funds to support the development of an Extreme Light Infrastructure presence in the Czech Republic.

Most internationalisation within both the university sector and the academy institutes sector is bottom-up rather than driven by top-down strategy, confirming our survey findings. Longstanding barriers relating to culture but also structure and incentives remain. The principal barrier remains funding. Inward mobility of foreign researchers for visits or to take up positions is limited by the funds available. Confirming the researcher survey, lack of openness of national grant programmes to foreign participants can also be a barrier. Finally, high teaching loads, even in leading university departments, can present a barrier to international research collaboration and medium-term mobility. There are also barriers to teaching internationalisation, including the legal requirement to teach in the Czech language. There seems to remain a perception amongst many researchers that national funding is 'easier' to obtain than EU funding. This may be compounded by barriers to closer co-operation between the university and institute sectors.

The bottom-up international activity of Czech researchers is likely to continue to grow organically. Younger researchers coming through are more likely to be exposed to internationalisation as an integral part of research and those researchers are likely to collaborate internationally as long as they are suitably supported/enabled to do so.

The **policy and funding** for R&D internationalisation is in hands of quite a number of ministries and agencies. However the key actor is the Ministry of Education, Youth and Sports (MEYS). This Ministry is responsible for policy formulation, strategy development and the implementation of almost all programmes for international R&D cooperation including those for industry.

The core of the policy instruments for internationalisation is focused at the European Community. Funding for participation in international organisations such as ESA, ESO, COST, EMBC, EUREKA and CERN have the majority of the budget funding. Other major initiatives are related to several Joint Technology Initiatives (Artemis, Eniac, IMI and Eurostars). The Czech Republic also has some active bilateral co-operations with non-European countries (Russia, S-Korea, China, Japan, Israel, Argentina and the US) that includes funding for research projects on the basis of an open competition. The emphasis of S&T collaboration policies is on establishing links for the public research organisations. Industry oriented R&D collaboration through funded programmes is relatively small and focused on the Eurostars programme.

The political importance of international R&D cooperation has grown considerably in the last years and national budgets have increased. Nevertheless some of the bottlenecks according to policy makers remain, particularly an inward oriented culture in the research community, a lack of experience with international networking particularly for those in research management positions. Some scientific domains are considered to have such a good reputation that they manage to attract foreign researchers. This is however not monitored systematically.

The evaluations done as regards international activities are somewhat limited to the Framework Programme. This analysis so far has been very focused on the participation, financial return and impact of the European Framework programmes.¹ A challenge that policy makers want to tackle is a better coordination between the various Ministries and Agencies from different policy domains. Another future development is to increase the pressure on initiatives such as competence centres and science parks to become more pro-active in their internationalisation activities and networking.

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¹ Albrecht V., Vančátek, J. (2008): Assessment of Participation of the Czech Republic in the EU Framework Programmes; Prague, http://www.fp7.cz/dokums_raw/eufordia-konverze_1236765864.pdf

1. Introduction

Working package (g) explores the international activity of the research community (organisations and individuals) and the relevant ministries and funding agencies. It seeks to analyse the level and breadth of international activity, establish some understanding of the benefits and pitfalls of internationalisation in research and sheds light on framework conditions and governance issues around internationalisation of research and research funding.

This document is a first – interim – report of this working package. It summarises and interprets the data and findings so far. The findings are **tentative** and shall give a first idea of the main activities and results. It is still largely organised according to different units of analysis (researchers, organisations, funding agency/ministries) and different data sets and methods used. It shall give a first insight and lay the basis for a more thorough, cross-cutting analysis in the report due in April which will be complemented by some more interaction in the field.

1.1 Scope of the working package and content of this report

The research questions of working package (g) are as follows:

- How international is staff, research, teaching and the overall strategy of the organisation?
- What is the role played by international funding vis-à-vis national funds? What is the involvement in and benefit of the European level instruments?
- What are the benefits of international collaborations?
- What supporting structures and incentives help researchers to link internationally and reap benefits for the CZ system and for their own research from this activity?
- What are action points, gaps to close in order to fulfil the ambitions

The working package is composed of **four pillars**.

The **first pillar** explores the cooperation patterns of Czech scientists over time and differentiated for scientific areas and institutional backgrounds based on a bibliometric study. This pillar of WP 2 is finished and a **separate document** accompanies this report. In this interim report we summarise the main findings in a short summary (**section 3**).

In a **second pillar** we seek to understand internationalisation patterns more broadly and in a more contextual manner. This looks at individual researchers, research organisations and policy/funding organisations. It asks for scope and scale of different modes of internationalisation, explores the (potential) benefits and pitfalls, as well as the framework conditions, supporting instruments and governance arrangements for international activities of the research and the funding community. In an additional step the survey and bibliometrics data will be complemented by funding data (mainly FP 6 data).

This second pillar builds on **survey data** - analysing the specific internationalisation questions in the surveys to research organisations and individual researchers –as well as on 17 interview sessions with more than 25 key representatives from ministries, funding organisations and research organisations. In a next step for this pillar, to be reported in the next interim report, we will conduct a focus group with key representative exclusively on the topic of international involvement.

In a **third pillar**, to be delivered by April, the study will look at three comparator countries and their strategies and activities as regards internationalisation of the research system. This will be delivered with the next interim report

Accordingly, this report contains

- (1) a summary of the overall highlight findings so far (see beginning of this document)

- (2) a summary of the self-standing report on pillar one, the bibliometrics analysis
- (3) the analysis of the international dimension in the survey on individual researchers and directors of research institutes
- (4) a first analysis of interviews with
 - (4.1) funding agencies and ministries
 - (4.2) research organisations
- (5) Next steps (data gathering, interaction, recommendations)

1.2 Policy context

This report does not yet analyse the findings against the official policy goals of the government in a systematic way. This cross-cutting analysis will be done for the April report. However, as general context and starting point, the overriding goal in the strategic document “National Policy of Research, Development and Innovation for years 2009-2015” is to “intensify the Czech Republic’s involvement in the international R&D&I co-operation”. This is broadly in line with the National Reform 2008 which stipulated three broad objectives as for the support to international collaboration in R&D&I²:

- Support for organizations providing information on possibilities of involvement in various European programmes as well as complex services enhancing the involvement of Czech research teams in international programmes.
- Creation of favourable conditions within the research institutes leading to higher involvement of the research teams in international programmes.
- Active participation in the development of European Research Area (ERA) and in activities of recognized international research institutes.

The subsequent “Inter-ministerial strategic policy of international cooperation in R&D to 2015” adopted 8.2.2008 codified the following four goals:

- Goal 1 – Improve conditions of Czech researchers’ participation in international R&D programmes
- Goal 2 – Increase efficiency of the R&D cooperation that is based on bilateral intergovernmental agreements on R&D cooperation
- Goal 3 – Integrate administration of existing programmes of R&D IC
- Goal 4 – Strengthen the involvement in the jointly performed security and defence R&D.

Interestingly, in the Reform Document, the focus of internationalisation is clearly on international collaboration with a strong view on participating in ERA and the participation in European infrastructure development. For the former, a strategy to balance national funding and participation in European funding is said to be developed in order to make best use of the combination of national and European funds (Reform 2008, p. 16, 17). As for the latter, infrastructure development is intended to be closely linked to the European developments to ensure strong international cooperation through joint use of infrastructure. European involvement should be coordinated, with transparent access to the Czech representatives and involvement in joint action at EU level be decided upon after systematic consideration (ibid. p. 17). The question of international mobility of researchers is less prominent in the policy documents.

The overall policy responsibility for international R&D collaboration rests with the MEYS, including engagement in international infrastructure development (Reform 2008, p.5). However, realising that one department alone cannot cope with the opportunities of international collaboration, a cross-departmental co-ordination led by MEYS is to be installed which should be governed through a long-term interdepartmental concept (ibid., p. 28). The Reform document 2008 concedes that “suitable

² See First Interim Report of this Audit, Annex 1, September 14 2010, p. 64

forms of targeted support (programmes) are missing that would enable the Czech Republic to become involved in new forms of international collaboration in R&D, especially within the European Research Area”.

In a self-assessment conducted as a basis for the Reform 2008 document, international collaboration is regarded as too weak and often “purposeless” and a failure to translate results into social and economic benefit, with poor participation of the Czech Republic in formulating key documents at EU level, low participation of Czech researchers in ERA programmes and poor coordination between different activity lines (Reform 2008, p. 44). The supporting and information structure, in contrast, is assessed to be strong, and the participation in international organisations regarded as a valuable asset. The biggest opportunity envisaged in this background document is to strongly participate in new initiative such as the EIT and the ERC, to step up the involvement as coordinators in FP 7 projects, to broaden collaboration in non-European countries and to attract talent from weaker economies in mainly in the Southeast and Eastern Europe. The biggest threat expressed is that Czech researchers and firms continue fail to benefit from the results of collaborations in terms of economic exploitation (*ibid.*).

2. International collaboration patterns – results of a bibliometric analysis

The bibliometric analysis draws on a dataset of more than 85,600 science, social sciences, and arts and humanities journal article records from the Web of Science published between 1980 and mid-2010 with at least one author from the Czech Republic or the Czech part of the former Czechoslovakia.

We find that about two-fifths of all Czech research publications are internationally co-authored and that Czech international R&D collaboration is strongly European and has grown more during the transitions of recent decades. Four-fifths of the Czech Republic's international collaboration papers are with European countries. The US is also a major collaborator. Czech scientists co-publish with German, American, French and British scientist in every subject group very extensively while they collaborate with other countries extensively only on some of the subjects. At present, collaboration with Asia is limited.

Internationally collaborated Czech publications are generally of higher citation quality than purely domestic papers. Czech international R&D collaboration is greatest (by absolute numbers of papers) in the fields of physics and material science, chemistry and chemical engineering, basic life sciences, clinical medicine, biomedical sciences and biological sciences. When international science papers are compared with purely domestic papers, Czech international R&D collaboration is relatively higher in physics and materials science and in basic life sciences, but relatively lower in biomedical sciences and clinical medicine. International collaboration in several social science disciplines is weak compared to this subject group's national significance. In particular, in economics and business and in politics and public administration, there are low levels of international collaboration relative to purely domestic research outputs.

International research collaboration through co-authorship is dominated by two institutions, the Academy of Sciences of the Czech Republic (ASCR) and Charles University (UK). These institutions are also powerful nationally in research, but there are other Czech research institutions that collaborate less internationally than their national ranking would suggest. Three Czech organizations lead in sponsoring internationally collaborated Czech research – the Ministry of Education Youth and Sport of the Czech Republic, the Czech Science Foundation (GACR), and the Academy of Science of the Czech Republic. While international institutions are also important sponsors (especially the EU), this suggests that there is capability (real or latent) within the Czech research system to influence the direction and nature of future Czech international R&D collaboration.

3. The view of the researchers – results of the researchers study

This section summarises the main results of the survey of individual researchers, including tables and figures where appropriate.

3.1 The sample

In the overall survey to researchers, 689 researchers have responded. Table 1 shows the distribution of respondents across the different types of organisations and the seniority of the respondents. The analysis below will differentiate between those categories when there are significant differences between the groups.

Table 1: Responding sample

Type of organisation	Share %	Number
University	45	310
ASCR	41	282
Other research organisation	13	90
Industry	1	7
Total	100	689

Level	Share %	Number
Top Management (Director, Dean)	3	21
Management (Head of Dpt., Lab)	14	97
Top Teacher (Full Prof, Assoc. Prof)	14	96
Teacher (Assistant Prof. Lecturer)	57	393
Top Research (Senior Researcher)	4	28
Research (Researcher, Post Doc)	4	28
NA	4	28
Total	100	689

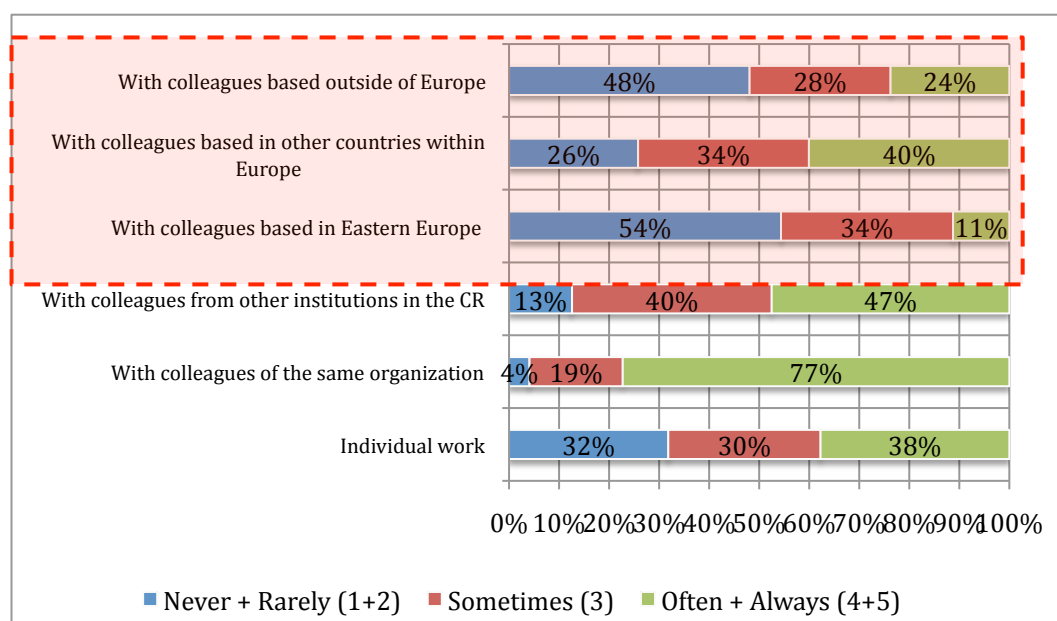
3.2 Level and scope of collaboration and international involvement

The level of international involvement is rather high. Asked for the share of projects that involved partners, on average exactly one third of all projects conducted by the researcher in our sample have at least one international partner. This figure is considerable given the fact that 46% of all projects are done without any partner at all. In other words, on average in more than two thirds of all projects that have a partner there is one international partner involved.

The researchers were asked about their collaboration patterns in the last three years. As depicted in Figure 1, international collaboration is a common feature. 40% of all respondents cooperate often or always with partners from European countries (outside Eastern Europe). Interestingly, 24% report to cooperate often and always with partners outside Europe, while only 11% report this for partners in Eastern European countries. The cooperation intensity with partners in Europe (outside Eastern Europe) is thus almost as high as with partners within the Czech Republic (outside one's own organisation). From this data one cannot conclude a low propensity to cooperate with international partners, but the pattern points clearly to a strong bias towards (Western) European partners.

The collaboration pattern outlined above does not differ statistically significantly according to whether the researcher predominantly engages in management, teaching and research. However, it does differ in some collaboration categories according to researchers' affiliations. Researchers located in ASCR collaborates more with wider Europe and non-European countries than researcher working elsewhere while researchers working in other research institutions and industry collaborate statistically significantly less with wider Europe and non-European countries.

Figure 1: Q9: Collaboration (Please characterize your research efforts during the last three years)
(5 point Likert 1: Never, 5: Always)



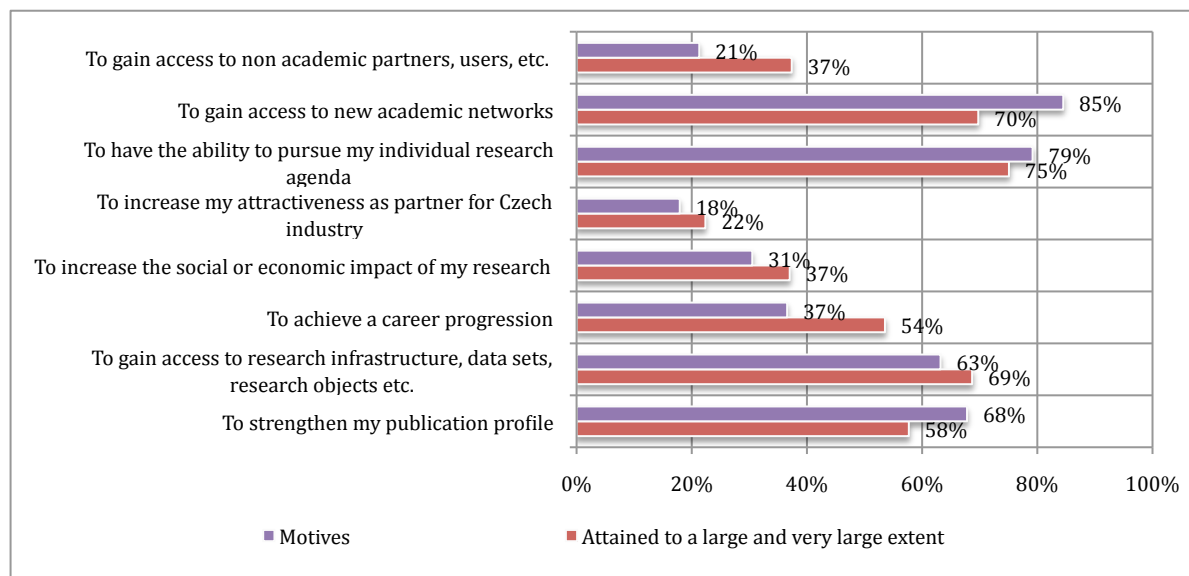
Respondents were asked to further differentiate the geography of their international partners and how they expect this to change in the future. 92% of international collaboration includes an EU27+EFTA partner, while this figure is 16% for North America and only 2% for other regions. The future projection is interesting, as 49% of all respondents say that despite a high collaboration intensity already achieved, collaboration with EU/EFTA will further increase, and a much smaller and almost equal share expect collaboration to raise with North America (30%) and Asia (34%).

Table 2 Share of Directors expecting a decrease or increase with collaboration with partners from certain regions

	Increase	Stay Same	the Decrease	Total
EU27/EFTA	49%	49%	3%	100%
Other European countries (Non EU27/EFTA)	25%	69%	6%	100%
North America	30%	62%	8%	100%
East Asia (including India and China)	34%	59%	7%	100%
Rest of the world	16%	76%	8%	100%

Figure 2 shows the motivations for international collaboration and, more importantly, the degree to which respondents assess the goals behind the motives have been achieved. Access to networks and the pursuit of individual research agendas in connection with improving the publication profile appear to be the most important motives. In terms of achieving those goals, it appears that expectations are met for the most important motives such as gaining access to new academic networks and research infrastructures, pursuing independent research agenda while for lesser indicated motives, attainment figures are low.

Figure 2 Motivations to collaborate internationally and the extent to which the goals behind the motives are fulfilled*



*Respondents could indicate three major motives

3.3 Mobility and foreign employment

Next to collaboration, the survey asked for international mobility and employment abroad. 83% of all respondents have been abroad at least once, with senior people being slightly more active, with 65% of post docs, but 95% of Directors having been abroad.

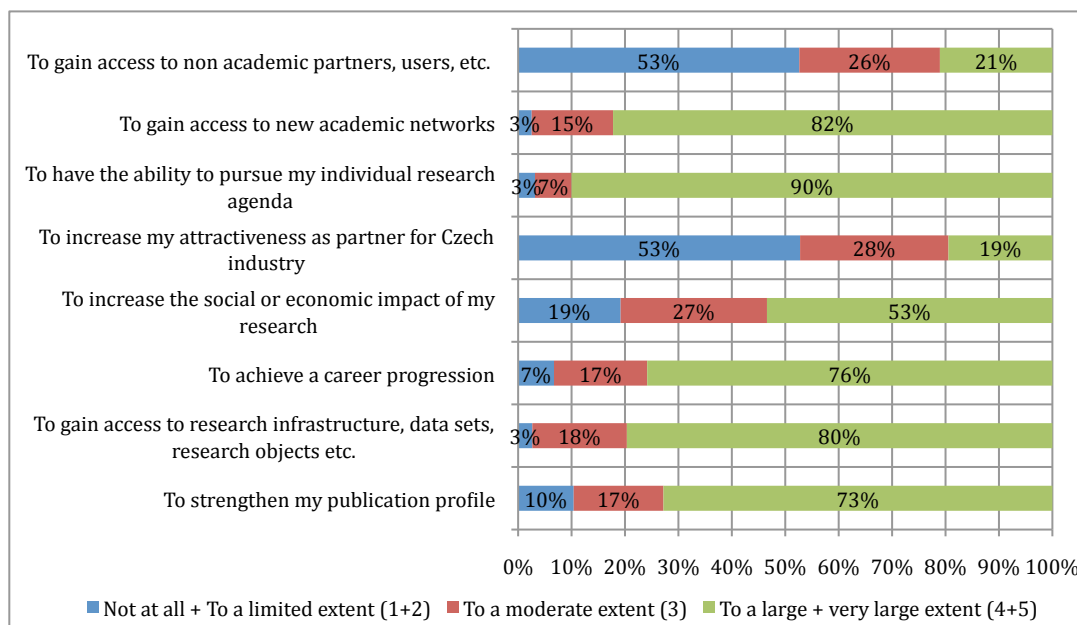
Beyond mobility, a considerable share of 39% Czech researchers has actually been employed by an international research organisation outside the Czech Republic, with an amazing 58% of all rectors in the survey reporting international employment during their careers.

One important dimension of international employment and mobility is the re-integration into the Czech system. When asked about the difficulties encountered upon return from stay abroad, the share of respondents reporting strong or very strong difficulties is low, with 4% for reintegrating into Czech networks, 6% for finding suitable post, 13 % for transferring pensions and social security rights and 17% respectively (costs of relocating). Re-integration into the system is no overriding concern; problems are rather of personal nature and lie in the general regulation of the social security system. Apparently, researchers with foreign employment are attractive for Czech organisations, which is also confirmed by the high level of top management personnel as reported above.

The major motives for international mobility are to gain access to academic networks (34% say strong or very strong motive), pursuing specific individual research agenda (32%) and individual career progression (25%). Access to other foreign partners or raising the profile for collaboration with Czech industry play an insignificant role.

In their self-assessment, the Czech researchers claim a very high level of goal achievements. There is one bundle of motives, access or attractiveness to non-academic partners (e.g. industry) as well as wider economic and social impact of the research; here the effects of international activities are less widespread.

Figure 3: Mobility goals: Degree of achievement



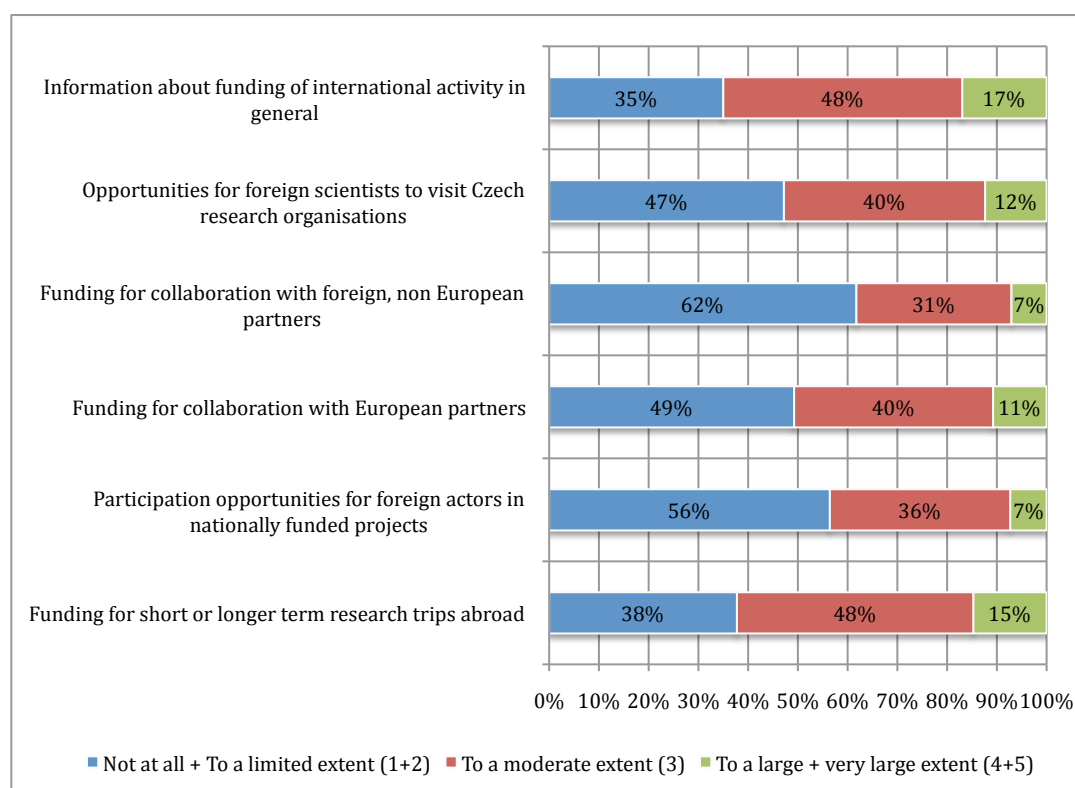
When asked about the barriers for research and development in the Czech Republic more generally, across the board of all activities and framework conditions, insufficient internal collaboration is not a major barrier to research, development and innovation, in a list of 12 general barriers international collaboration ranks 8th and limited reputation in the international scientific community is 11th.

3.4 Assessment of Support

Finally, researchers were asked about the support they get or perceive for their international collaboration activities. Here we distinguished between general support and support from the employing organisations. As for the latter, interestingly, two thirds of all researchers assess their organisations to recognise international activities for their career development and to support their international activities, even if this is mostly not embedded in an institutional strategy for internationalisation at organisational level. There are significant differences between organisational types only as regards language editing and support for trips abroad, where “other research organisations” appear to have an advantage over ASCR and Universities.

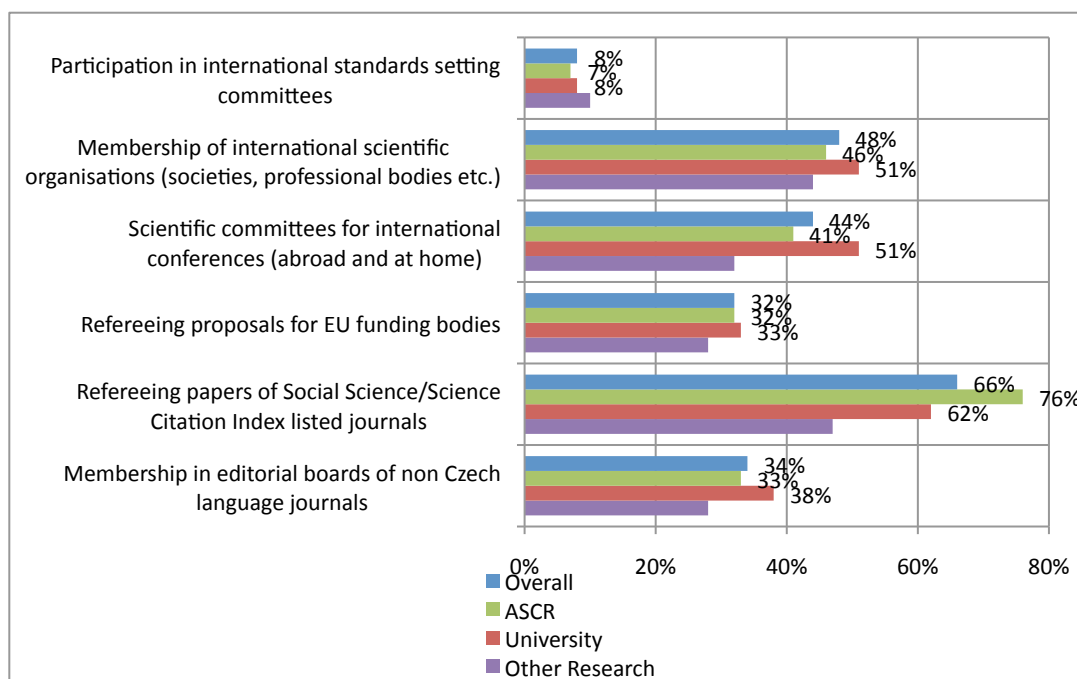
As regards support for international R&D activities more generally, the satisfaction level is much lower, the share of researchers indicating large or very large satisfaction is low, highest for general information (17%). The most dissatisfying aspect is the poor support of collaboration with non-European actors (which contradicts their wish to collaborate more with those partners) and the participation of foreign actors in national programmes. Interestingly, the funding for collaboration with EU partners, although covered widely through the Framework Programme, is still seen largely unsatisfactory. This high level of dissatisfaction is very similar across the different types of organisations and different types and levels of researchers.

Figure 4: Satisfaction rate with support for international R&D activities (To what extent are you satisfied with the support for pursuing international R&D activities in your country?) (5 point Likert 1: Not at all, 5: To a very large extent)



Beyond concrete collaboration researchers were asked to indicate a set of further involvements in international activity. Roughly half of the researchers have involvement in international scientific organisations, conference committees etc. The level of peer review involvement in international journal is highest, but assuming that all researchers should aspire to publish internationally and thus also be reviewer of international journals this figure should rather be slightly higher.

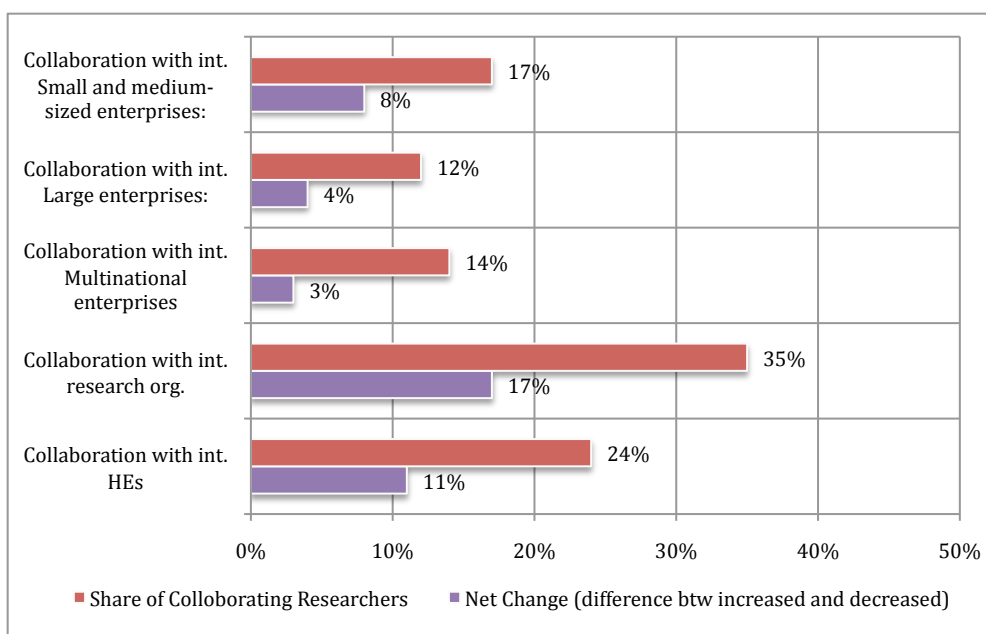
Figure 5: ~~Q12~~ Involvement in International Research related activities
(In the last three years, have you been involved in any of the following research-related activities?)



There are a few statistically meaningful differences according to the institutional affiliation: ASCR employees tend to be more active in refereeing papers in indexed journals while other research organisation employees are less active in this. University researchers are slightly more involved in scientific committees for international conferences while again this ratio is lower for other research organisation employees.

The type of organisations with which Czech research community cooperates is shown in Figure 6 below, indicating the high importance of foreign research organisations (highest share), and the (lower) share of industry partners, both within (Multinational) and outside the country.

Figure 6: International Collaboration
(With which types of research organisation(s) did your research group collaborate? How important will these collaborations be to your future research agenda?)



Researchers were also asked about the extent of industry related activity more broadly and the value this has for them. Cooperation with firms in the EU Framework Programme was only ranked 13 out of 16 industry related activities, however, the relative value of those cooperations was high, ranked 5th most valuable industry related activity. EU supported firm engagement appears to pay off for public researchers, and thus may have to be increased.

3.5 Funding

International funding sources are a key dimension of internationalisation, not so much as an additional funding source, but because they imply and allow for international research activities of various kinds. The relative importance of international funds is low, only 10% of ASCR and 7% of Universities claim to have more than one third of their research group financed by international funds.

Finally, we asked for specific funding sources and the relative benefit of the funding from different sources for the advancement of the research. We asked specifically for three sources for international collaboration: Science Foundation international programme, Framework Programme and other EU funded programmes (not Structural Fund). The Framework Programme turns out to be the fifth most important source for Czech researchers, with ASCR researchers reporting a slightly higher significance of the Framework Programme. The Framework Programme is the sixth most beneficial funding source, slightly lower ranked than its quantitative importance. The Science Foundation international programme, interestingly, is much less important (ranked 15) as funding source, but perceived slightly more beneficial than the Framework programme.

4. The perspective of research organisations

4.1 Results of the Director's survey

4.1.1 The sample

The survey to Directors of research organisations had a response of 74. Table 3

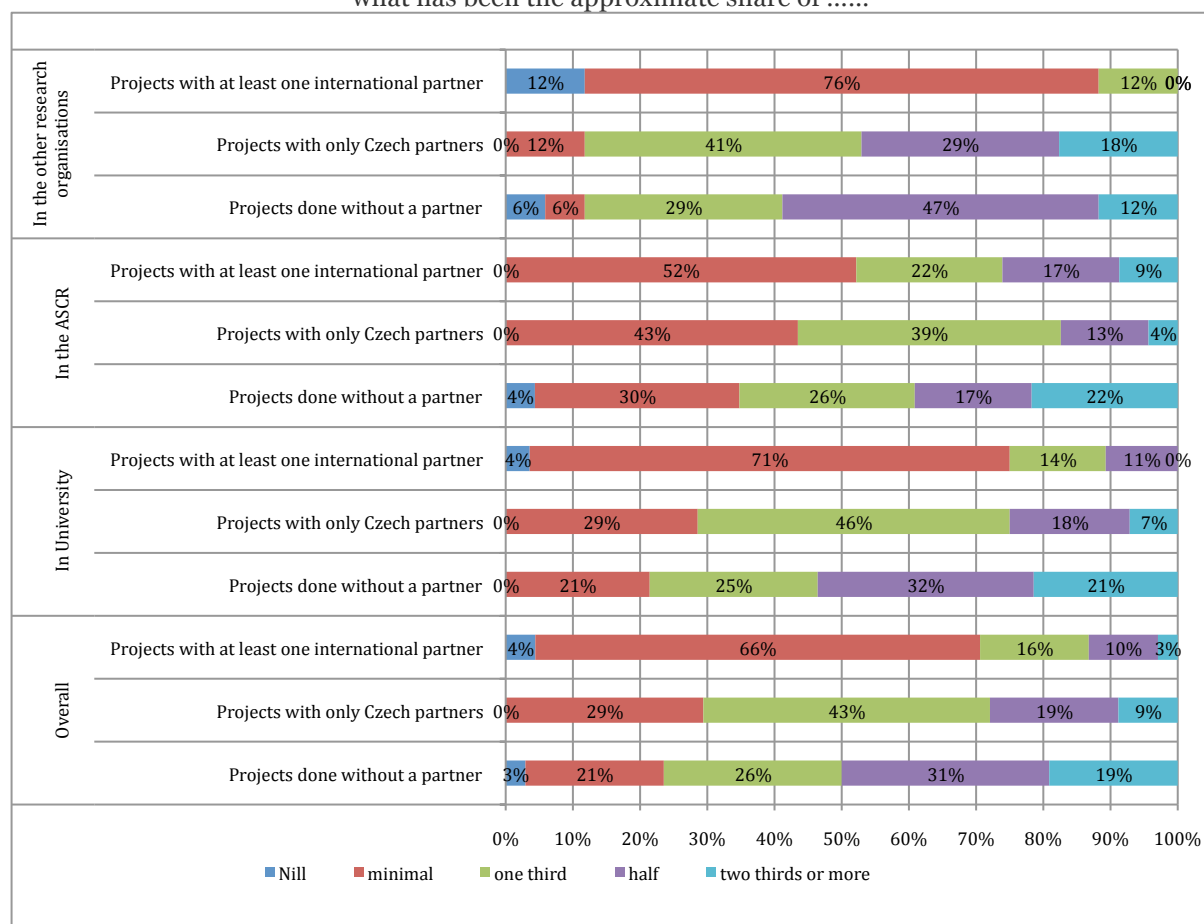
Table 3: Responding sample Directors

Type of organisation	Share %	Number
University	45 %	33
ASCR	31 %	23
Other research organisation	24 %	18
Total	100 %	74

4.1.2 Scope of international activities

The scale of cooperation is measured by the share of projects that have at least one international partner. Overall, 70% of organisations have no (4%) or minimal share of projects with international partners, 13% have half or more than half of the projects with one international partner (Figure 7). ASCR institutes show a considerably higher share of projects with international partners than Universities.

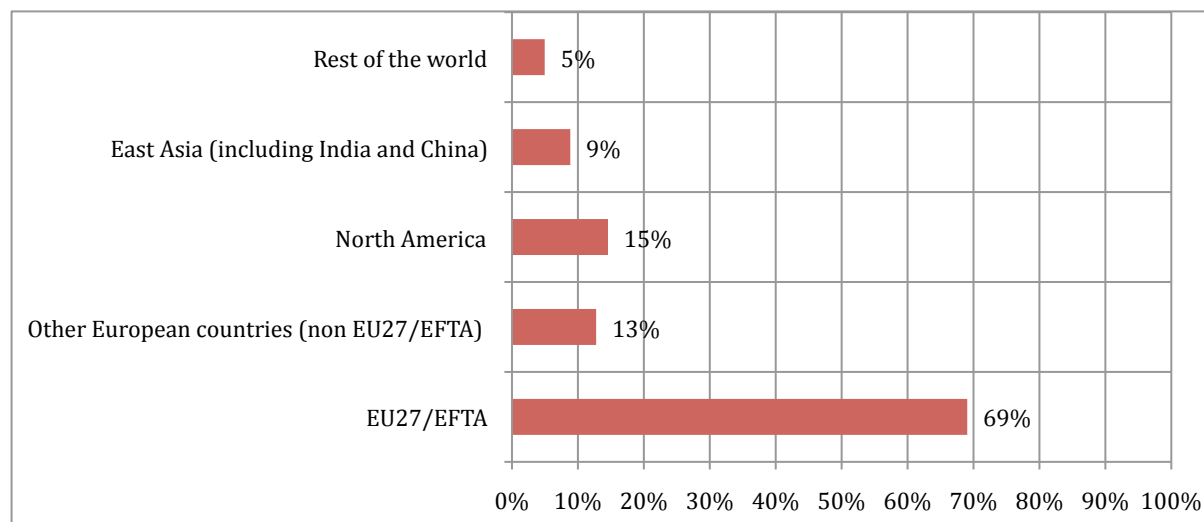
Figure 7: Considering the research portfolio of your organisation over the last three years, what has been the approximate share of



Roughly two thirds of all organisations (again slightly more ASCR institutes (70%)) indicate that they have strategic partnerships with foreign organisations that go beyond concrete project collaborations. The strategic partnerships are strongly focused on partners from within EU 27/EFTA countries, while US partners and Asian partners are much less common as depicted below..

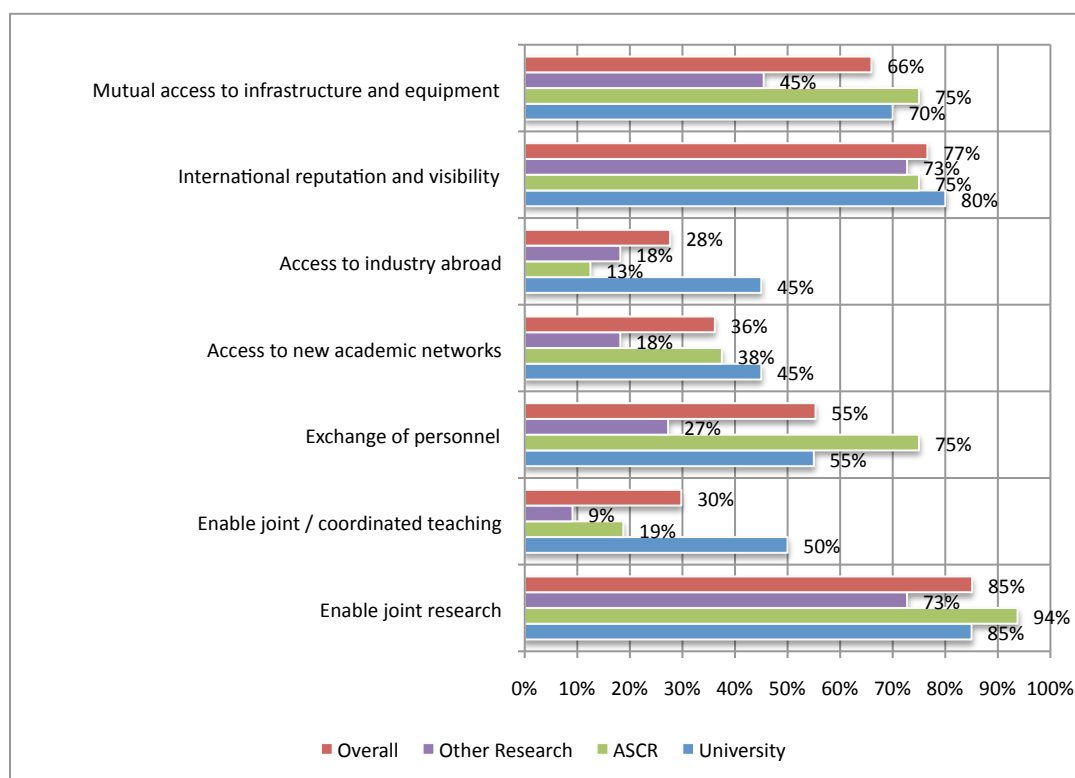
This trend continues, as two thirds of all organisations say they will increase strategic partnerships with EU27/EFTA organisations, followed by 43% intending to increase Asian strategic partnerships (North America 34%, Other European countries 36%, Rest of the world 21%).

Figure 8: Estimate the share of strategic partners from the following regions



The motives for strategic partnerships are given in the figure below.

Figure 9: How important are the following motives for these strategic partnerships?
(Share of high and very high importance (4+5 in 5 point Likert))



Above all, they shall enable joint research, but interestingly, they are almost as strongly driven by the urge to increase international visibility and reputation. They further allow access to infrastructure and exchange of personnel, as more than 50% of the organisations say that this is a strong or very strong motivation. Access to new networks, on the other hand, is not a very strong driver, strategic partnerships are apparently built not at the beginning of new collaboration, but on the basis of existing networks.

Figure 10 compares the share of organisations with cooperation with national and international partners. As to be expected, collaboration with international partners is less common than national ones, there are a significant number of organisations that have no international partners. The ASCR institutes seem to be best connected, other research organisations least. However, approximately two thirds of all organisations see an increase in international cooperation in the next three years. While ASCR and other research organisations do not differentiate greatly between types of international partners, Universities clearly prefer other Universities over research organisations abroad. We also note an expectation of roughly two thirds of all organisations that international cooperation both with Higher Education and with research organisations will continue to raise Figure 11.

Figure 10: Collaboration with typologies of research organisations
(With which types of research organisations did your organisation collaborate in the last 3 years?)

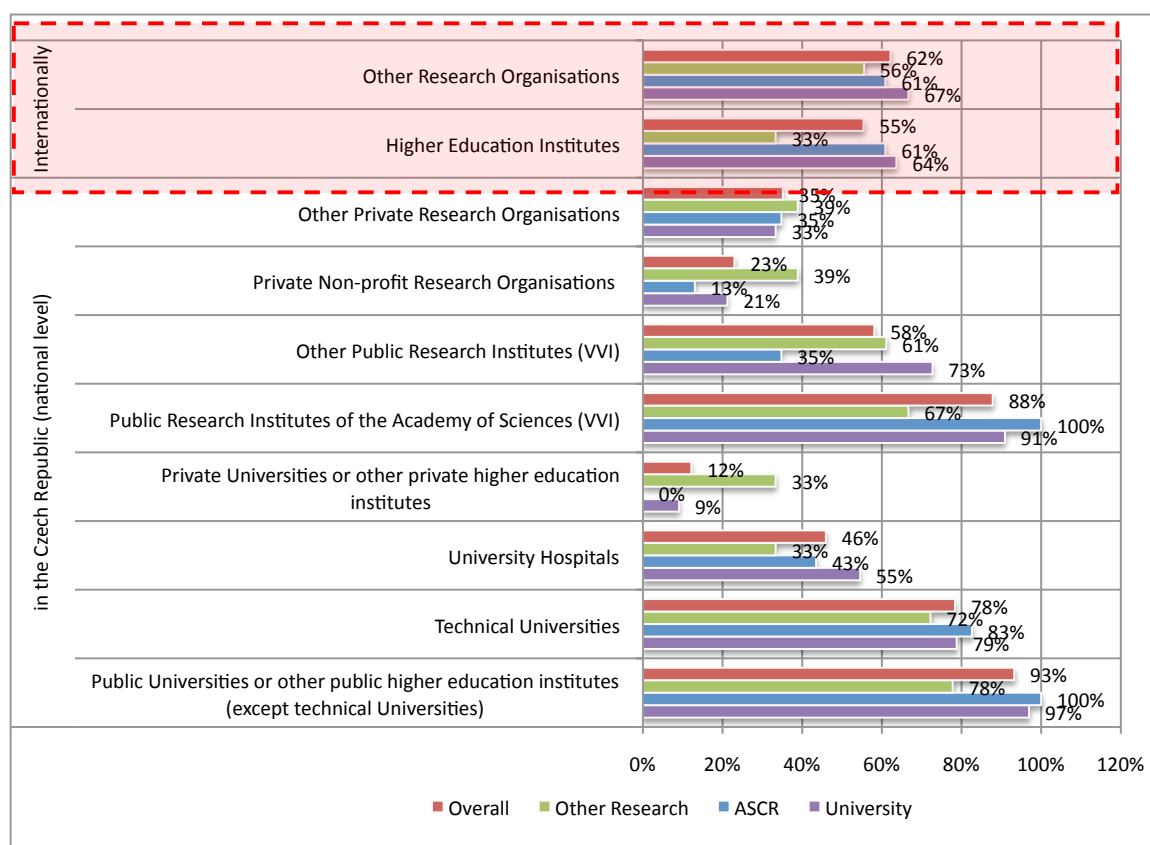
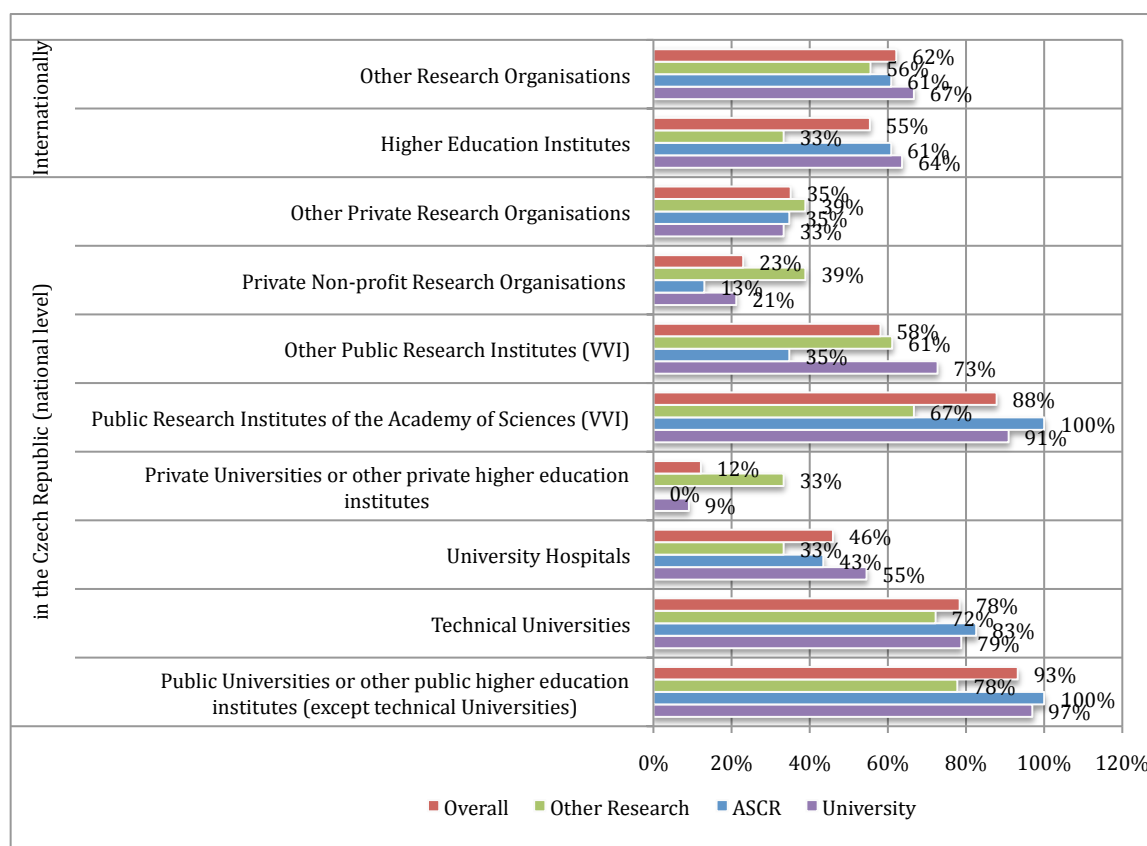


Figure 11: Collaboration with typologies of INTERNATIONAL research organisations and importance for future research agendas (How important will these collaborations be to the research agenda of your organisation in the next three years?)



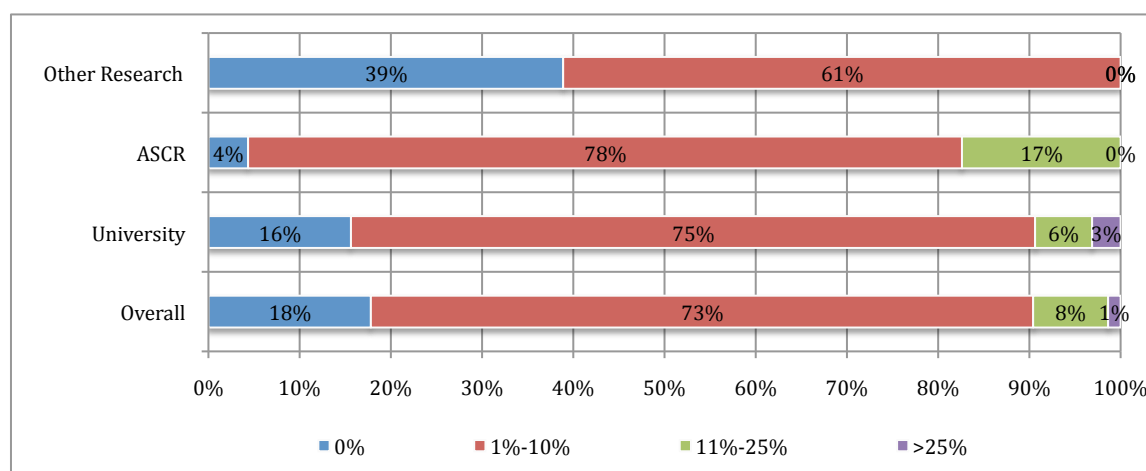
The cooperation with international firms is less common, as to be expected. Overall, one third of all organisations collaborated with foreign SMEs and one fifth with large foreign firms. Universities were considerably more active, roughly half of them claim to have had collaborations with foreign firms in the last three years, with an equal share for SME and large firms, while 26% of ASCR institutes collaborated with foreign SME and 17% with foreign large enterprises. Overall, collaboration with international firms is well below collaborations with national firms, which are 72% (all sample) for SMEs and 52 % (all sample) for large firms. Domestically, ASCR are collaborating as often with SMEs as Universities and other research organisations, but far less often with large firms (46% versus 76% Universities).

In a further question on activities with industry, international cooperation with firms is ranked 10 out of 14 options, and thus not a prominent activity for research organisations, but it is ranked 7th in terms of its value contribution, indicating that international cooperation with firms pays off but is somewhat neglected.

4.1.3 International staff

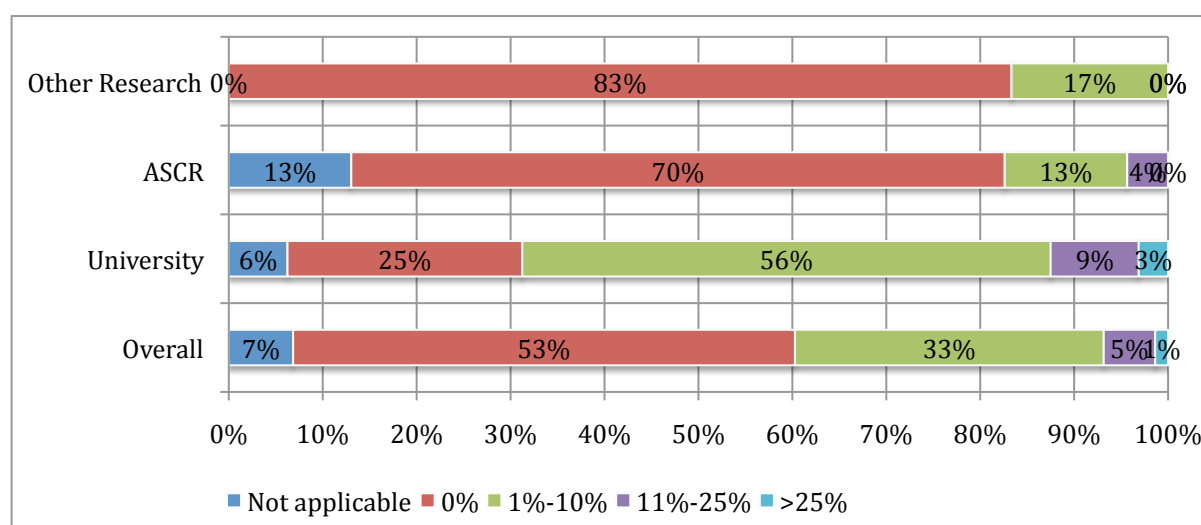
One important measure of internationalisation is the share of international staff in organisations. This is not to say that more is better, but it indicates openness towards and attractiveness for foreign researchers – and thus an important pre-condition to share knowledge internationally. The vast majority of organisations has a small share of international staff, below 10%, and outside ASCR and Universities a considerable number of institutions have no foreign personnel at all. ASCR institutes seem more international than Universities.

Figure 12: What is the approximate share of non-Czech R&D staff in your organisation?



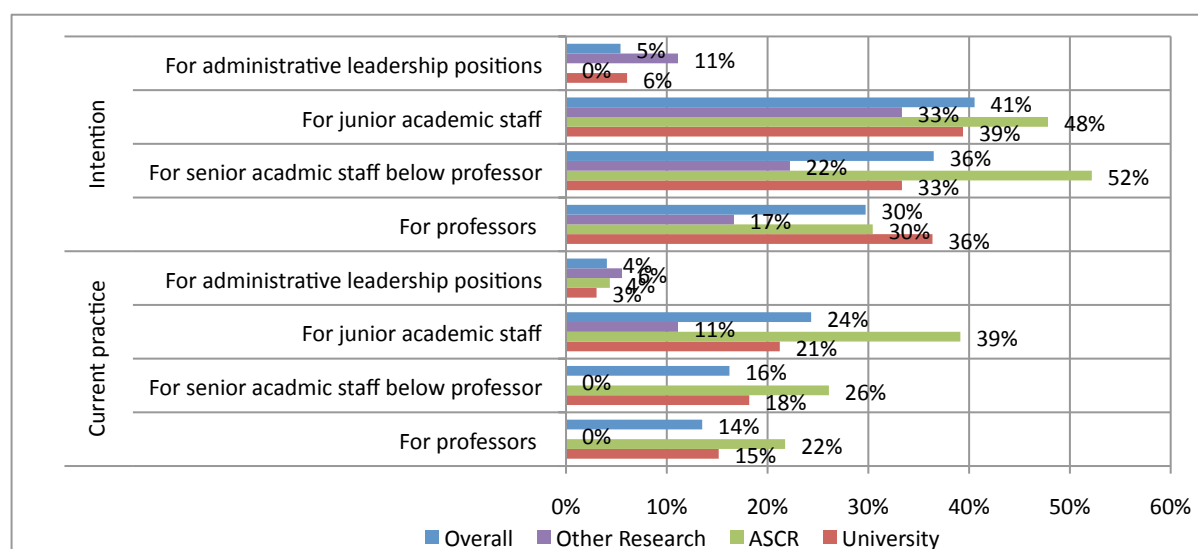
Some interesting difference are to be seen when it comes to the presence of international personalities in advisory boards of the organisations (Figure 13). This is an indicator of the exposure to international scrutiny and at the same time indicates the level to which organisations promote themselves through inter-personal networks. Only Universities have meaningful presence of foreign personnel in those boards, 83% of ASCR institutes and other research institutes do not have any foreign peer and advisor.

Figure 13. What is the approximate share of non-Czech members in the main supervisory board of the organisation (highest level)?



A next dimension of international staffing is recruitment (Figure 14). Here we make a set of interesting observations. First, there is generally a low level of international recruitment, currently only 14% of all organisations recruit Professors internationally, and the figures are only slightly higher for junior people. Administrative leadership is almost completely recruited domestically. Second, there are strong differences between types of organisations, with ASCR institutes considerably more often recruiting internationally than other organisations. Third, there is a clear intention to broaden international recruitment, the share of organisations which intend to do that routinely in the next three years more than doubles, and according to these projections Universities catch up (and in case of Professors even overtake) ASCR. This may potentially alter the fabric of the Czech research system considerably.

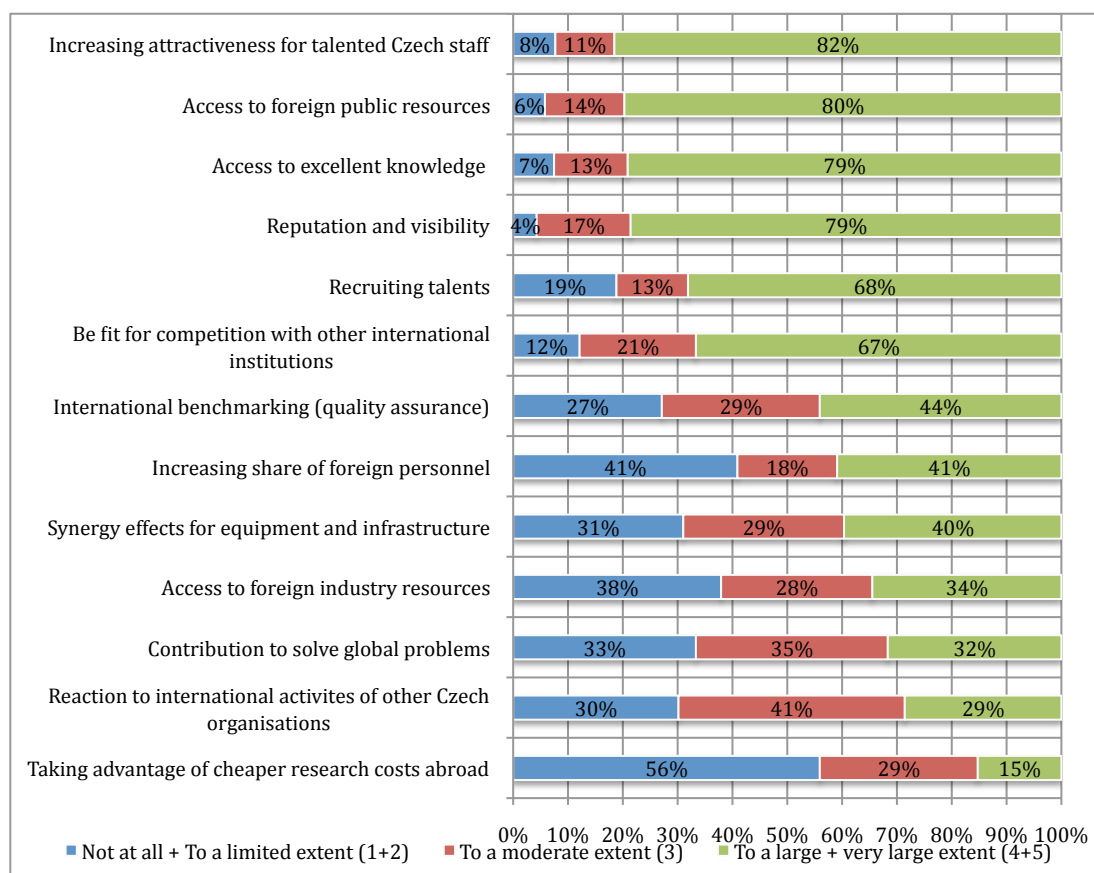
Figure 14: Does your organisation routinely issue job advertisements internationally? Do you plan to do so in the next three years?



4.1.4 Motivation for international activities in general

Organisations can impede or drive internationalisation, they can provide opportunity structures for personnel to exploit international opportunities or stifle international activities. Ultimately, it must be in the organisational self-interest to have a clear internationalisation strategy. Part of such a strategy is the portfolio of motives for international activities. The following figure summarises the motivations, sorted in decreasing importance. The most important motive is the attractiveness for talented Czech staff. This implies that being supportive for international activities is a key motivation in the choice of positions for Czech staff. Combined with the fifth most important reason, recruiting talent, this gives a clear signal that the organisations have understood the importance of the international dimension for HR development. The second single most important motive is to get access to international and foreign research budgets and be fit for competition (reason 6). Interestingly, costs are not an important factor – reflecting the fact that the Czech Republic itself does not have a cost disadvantage within Europe. Equally, the fact that other Czech partners internationalise is not a driver for public research organisations.

Figure 15: In general, to what extent are the following motives important for international activities in your organisation?



When asked which reasons will be more important in the future, the picture re-enforces itself, recruiting talents is most often mentioned (42% of all organisations, accompanied by 31% who say they will want to increase the share of foreign staff), followed by increasing attractiveness for Czech staff (41%) and access to foreign (including EU) funding sources (41%).

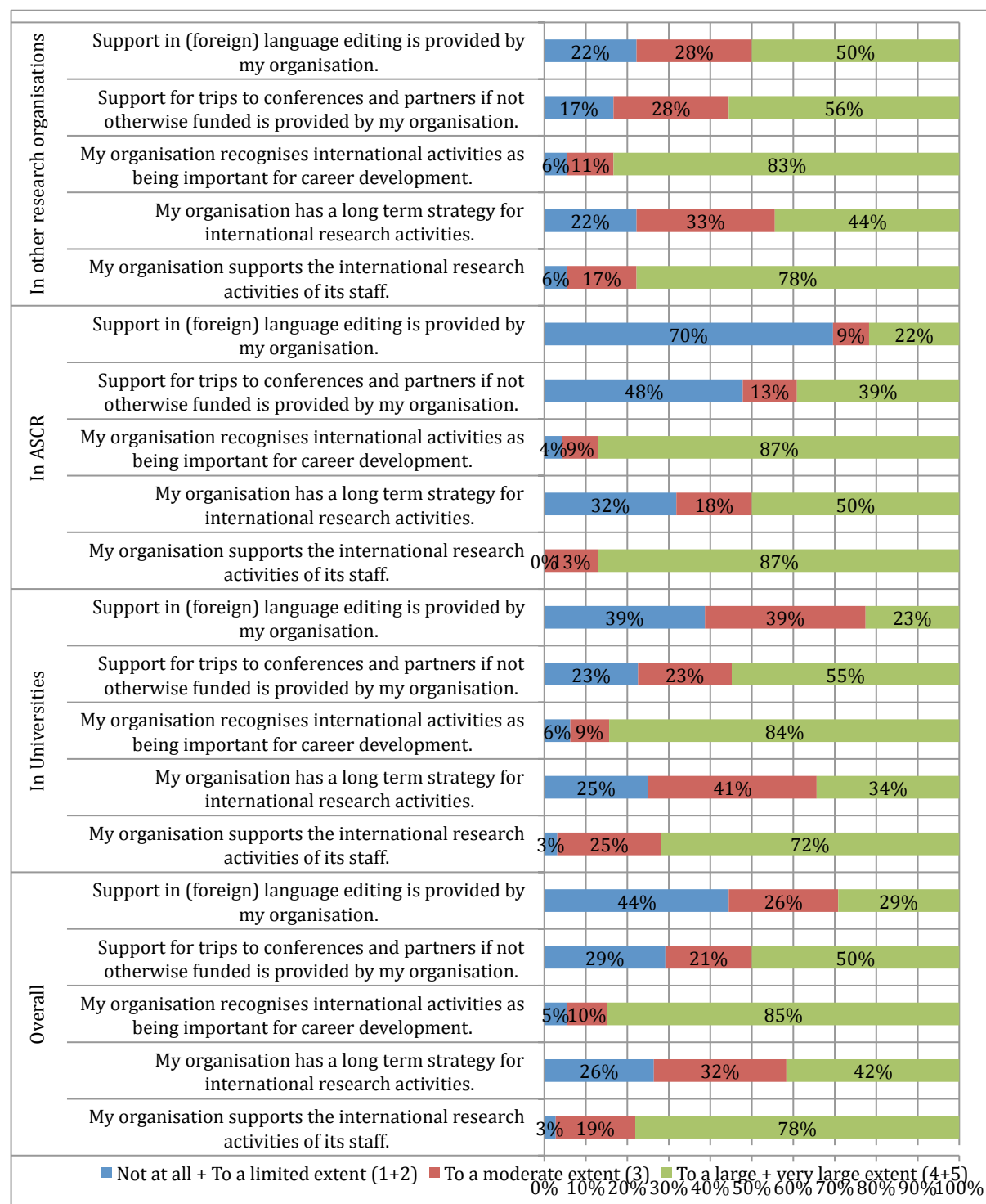
The Directors, similar to the researchers, do not see the scope and scale of international activities is not perceived to be a major barrier for RTI activities in the Czech Republic. Out of 13 barriers they were asked for, insufficient international collaboration was ranked 10th-, with no significant difference in different affiliations. This ratio is slightly higher than the researchers' perception. The situation is slightly different in terms of international reputation, here Directors are more concerned and see this as a significant barrier (6th out of 13) – in contrast to researchers.

4.1.5 Support and funding

The Directors were asked to characterise the support they give for various researcher activities. These answers are consistent with the responses of individual researchers reported above. 85% of all organisations claim to recognise international activities of researchers to a large or very large extent, and 78% thus support international activities to a large or very large extent. Concrete support for trips and short term mobility is provided by half of the organisations (see Figure 17).

Around three quarters of the directors believe that their organisation support international mobility to a large and very large extent, here the share of ASCR institute claiming such support is significantly higher (87%).

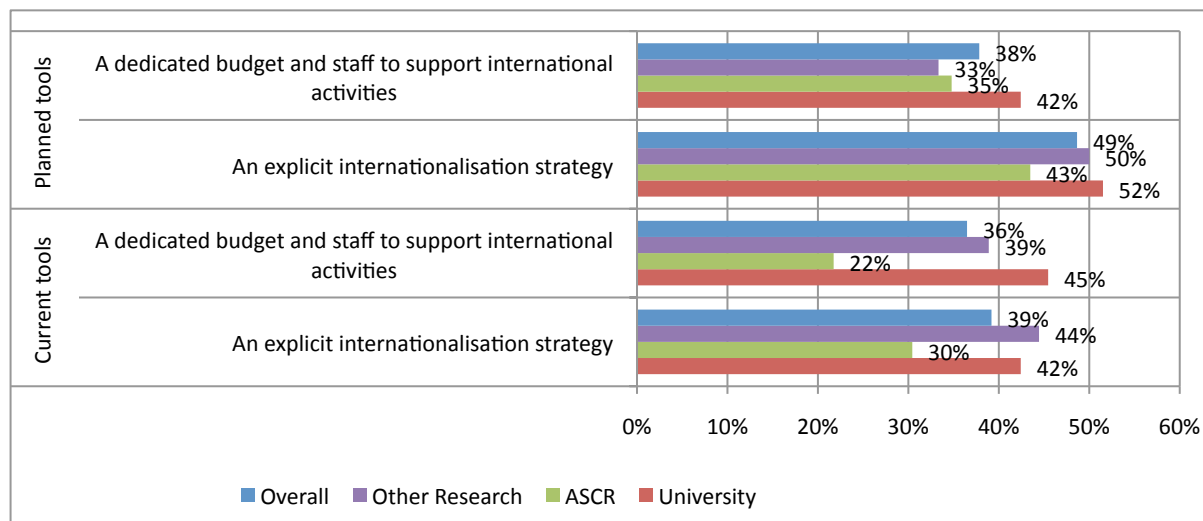
Figure 16: Support to international collaboration
(To what extent do you agree with the following statements?)



Specific support mechanisms need to be linked to organisational strategies and need to be financed. Slightly less than 40% of the organisations have an explicit internationalisation strategy, but 49% plan to have one within three years, which means that almost all organisations in the Czech Republic have or will have such a strategy. The situation is similar with dedicated budget, albeit the numbers are a

bit lower. ASCR institutes appear to be slightly less inclined to formulate a strategy and dedicate a budget but their plans is to introduce these tools are in line with the other types of institutions

Figure 17: Does your organisation have the following tools for the management of international relations?



International funds are yet of very low importance for research organisations. 28% of all Directors indicate zero income from international sources, 58% minimal. However, there is an upward trend, as 23% of Directors indicate that the share of international funding has increased in the past (7% say it has decreased).

4.1.6 Overall assessment of internationalisation consequences

In a final step the questionnaire asked for assessment as to the consequences of internationalisation more generally, for the Czech system. Overall it appears that the benefits by far outweigh the costs. For example, only a minority of Directors sees the Czech Republic lose more knowledge than it gains, very few think that international collaboration weakens domestic cooperation, while 21% say that foreign competitors are strengthened to a moderate (17%) or a large/very large (4%) extent. The only more general concern is with the loss of Czech talent, as 41% of all Directors agree to a large or very large extent that more highly skilled people leave the Czech Republic than move to it. The main issue, thus, is the attractiveness of the Czech system and the need to re-patriate Czech researchers that have gained valuable experience abroad (rather than stop Czech researchers from going abroad as this clearly would reduce overall benefits of internationalisation).

While, overall, the outlook of the ASCR institutes is more positive than for the rest of organisations, many of the other organisations, largely more application oriented, have more concerns. They fear that through internationalisation the focus of research is becoming less and less relevant to Czech industry and more often see problems with international property rights issues. 11% of those organisations even see to a large or very large extent a strengthening of foreign competitors through international activities.

Figure 18: Standpoint versus international collaboration
(Based on your experience, to what extent do you agree with the the following statements?)



4.2 Insights form research organisation interviews

4.2.1 Introduction

The following section draws upon telephone and face-to-face interviews conducted with representatives of research-performing organisations (drawn from the University and non-university Academy sectors) by members of the project team. Not surprisingly we find that there is variation in the extent to which research (and teaching activities) are internationalised across subject areas (with some subject areas showing evidence of a much higher international orientation than others) and between but also within sectors. International collaboration and international mobility are increasingly accepted as necessary to ensure the excellence of Czech research. Most internationalisation within both the university sector and the academy institutes sector is bottom-up rather than driven by top-down strategy. Longstanding barriers relating to culture but also structure and incentives remain. The principal barrier remains funding. The bottom-up international activity of Czech researchers is likely to continue to grow organically. Younger researchers coming through are more likely to be exposed to internationalisation as an integral part of research and those researchers are likely to collaborate internationally as long as they are enabled to do so.

4.2.2 Strategy, mission and structure

At a strategic level international collaboration and international mobility are increasingly accepted as necessary to ensure the excellence of Czech research in all but a few areas of the humanities and social sciences where there is relatively little realistic scope for international research collaboration (for instance the study of the Czech language and culture). The **Academy of Sciences of the Czech Republic**, which (together with the Charles University) accounts for much of the research activity in the Czech system, emphasises internationalisation in its high-level strategies and has a division for international co-operation within its central administration to promote and support this. The ASCR, through its own expert groups, also works with policy-makers to influence the overall Czech policy stance towards internationalisation (for instance policies towards European research infrastructures³, the EU Framework Programme, cohesion policy, the ‘innovation union’ etc). The central administration provides support to Academy institutes and researchers participating in the Framework Programme and promotes active Czech membership of expert groups etc. The Czech Mobility Centre of the ASCR provides some support, both for outward mobility and for incoming researchers.

The individual **ASCR Institutes** make decisions about specific research activities and appointments. Some institutes, especially those in the area of physics, are highly internationalised in most areas of activity, with intense international collaboration, shared use of facilities, and inward and outward mobility. Others, especially in the humanities, seem less so. The ASCR does not collect routinely data about foreign researchers working within the institutes but many institutes do collect and report such data. Institutes also collect data on funding from international sources such as the FP or EURATOM. The ASCR uses international assessment committees to periodically evaluate the research performance of individual academy institutes. However there seem to be no standing scientific committees or advisory councils (at either the ASCR or institute level) with international members. We found no evidence that indicators of international profile such as international co-publications were used in decisions about staff appointments although we did find evidence that institutes do consider the broader international profile of applicants, and positions in leading academy institutes or university departments are increasingly opened internationally.

The universities are the other significant research players in the Czech system. The funding system is increasingly oriented towards enabling research in universities. The most prominent research university is the Charles University, though new institutions with aspirations to be research-intensive (sometimes based on an international rather than national model) are emerging. Others are likely to remain teaching-focused or very focused on applied technical problems. Most research

³ Academy institutes send participants to sub-panels under ESFRI, and the Czech Republic has successfully used structural funds to attract infrastructure development (through the Extreme Light Infrastructure – ELI project, managed in the Czech Republic by the ASCR Institute of Physics) and, more generally, has worked to shift the axis of European research infrastructure planning to the east.

internationalisation within the university sector is bottom-up rather than driven-by top-down strategy. At best top-down strategies, where they exist, enable or support bottom-up demand for international activity (e.g. participation in the Framework Programme). There are efforts towards teaching internationalisation (e.g. use of ERASMUS and other exchanges, joint programmes, doctoral training programmes in English, etc) but there remain barriers to such developments (see below).

Actors in the system note some changes in mobility patterns. In the past the Czech Republic may have been a convenient “stopping off” point for researchers from Eastern Europe and the Former Soviet Union countries heading West. There is still much bottom-up research interaction with (and mobility from) these countries. However the Czech Republic is now a destination of choice in itself for these researchers, and researchers increasingly come from a wider range of countries.

Finally, it was suggested to us that research-performing organisations which collaborate with firms may sometimes be more active in collaboration with foreign firms than with domestic ones. It was suggested that this could be because foreign firms have a greater absorptive capacity which makes collaboration easier and thus more attractive.

4.2.3 Drivers, barriers and framework conditions

The overwhelming driver of top-down internationalisation strategy at the level of research-performing organisations is the quest to improve the excellence and visibility of Czech research. Bottom-up internationalisation is largely driven by intrinsic research factors (the need to access advanced or complementary knowledge, skills, samples, technologies and facilities) much more than by incentives shaped by top-down strategies.

In the early years of the new Czech research evaluation system, the method used (where credit was divided between partners, including international partners) arguably incentivised against international collaboration. This problem has now been fixed. Some actors believe that this evaluation system continues to create volatility and problematic incentives for high-quality research. Some actors within the research system also observe a tendency towards paying lip service to slogans rather than concrete action, something which is now changing as a new generation of policy-makers, researchers and academics come to prominence. Having said all that, it was observed that the principal barrier to international collaboration remains funding and/or salaries. Inward mobility of foreign researchers for visits or to take up positions is limited by the funds available (salary expectations often being higher). At present many research-performing institutions are themselves stepping in to facilitate internationalisation with their own funds because the national support for internationalisation activity which does exist is seen as inflexible and bureaucratic. The broader lack of openness of national grant programmes to foreign participants can also be a barrier. Finally, high teaching loads in even leading university departments can present a barrier to research collaboration and medium-term mobility.

It was suggested that Czech students and researchers have relatively little motivation to become internationally mobile. And whilst Prague is a relatively popular destination there are also barriers to inward student mobility, including a legal requirement to teach in the Czech language for most purposes. This also presents a potential barrier to recruiting foreign teaching staff, whilst lack of English ability remains a barrier to outward mobility or collaboration for many (often older) researchers in the Czech system. Some institutions proactively support the learning of English in order to overcome such barriers and there is some use of incentive structures to promote take-up of English by doctoral students. At the higher (doctoral) level there seems to be a greater willingness to go abroad for short to medium-term visits.

There are longstanding barriers relating not only to organisational culture but also structure that reduce co-operation between universities and research interests. For instance it was reported to us that there are barriers to institutes and universities pooling their capital investment to create joint facilities or cross-fund each other's facilities. If obstacles to collaboration between the different parts of the research system do remain, this could have a retarding effect on internationalisation. As for European funding, some universities and institutes are providing central support, but Czech partners seldom lead projects and there remains a perception amongst many researchers that national funding is ‘easier’ to obtain. As for policy co-ordination at the higher level, it was suggested to us that whilst there is now good programme co-ordination through the RDI Council, the broader goals, strategies and ideas behind them still do not appear to be co-ordinated.

4.2.4 Effects and results of international S&T collaboration

Whilst the systematic assessment of impacts from internationalisation is really just beginning in the research-performing organisations, there has been some effort to share experience about impacts at the system level – for instance through the Technology Centre. The most dramatic success story in recent years, in terms of internationalisation, and one that is as yet far from being finished, concerns research infrastructure. The Czech Republic has developed its own national infrastructure planning process and roadmap and has engaged (and continues to engage) actively in the European ESFRI roadmapping process. In particular the Czech Republic has worked to shift the emphasis in research infrastructure planning eastwards towards the new member states, and as a result has successfully mobilised structural funds to support the development of the Extreme Light Infrastructure presence in the Czech Republic.

4.2.5 Future developments

The openness of the Czech system is likely to remain a critical issue. Even where international collaboration is increasing Czech researchers may only rarely be playing an initiating/leading role. Some of the international activity may also be following historic patterns rather than reflecting current priorities or the pursuit of excellence. Although great strides have been taken in terms of a more strategic attitude in the ASCR, in the leading academy institutes, and in the leading research universities⁴, a conservative and inward-looking culture and comparative lack of incentives mean that many researchers within the Czech system seem content to remain focused within the national system. It was suggested that positive incentives for international collaboration would be likely to be more effective in changing behaviour than the kind of financial penalties which can be applied through research evaluation processes.

The bottom-up international activity of Czech researchers is likely to continue to grow organically rather than in big leaps except in those fields where internationalisation is critical. In the university and research institute sectors some changes in practice (e.g. changes in funding rules) and culture could remove some small barriers to international collaboration. This is partly an issue of generational change. Younger researchers coming through the system now are likely to be less conservative and more outward-looking and are more likely to have been exposed to internationalisation as an integral part of research. These researchers are likely to be motivated to collaborate internationally as long as they are suitably supported and enabled to do so. Actors expressed a need for well-defined and stable supporting programmes, with clear objectives. There also appears to be a need to consider opening up national funding to foreign collaborators. Stability in general was a theme – it was suggested to us by several participants that the perception of permanent reform in the Czech system was itself a barrier to attracting in good researchers from abroad.

Many of our interviewees felt that there remain cultural and structural barriers to collaboration between the academy institutes and the universities, although it is clear that the situation is much improved. However, whilst the two sets of institutions have both modernised over recent years, their relationship has not been explicitly modernised. Finally, it is an open question as to how open to international advice/scrutiny the strategies and management of Czech research-performing organisations will be in the future.

⁴ albeit on an uneven basis, with some university departments or academy institutes believing they have no need for an explicit internationalisation strategy

5. Understanding supply for and policy benefit of international R&D: institutional action and strategies at the level of Ministries and Funding Agencies

5.1 Introduction

Internationalisation of R&D in most EU countries is implicitly integrated into a wider strategy for Science and Technology policy. As recent studies on S&T collaboration show, few European countries have explicit dedicated policy strategies for internationalisation.

In the Czech Republic the key organisation that develops and implements policy for R&D internationalisation is the Ministry of Education, Youth and Sports (MEYS). MEYS is the central authority of state administration for overall strategy, educational policy and the preparation of appropriate legislative standards and executive and operational activities. It distributes financial resources from the State budget and develops general scientific research and development policy. Amongst four other departments at the ministry, there is a **Group of European Integration and International Relations**, which is responsible for international R&D cooperation. In this group approximately 16 people are dealing with the international aspects of R&D.

The **Ministry of Foreign Affairs** is de facto a large funder of international science cooperation as they are funding the Czech Republic's memberships to the international organisations such as ESO, COST, EMBS, EUREKA and CERN due to the diplomatic status of the intergovernmental agreements. It is however MEYS who are dealing with the day-to-day operation of these programmes. The Ministry aims to use its foreign embassies better for the purpose of transferring information on R&D.

A second organisation involved is the **Ministry of Industry and Trade (MIT)**. This ministry provides direct support to private business R&D (grants, loans), indirect support to business R&D (tax incentives and guarantees), support to innovative start-ups, produces strategy policy documents (policy consultation papers, green or white papers, some Operational Programmes of Structural Funds). The Ministry is responsible for managing programmes for industrial research and the Operational Programme Enterprise and Innovation (2007-2013). The ministry does not have an explicit strategy for international collaboration.

Despite this industry oriented mandate, MEYS is responsible for managing the industrial applied international R&D programmes such as EUREKA and in particular Eurostars, with the exception of the Community Innovation Programme (CIP). MIT does however cooperate with MEYS particularly to prepare international agreements related to R&D, to promote interest in various international bodies (e.g. ESA) and to promote Joint Technology Initiatives and Article 169 and 171 initiatives.

The **Ministry of Defence** is responsible for a number of international safety & security related S&T programmes as well as international activities done as part of its NATO task.

Agencies are also engaged supporting R&D internationalisation. The **Technology Agency** that has only recently started its operation has hardly implemented any cross-border activity. It is focusing its activities mostly on domestic programmes, which have no formal internationalisation requirement, nor are the industry oriented programmes open for foreign participation. As the MEYS is responsible for the international programmes the Agency does not have any involvement in programmes for SMEs such as Eurostars. It has become a member of TAFTIE in December 2010.

The Presidium of the **Czech Science Foundation (GACR)** has set the promotion and strengthening of international cooperation and supporting the better integration of Czech scientists into the world scientific community as one of the priorities of the GACR programme. The main objective of the international cooperation is to establish bilateral research project schemes with foreign partner funding agencies, in order to enable the better exchange of scientific information and techniques and the use of specialized equipment available in the countries involved. The GACR has bilateral cooperation agreements with the National Research Foundation of Korea, with the German Deutsche Forschungsgemeinschaft (DFG) and the National Science Council of Taiwan.

5.2 Internationalisation in current strategy

The National Policy for Research, Development and Innovation 2009-2015 has nine objectives, of which one is directly related to R&D internationalisation namely to 'intensify the Czech Republic's

involvement in the international R&D&I co-operation'.⁵ However one can state that other objectives such as 'creating an environment stimulating R&D and innovation' indirectly stimulate a closer interaction of the Czech research system with the international R&D as well. The better the research system functions and improves its quality the higher its reputation and ability to attract international collaborators and foreign researchers will be.

The political importance for internationalisation of R&D has grown as can be derived from the growth of national budgets for international co-operation programmes. All major programmes for internationalisation have seen their budgets grow considerably.

MEYS has initiated the development of an inter-ministerial strategy for internationalisation to 2015. The strategy mostly consists of an overview of foreseen policy instruments. The key rationales behind the an intensified international S&T collaboration are that it:

- Supports the fast modernisation of Czech R&D environment;
- Enables access to knowledge and results otherwise inaccessible;
- Increases the effectiveness of R&D;
- Keeps an excellent level of R&D;
- Increases prestige and attractiveness of the CR;
- Broadens the capacities of Czech R&D while at the same time sparing national funds;
- Fulfils diplomatic engagements of the CR (ERA, NATO, other).

The four main goals for internationalisation are 1) to improve conditions of Czech researchers' participation in international R&D programmes 2) to increase the efficiency of the R&D cooperation that is based on bilateral intergovernmental agreements on R&D cooperation 3) to integrate the administration of existing programmes of R&D collaboration and 4) the strengthen the involvement in the jointly performed security and defence R&D.

The strategy was adopted in the summer of 2008 and an update is planned for 2012.

5.3 Drivers and bottlenecks for internationalisation

The drivers for S&T internationalisation in the CR are not very different than in many other countries. From a policy perspective two issues seem to have the most policy attention in documents such as the White Paper on R&D:

- The lack of international mobility of researchers both outward and inward
- The insufficient participation of Czech researchers in the European research programmes such as the Framework Programme collaborative programmes, ERC, EIT and so on;

The analysis in the policy documents is that the internal reform of the research landscape is necessary to improve the quality and reputation of Czech research in order to increase the publicity and reputation of Czech research. There is relatively little policy attention to R&D internationalisation from the perspective of innovation and industry. There are hardly any programmes for internationalisation of Czech industry and those that are focused at industry are run by MEYS rather than the ministry and agencies that are more industry oriented.

As international performance and publications are becoming a more important of assessing the quality of research an important driver for more internationalisation comes from the research community itself. There is a parallel driver at the policy level: activities such as Joint Programming and ERA-NETS have increased the international outlook of Czech policy makers.

⁵ Erawatch, Policy Documents, last updated 03-04-2010.

The interviews with representatives of ministries and agencies brought forward a number of observations on the key bottlenecks:

- From a policy perspective too much emphasis is put on getting a better financial return from the European FPs, as this would alleviate the Czech national budgets, while not enough strategy is developed how to improve the international collaboration in a wider sense;
- A tendency for Czech researchers to be inward looking with a lacking eagerness to be internationally mobile. Given the history the experience with working in an international research community is still developing. According to the 2008 White Paper on R&D this is particularly the case for the middle aged research managers;
- Language skills still form a barrier, albeit less so than in the past;
- Only certain domains in the Czech research system (e.g. IT, Mathematics, Physics, Chemistry, Egyptology) really have a good international reputation and do manage to attract people from abroad.
- There is a lack of coordination between national and international R&D policy programming and planning and at the same time a lack of coordination between ministries leading to missed opportunities in the EU (e.g. in the area of Joint Programming);
- There is a shortage of staff at the Ministries who deal with the many international and cross-border activities. Too few people have to represent the Czech Republic in many strategic committees and working groups;
- According to our interviewees Czech companies and SMEs in particular are not yet prepared for international collaboration or even trade. Getting into the FPs is a far too big step for them.

According to policy makers much progress has been made in decreasing the bureaucratic and administrative hurdles for inviting foreign researchers for short and long visits. The visa arrangements for scientists have been improved. According to some interviewees it is mostly still a matter of perception by the research community that this is a major hurdle. Indeed some of the interviews with internationally oriented research managers stated that inviting non-Europeans to stay in the CR was not a real bottleneck, while others reported that this is a major problem, particularly for longer stays in the country.

5.4 International aspects of R&D programmes

There are five types of policy initiatives that explicitly support the internationalisation of R&D in the Czech Republic:

- i. Diplomatic agreements that include mostly bilateral R&D collaboration
- ii. R&D programmes dedicated to cross-border collaboration
- iii. Membership of trans-national R&D organisations
- iv. Support and information on the European R&D Framework programme
- v. Improving the framework conditions (e.g. visa regulations for scientists)

The majority of the national Czech budget goes towards international organisations such as CERN, COST, EUREKA, etc. which is formally dealt with by the Foreign Ministry but comes out of the budget for R&D policy.

The second largest budgets go towards bottom-up research co-operations within the geographical framework of formal bilateral co-operations. These are all implemented by MEYS.

For collaboration within Europe the main vehicle is the Commission's RTD Framework Programmes. The government supports a NCP system run by the Technology Centre that gives advice and information to potential applicants both from the public and private sector. It is a major objective for the CR to increase the Czech participation in the FPs.

Overall membership in ERA-NETS is very small and not very active. MEYS is involved in some mostly in aeronautics but it often happens that due to staff shortage tasks are outsourced to experts from the research community. MIT was involved in two SME oriented ERA-NETs but they were not very

successful and their support from the European Commission will not be continued. The Ministry is discussing whether to continue at least one of them with the most dynamic partners, outside the official ERA-NET framework.

The CR has an active involvement in ESFRI and the investment in infrastructure offers an important building block for internationalisation. As interviews showed these infrastructures investments are sometimes made with an explicit international set up, such as the investments of Czech infrastructures at the site in Trieste, Italy. Considerable funding is allocated to the Joint Technology Initiatives.

Involvement in Joint Programming is reasonably well established and a number of Ministries are involved such as the Ministry of Health and the Ministry of Agriculture. MEYS is supporting the JP activity by co-funding the transaction costs (travel, etc) of the other ministries. However there is no central strategy or prioritisation, by the Council for Research and Development, in which JP the CR should invest.

There are bilateral mobility (exchange) agreements with France, Slovakia, Hungary, Slovenia, Poland and Austria. The CR had agreements with Italy and Greece but they have not been continued, as there was no real interest from those countries. The EU-country bilateral co-operations are mostly without money crossing borders, so there is no budget attached to the agreements.

National budgets are allocated to the bilateral cooperation agreements with non-EU countries. There are official intergovernmental agreements with Russia, S-Korea, China, Japan, Israel, Argentina and the US. In preparation are Taiwan (MoU) Brazil and South Africa. There are discussions with India ongoing. Based on bilateral government agreements the countries set up joint committees and invite a long list of projects. This is mostly funded through the KONTAKT programmes. This funds full research projects not only mobility. In some countries specific themes are defined in others it is open.

The total government budget for R&D internationalisation is steadily growing. Today the annual level is at 1.6 billion CZK and in the next two years it is expected the spend will still be around 1.5 to 2 billion CZK annually. The current budget is double what it used to be in 2007. So this is an indication that its importance in policy is growing. The biggest budgets are for ESA, CERN, EMBC, COST and EUREKA and the Kontakt programme. Only 12 million goes to the mobility programmes.

Interest from industry for EUREKA is quite strong according the MEYS and supplied with a budget of 150 million CZK per year. There are currently 30-40 Eurostars projects with Czech companies. It was not considered a problem that industry-oriented programmes are run by MEYS and not for instance by the Ministry of Industry and Trade or the Technology Agency, which could be considered more natural partners for industry.

5.5 Effects and results of international S&T collaboration

The interviewees can at best give some anecdotal evidence and their general impression on the effects and results of S&T collaboration as hardly any studies have been conducted to assess the increased internationalisation. The interviews gave the following indications of the effects so far:

- According to research community and R&D Council some domains and institutions have better results in for instance EU projects, particularly the good and excellent groups.
- The foreign visitors have a positive effect on language use (very good stimulus to talk English)
- The specific programmes (e.g. US exchange programmes) have the effect that they require detailed research plans which has a positive learning effect for Czech research groups
- It helps having open discussions with people from outside
- Having more frequent foreign contacts is a further basis for networking which needs to be further developed in many parts of the Czech research system.

There is overall very little analysis and evaluation on the effectiveness of international R&D collaboration. MEYS has commissioned the Technology Centre to do an analysis of the success of CZ in domains and topics in FP7 and also to provide strategic information to people about the FPs. A second study is launched to assess the interests and possibilities of the institutions to prepare for FP8. A consultation is launched to collect the experience with the EU programmes and instruments.

What is missing according also to those involved is a good overview of the bilateral relations with non-EU countries: does it work, are there any gaps? There are still open policy questions to be tackled: do we launch more bilateral agreement and if so where? Has the Czech research system reached saturation?

5.6 Future developments

The CR follow the Europe 2020 strategy at the highest level and preparing a response to the Innovation Union ready in January. A number of challenges and objectives for the future have been raised in the interviews:

- Create a better coordination across policy domains (e.g. development aid, agriculture policy) to use foreign diplomacy and relations in a more coherent manner
- To put more pressure on competence centres and other domestic R&D initiatives to incorporate internationalisation in their strategy

6. Next steps

This interim report has summarised the bibliometric study for which a separate report has been submitted. It has delivered a first analysis of the internationalisation dimension in the researcher and Director's survey. It has further analysed the strategies and assessments of research organisations and funding agencies/ministries.

The next steps to finalise this working package are as follows:

- Cross-cutting final analysis of the existing material, including an interpretation against the policy objective
- Focus group with a set of representatives from policy/funding and research (end of February), involve key representatives of the most relevant agencies and ministerial departments and some other key actors and roles in the system (such as Research and Development Council and 2-3 researchers active in inter-governmental research organisations).
- Comparative analysis of policy approaches in three comparator countries, reaction to feedback from project group
- Workshop with Stakeholders
- Final report (April) with conclusions and recommendations.

International Co-operation in R&D Preliminary Findings
Annex 6 to the Second Interim Report

In Brighton, 04/04/2011



Erik Arnold
Technopolis Limited
Managing Director

technopolis_[group]



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