

Comments on the Final Report
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EVROPSKÁ UNIE



MINISTERSTVO ŠKOLSTVÍ,
MLÁDEŽE A TĚLOVÝCHOVY



OP Vzdělávání
pro konkurenceschopnost

INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

PhDr. Pavel Baran, CSc.

In the context of development in the area of R&D&I in the Czech Republic in recent years, a comprehensive look at it is very welcome, as included in the final report submitted on the International Audit on Research, Development and Innovation in the Czech Republic (hereinafter referred to as the "Report"). The significance of this Report also lies in the fact that as a whole (and in international comparison) it clearly shows for the first time a number of key issues in the area of R&D&I in the Czech Republic. It describes the state of R&D&I in the Czech Republic in a very broad perspective. It also pays a good deal of attention to reform steps implemented to date over the last few years, especially since 2008. The report clearly demonstrates – based on detailed analysis – what negative effects and trends were caused by these reform policies and how one-sided and simplistic the approach has become in the basis for reform efforts in the last decade. The Report compiled by Technopolis is an extraordinarily valuable document in the Czech environment, which will, however, be fully evaluated and used only if specific measures will be formulated in the relevant policies based on it, leading to the establishment of desirable development trends in R&D&I.

At the same time, I would like to emphasise that the final Report fulfils the task formulated by the customer in the essential aspects, either in the actual text of the Report, or in its seven annexes. Seen through the lens of social sciences and humanities (which is closest to me professionally), there is however a clear and visible measure of reduction of the whole range of the R&D&I issue on a markedly closer relationship of science, research and innovation to the sphere of technologies and their applications, especially in the area of industry, without this reduction being enforced with formulations from their own audit assignment.

One of the more general and unfortunately negative results of this approach is probably also the fact that the report does not deal with R&D&I in all the important links, primarily in relation to the education system and its level in the Czech Republic, and especially for tertiary education. However, this relationship was not sufficiently considered and explicitly formulated in the assignment. On the other hand, however, it is clear that without thematisation of this link, it is not possible to objectively and fully capture the range of issues the Report addresses. Furthermore, in this regard, the Report is based on currently problematized quantitative criteria for evaluating the level of tertiary education (e.g. it perceives the lower average representation of university graduates in the population critically) and does not pay attention to the need primarily to emphasise its quality.

Now I will focus on the constituent comments on individual parts of the Report:

On Annex No. 1: Evaluating Public Expenditure on R&D in the Czech Republic

This part can become an important basis for the formulation of policy for state (public) spending in the area of R&D&I in the Czech Republic. Three particular problem areas can be considered absolutely crucial in this regard (apart from the overall level of spending): distribution of public support to beneficiaries, distribution of public support among individual scientific areas, and the ratio of targeted and institutional financing. From this perspective, the issue of how to achieve a higher share of collaboration between the corporate sector and institutions in the public sector is seen as problematic (especially with regard to universities, where income from implemented research by

corporations only reaches 0.7% – see p. 6, Annex No. 1). Regarding distribution of public support between disciplines, detailed analysis and international comparisons show a range of negative specifics in the Czech environment, particularly the **distinct fact of insufficient financing of R&D in the field of social sciences and humanities**. Funding of corporate research from public sources is, in contrast, 6% higher than the European average (see p. 7, Annex No. 1). The Report corrects some highly **controversial views of reform in the area of the proportion of targeted and institutional financing**. The Czech Republic already demonstrates a high level of support for targeted financing, both on the international level, whereas the Report compiler warns of the risk of insufficient institutional financing in the area of R&D&I and thematises the disadvantages of targeted financing. In this respect, however, I find it lacks a more detailed analysis of the efficiency of the grant system and the system of programme financing in the Czech Republic and their administrative and economic demands (e.g. a comparison of the grant system and the system of centres for basic research, MEYS, etc.). The recommendations of the Report in this area may take the form of general principles but in these cases, it is easily possible to develop these principles into a form of specific measures.

On Annex No. 2: R&D Management in the Czech Republic

The Report focuses mainly on the dominant role of the R&D Council in the area of R&D&I. This focus of the Report is certainly legitimate, especially with regard to the fact that the activity of the R&D Council goes beyond the ambit of a government advisory body and that the R&D Council also has decision-making powers. On the other hand, it is stated that the R&D Council inadequately fulfils its role in formulating long-term R&D strategies. A clear shortcoming in the Report is that it does not pay attention to the issue of management of R&D&I in two major ministries for this area in the Czech Republic – MEYS and MIT. The Report also fails to address competencies and mutual relationships of individual players significant in the area of management of individual R&D&I segments in the Czech Republic. The Report recommends, certainly correctly, the retreat from the current centralised management of the existing R&D&I system. On the other hand, it does not address the definition of competencies for individual players, which would be essential for any decentralisation of management.

On Annex No. 3: Quality of Research, Institutional Support and Evaluation of Research in the Czech Republic and Abroad

I can completely identify with the plans submitted for this area; in particular, the critical analysis of the evaluation methodology, which relies on the mechanical application of quantitative criteria, is, in my opinion, one of the best and most useful parts of the Report. In particular it is necessary to appreciate that the Report specifically warns of the following issues in the evaluation process, which significantly negatively affects the quality of research in the Czech Republic: the performance of R&D is reduced to a single category, although it should also be assessed according to the results and primarily according to the impact, which represents the desirable externality for the company; the method of evaluation does not adequately capture the differences in the types of output from the various disciplines and in the costs for them; it handles all institutions with no regard for their role; it brings instability into the institutional environment; it leads to the acceptance of opportunistic

solutions with short-term effects. On the other hand, the authors of the Report do not differentiate enough between the individual types of scientific disciplines and specialisations – see, for example, criticism regarding the tendency to create insufficiently sized research units, which leads to limited opportunities for innovation. This claim certainly cannot be applied across the board for work in the majority of scientific disciplines and it would clearly be suitable to specify and refine this idea. Likewise, an unsupported proposition on limited collaboration between universities and the AS CR appears in the text. In this context, I should point out the fundamental methodical problem in the Report, which appears repeatedly, where universities are referred to as a whole, which can and does lead to a marked misrepresentation of a range of analyses, conclusions and statements in this area. It is a known fact that for R&D in the Czech Republic, there are crucial differences between individual universities and even their faculties. This approach also distorts the view of the extent of collaboration between AS CR workplaces and universities significantly, which is not just intensive, but also very wide. Furthermore, the Report lacks clear statement that any existing limits on collaboration are primarily of a formal nature (see, for example, the current fundamentally problematic solutions for training and education of doctoral students). Factual and existing collaboration in recent years, furthermore, has fundamentally undermined the superficial conflict primarily about the source of institutional financing, which does not only concern collaboration between AS CR workplaces and universities, but all players in the area of R&D&I.

On Annex No. 4: Report on the intellectual property rights system

In this area, the Report shows both the historical reasons and the context of problematic situations in the area of legal protection of intellectual property in the Czech Republic, and formulates adequate recommendations for further desirable modification of the situation.

On Annex No. 5: Relationships between Industry and Science

In this part of the Report, it thematises the whole core issue of relationships and insufficient collaboration between national research institutes and multinational corporations (MNC) active in the Czech Republic. So it is a problem which is not just important for the development of R&D in the Czech Republic, but also has a significant impact on the position and future of the domestic economy. In the context of the current situation where R&D investment by MNCs is sought by a number of developed countries, it would however be highly desirable to formulate very specific recommendations based for example on successful international strategies in this area (while respecting the possible application in the context of the Czech Republic). However, the Report is unfortunately limited only to a brief and very general statement (see p. 67 of the Report and p. 120 of Annex No. 5).

On Annex No. 6: International Cooperation in R&D

This part of the Report notes the meaning of international collaboration to stimulate the desired development in the area of R&D&I in the Czech Republic. However, it basically has a descriptive nature, where known facts are often reproduced. The exception is the emphasis put on formulating explicit strategies of international collaboration on the level of individual scientific workplaces. For me, it lacks specific recommendations to remedy the current situation in the Czech Republic, for example in the form of a centrally managed and administrative programme supporting various models for two-way mobility, particularly for the new generation of scientists.

On Annex No. 7: Human Resources in R&D

Essentially, the Report adequately captures the important issues in the area of human resources in the Czech Republic, which are: low representation of women; the frequent closed nature of teams restricting entry of workers from other scientific workplaces; low international mobility, etc. However, it does not pay enough attention to the specifics of this situation in different types of scientific workplaces and for different career stages. These shortcomings of the Report restrict its testimonial value in this area, which at the same time restricts more precise analysis of the cause of this situation and of course, stops targeted measures from being proposed.

On the conclusions and recommendations of the Report

R&D&I should be (in accordance with governmental policies of the last decade) one of the major pillars of economic stability in the Czech Republic, its competitiveness and in particular should have a positive impact on the quality of life for Czech citizens. It is clear that the current system means the functioning of the R&D&I system is negatively affected by a range of factors. I believe the Report – especially in its conclusions (see pp. 66-69) – reflects these factors adequately and addresses them. In addition to the overall low volume of financial resources in the system, it refers particularly to the fundamentally unsuitable methodology for evaluating the results of R&D&I, linked furthermore to financing, plus the weakening of the role of institutional financing, overly rigid distinctions between applied and basic research, insufficient representation of corporate research creating conditions for manufacturing and services with high added value and also an overly high level of centralised management of the system. These, but also any other factors, generate as a whole, an undesirable destabilisation of the R&D&I system and at the same time are a source of a low level of faith in the players in the system itself, and also inhibit its further desirable development. On the other hand, it should be emphasised that the Report ignores one of the key prerequisites of development for R&D, which is to provide quality tertiary education and its organisation. Also, an absolutely crucial problem directly related to the competitiveness of the Czech Republic economically, the provision of strategic investments into R&D&I by MNCs, is not sufficiently analysed in the Report and is also not evidenced with examples of good practice from the country, which have been and are successful in this regard.

Given the above emphasis on the meaning of the Report, I would also conclude with the formulation of a critical reservation on the insufficient user comfort offered by the Report. The actual results are not often presented in a clear and consistent manner. The report contains a number of redundant

passages and formulations, non-organically integrated either in the Annexes, or vice versa only in its own text. In some cases, terminological unity is completely lacking, and in some cases content inconsistency of individual parts of the Report are visible, which is clearly due to the fact that several authors worked on it, and it was clearly difficult to carry out a final edit.

Amendment

In the assignment and in the requirements relating to the audit preparation, there is reference to analysis of possible effects of building new research capacities within large projects financed by the OP EU for financing R&D&I from public funds. I think that this problem – very important for both the structure of R&D&I in the Czech Republic as well as its financing – is not addressed adequately in the report or its annexes, and special attention should be paid to it. Ultimately, it also applies for the opinion of the final Report on the structure of “tools”, in which financing and implementation of R&D&I in the Czech Republic take place.

prof. MUDr. RNDr. Miroslav Červinka, CSc.:

I have studied the Synthesis Report (I cannot say the same about all the Annexes, as they are too extensive). I like the report in general, I think it is very comprehensive yet concise. It can be a good basis for further considerations and recommendations. And the recommendations are probably the greatest weakness of the report. There are not enough specific and unambiguous recommendations. Personally, I would also prefer a more precise definition of the role of basic and applied research and from this, the ensuing funding methods. For me it slightly lacks a clear need to support research as well, which does not currently have known (economic) benefits.

Ing. Miroslav Janeček, CSc.

Annex 1 R&D Expenses

I have just one rather crucial comment on the annex. Among the literature used, I could not find Analysis of the State of R&D&I in the Czech Republic and its Comparison with Other Countries in the year XXXX. This material periodically prepared by the R&D Council is an official document approved by the Czech government and as such is not without significance. The problem is that the Analysis provides other data and offers a different perspective to the R&D&I scene in the Czech Republic than an audit; for example it can indicate the ratio of institutional and targeted support. Principles for Reform of the R&D&I System come from the Analysis, among others the proposal for gradual changes in the ratio of institutional and targeted support. These differences should be analysed and commented upon.

This comment is crucial.

Annex 3 The Protection of Industrial Property Rights

1. I consider this part to be very well prepared and it characterises the situation in the Czech Republic well. I consider the recommendation to enhance the knowledge and roles of individual institutions (research organisations, ministries, FS, or the Czech Chamber of Commerce) and recommendations to apply a Code of Practice in research organisations (including the need to apply this EC recommendation in a creative way) to be very useful.
2. Based on my experience with government authorities, I have some doubts about the establishment of the position of “IPR promoter” in the relevant ministries. Most ministries lack other, far more fundamental specialist units/functions necessary for them to work properly.
3. One shortcoming is the fact that this Annex (nor elsewhere) does not mention educational or other activities supported by structural funds (OP EI, OP RDI, OP EC).
4. Ch. 2.3.2, p. 29 The statement (by those interviewed) about a barrier to using state-owned patents is not based on fact in my experience. Act No. 211/2009 Coll. defines in Section 16 very clearly that the right to use patents depends on the beneficiaries and defines further clarifications for the co-financing of supported projects.

Annex 5, Cooperation between Industry and the Academic Sector

1. P. 2 bottom (but also fig. 4 and 5 on p. 19, 20, or in ch. 3.1.4 p. 36)

Claims of a strong position for the “office machines and computers” sector should be corrected with the data that the largest manufacturer in the Czech Republic, a branch of an MNC (for a number of years among the top ten largest Czech companies) has only assembly capacity in the Czech Republic – it has no research capacity in the Czech Republic and does not collaborate with research organisations.

2. P. 22, passage on regional disparities

The fact that structural funds (in accordance with the principles of cohesion policy) are allocated outside of Prague, also has, alongside the negative, a very positive aspect. The regional disparities between the presence of research capacities and industry mentioned a couple of lines above could be reduced, thanks to the establishment of regional technological centres. This topic is very relevant for the topic of SIL, and the conclusion made from this fact should be entirely positive, e.g. in the sense: “use of SF in R&D&I may significantly support SIL and the economic performance of the majority of regions in the Czech Republic.

This comment is crucial.

3. P. 24, ch. 2.2 conclusion (passage on the creation of spin-off firms, or SOF)

I consider the assessment of the situation to be inadequate – it is missing analysis (and statistics) of the creation of SOF entirely.

4. Ch. 2.4

The statement on good absorption capacity of high tech industry has already been commented upon in remark 2).

5. Ibid, item 4

This claim is hugely exaggerated; Prague is undoubtedly the largest and most important producer of R&D findings and has huge potential, due to all the other shortcomings however, it is absolutely not the most important centre for innovations (you could almost say the opposite – the enormous potential has not yet been used enough). The same problem is presented adequately in the Recommendations on p. 120, point 6 Current Issues.

6. Ch. 32, p. 36

In contrast to this Annex, in the 2nd interim report, it is stated that in many countries the “governmental” sector is made up of a large part of institutions engaged with applied research and development (Fraunhofer, VTT, TNO, etc.). In my opinion, the absence of such institutions in the Czech Republic is one of the major limiting factors for the entire national economy, which is not even mentioned in this Annex.

This comment is crucial.

7. Ch. 3.1, p. 37, passage on privately owned research institutions

It should be noted that about 20 of these institutions meet the nature of research organisations, and are beneficiaries of institutional support (due to the nature of their activities and funding they are therefore at the level of public research institutions)

Ibid, bottom of the page

Instead of COMET it should be COMTES (FHT a.s.)

8. Ch. 3.2.2

The academic performance of individual institutions, as a manifestation of excellence, clearly has a potential influence on the interest of industry in collaboration. However, I would also consider the overview of patent production, data on licence sales, and any other information about other applied results of R&D, which is equally relevant to the topic, to be very beneficial.

This comment is crucial.

9. Ch. 3.2.3, footnote 32

The creation of SOF at the Czech Technical University is no more successful than elsewhere; other R&D institutes are far better off.

10. Ch. 3.3.1, p. 41 bottom

Data on financing research in the private sector from public budgets is (strongly) affected by the fact that a specific part of this funding is absorbed by privately owned research organisations (see note 9), which uses it however (similarly to universities and R&D institutes) for research, the results of which are then offered to businesses (which is mentioned in other places, including in the summary report).

11. Tab. 4, p. 47

How far it is reflected in investments into the application of SF (e.g. the Potential programme) would be interesting data. This figure could be easily ascertained by querying the MIT.

12. P. 47, second item

The first sentence does not make sense (probably because it uses the term “conterprise”).

13. Ch. 3.3.3, item 1

The statement about the higher share of private investments into AS CR institutes than into universities was discussed and doubted during the debate of the second interim report by the opponent prof. Opatrný. Unless data on “adjusted performance of AS CR” (by deducting revenue from one of the institutes of AS CR – IOCB – from the sale of (a) licence(s)) is available, the authors should avoid such assertions, or at least make a comment and explicitly mention this atypical influence.

This comment is crucial

14. Ch. 4.1, p. 57 top

The low share of labour costs on R&D costs has another cause, which somewhat weakens the authors’ assertion – until recently, in many cases (at least for GA CR grants), labour costs were not calculated at all – it was assumed that salaries of researchers would be paid from other sources. Since this anomaly has finally begun to be addressed in recent years, expenditure by GA CR will grow to up to three times as much.

Also, in the following paragraph (and afterwards), the statement needs correcting somewhat – the MEYS programme 1M Research Centres – had as one of its aims to develop human resources and creation of collectives capable of supporting collaboration between the academic and application spheres. Also, the MIT Tandem programme immediately targeted the collaboration between both sectors (which is mentioned in further chapters of the Annex).

15. Ch. 4.2, paragraph 1 (the same mistake is repeated in the summary in Ch. 4.3.2.)

Using the abbreviation ESF is confusing; the authors clearly mean European Structural Funds, but in Czech practice, these letters usually mean European Social Fund (as a complement to ERDF, i.e. the European Regional Development Fund). I would consider using the abbreviation SF, which is established in the CR, as the easiest way to correct this.

On the ALFA programme, it should be added for the announced TA CR that collaboration between companies and research organisations is advantageous in the evaluation criteria (which appeared in

the first call with approx. 90% participation of consortiums, made up of participants from both sectors).

16. p. 60, 1st line

The authors were obviously thinking of the Prosperity programme (not Property)

17. Ch. 4.3.1, paragraph 4

The comment on the Regional R&D Centre programme is peculiar to say the least. On the one hand it is true that the creation of such centres will lead to the reallocation of funds to support R&D, which of course applies approximately equally for the Centres of Excellence. However, it totally lacks the statement that by strengthening the R&D infrastructure in regions there will be (or should be) counterbalancing (reduction) of regional disparities and the approach of research bases to a more equal distribution of industry, which ought to support collaboration between the research and application spheres in these regions (also see note 2). It should also be mentioned that the Regional R&D Centres would have to earn a considerable amount of funding for operations from non-public sources, which should motivate them greatly to collaborate effectively with industry.

This comment is crucial.

Ch. 4.3.1 should include the (relatively recent) information that MIT and MEYS are planning programmes which would allow the form of so-called (pre-)seed funds to support preparation for founding spin-off firms and financing the initial stage of their existence.

Even though it is (weakly) mentioned elsewhere, it should be mentioned somewhere in ch. 4 (e.g. in the summary in ch. 4.3.2.) about the absence of (a) programme(s) to promote horizontal mobility. This is a deficit which perhaps most significantly distinguishes the Czech Republic from developed countries. Nothing in this changes even specific attempts developed by MEYS in the OP EC.

18. Ch. 4.4, paragraph 1

The statement on low wages and low prestige of scientific careers would be worth discussing. I hear that active people (whether already at universities or in AS CR) who have projects, grants and collaborate with the application sphere, are at times better off than employees at private companies. I do not want to cast doubt on the degrading conditions of doctoral students and other young scientists but this problem is not unknown in the private sector either – not every employer is a bank or consulting firm from the top five.

Ibid, item 2

There are programmes here to promote collaboration, but only a few (“missing programmes...” is therefore incorrect).

Ibidem

I would add a 7th doubt of my own (which although mentioned elsewhere) not analysed here – the absence of motivation for research organisations, in the purest form the enactment of accountability for using results of R&D, as is known in Scandinavia (the third role of universities).

This comment is crucial.

19. General comment on ch. 5

The survey brings a number of very valuable findings, which should be taken into account when creating concept documents.

20. Ch. 5.1.1.

The statement on the absence of systematic monitoring of SIL issues is true, but a range of previously implemented relevant surveys exist, including for the collaborating entity – TC AS – which supplements the systematic activity to a certain extent.

21. Ch. 5.5, p. 106

It is not true that in the CR there are no programmes supporting SIL (Centres), see above.

The mention of the administrative burden of programmes to support R&D has a rational core, but the corresponding burden in the EU framework programmes is far greater. The same can be said about operational programmes, where the bloated administration (at least in part) is required by the EC.

22. Chap. 5.5, p. 107 Motives and Incentives

In the previous text, there are sufficient reasons to state that not even non-technical universities are actually all right, in regard to SIL.

23. Ch. 5.7

It is somewhat surprising that the resume does not even mention the small support for the creation of spin-off firms, which should become the bearers of progressive technologies and the partners of excellent scientific teams, primarily from the most supported area of natural sciences.

24. Ch. 6 SWOT, Threats section Sustainment of Infrastructure, p. 113

The statement about inaccessibility of SF for Prague's research organisations is only true in part. It is well known that in many cases new capacity has been established, supported from SF just beyond the borders of the City of Prague (which is easy to ascertain and prove).

It is possible to agree with some of the arguments expressed, but personally I do not doubt that the SF application is primarily an opportunity to establish a knowledge-based economy in the Czech Republic (see note 2 as well). In addition to establishing a modern physical R&D infrastructure, it is also the pressure on collaboration with industry and the opportunity to attract top scientists, including Czechs, active abroad. It is worth noticing that these aspects are not mentioned in the study; the same can be said about the OP EC, which could/should significantly contribute to strengthening "soft" factors of SIL.

"Human resources" section

I consider the overview to be very useful and inspiring. I am somewhat sceptical about the need to train scientists to collaborate with industry on projects (especially, if the trainers are meant to be academic staff, as is common for programmes supported by MEYS). I think this is a typical issue that can be resolved with the system of “learning by doing”.

25. Ch. 7 Recommendations

Some recommendations (especially on p. 117 and others), are the subject of other EFTRANS IpN (but this is not mentioned in the text).

26. On p. 119, the authors refer to ch. 4.6.5, but this is missing from the document (ch. 5 follows immediately after ch. 4.4 on p. 67).

27. Section 6, Recommendations, paragraph L, p. 120

I do not consider the statement “but so far public R&D expenditure in Prague is limited” to be adequate. It is well known that 60% of the state budget for R&D (and in some major parts, e.g. in the case of institutional funds and more) is absorbed by Prague research organisations. The authors are clearly reacting to the fact that SF has clearly been applied according to the principles of EU cohesion policy) allocated in regions with a below-average standard of living outside of Prague.

This comment is crucial

28. Unless I have missed it, the amendment fails to mention a Code of Practice, a tool recommended some years ago by the European Commission to all research organisations mainly utilising public resources as a tool for using the results of R&D in practice. Although it is mentioned in other parts (including the summary study), it is relevant to the topic of SIL and should be properly discussed.

Tomáš Jungwirth, Ph.D.

Overall, the report made a very positive impression on me. It seems very professional and comprehensive. In general, I would criticise the fact that it is not easy to read and in some places it is overly general. I think it would be highly suitable to compile a brief, say 10-page summary for this extensive report with many annexes, which would summarise in points and in order of importance the organisation’s biggest problems and the functioning of R&D in the Czech Republic, and the specific steps Technopolis proposes to remedy this.

Allow me to mention one specific comment, even though it is possible that this issue is addressed in depth in one of the annexes. For me, the final report lacks a detailed commentary on the emerging large infrastructures in support of structural funds (BIOCEV, ELI, etc.). These institutions, with their size, are significantly changing the face of Czech research although at first glance, they defy the conventional models of science funding. I think that for the success of these newly emerging scientific infrastructures and to understand the justification of this funding model, in the future a

Technopolis audit evaluating experience so far with the implementation of these programmes in the Czech Republic would be very useful.

doc. Ing. Štěpán Jurajda, Ph.D.

The report offers an unprecedented amount of work covering an unprecedented breath of R&D&I topics in one interconnected package. The analysis uncovers surprising facts about Czech R&D expenditure structure, it accurately portrays the sad state of Czech R&D governance, and it provides the first relevant bibliometric analysis for the country. While the overall effort is most impressive, there are several issues that I believe remain to be addressed as well as several opportunities for delivering the message of the report in a more effective way and I discuss some of these below.

Main Content Elements / Comparison to ToR

As noted in comments provided at the time, the 2nd Interim Report did not cover the important ToR areas of (a) assessment of the productivity/efficiency of research sectors/fields in the international perspective, and (b) the impact of building large infrastructures with OP funding.¹ I would like to be directed to where this analysis is to be found in the Final Report and I would also appreciate directions to where 'critical mass of research' is addressed (part 2a)iii of ToR).

Expositional Comments

I am sympathetic to the view that the report must first explain basic principles and international practice of R&D&I before discussing the Czech situation; I am thus happy to see parts of the final report being quite general. On the other hand, I believe descriptive facts about the Czech system should not be presented without a commentary as otherwise they're not worth including in the precious limited space of the Final Report.²

More importantly, I believe the R&D governance summary would benefit from contrasting the goals of the 2008 reform with the report's assessments of the main current characteristics of the Czech R&D&I system:³

¹ For example, the combination of (almost) no access to OP funding in Prague combined with the expiry of the LC center program makes funding for groups of doctoral students nearly impossible to obtain. This threatens human capital production where some of the best capacities are currently located.

² For example, listing the planned goals of the 2009-2015 National Policy at the end of Section 3.4 seems pointless unless one says something about whether those plans were well formulated, achieved in part thus far, etc. In some parts, the Report explicitly refers to the "gap between strategy and implementation" (i.e., on p. 53, referring to HR issues), which I see as omnipresent. But in few places, it simply recites the content of strategies without saying much about whether they had (will have) any real-world impact (footnote n. 72 is an important case in point).

³ Also, get rid of one of the two occurrences of the sentence beginning with "We noted good practice".

- 1) The reform aims to continuously increase the share of targeted funding, but the report argues (on p. 29) that the share of project (targeted) relative to institutional financing is actually already very high in the Czech Republic.
- 2) The 2nd Interim Report documented that the reform resulted in about 60% of targeted financing being discontinued and replaced with new programs; it also argued that these are not optimally structured. The Final Report does not refer to this figure, but it highlights the decline in the share of targeted funding for basic research from 27% in 2004 to 21% in 2012. One would appreciate a summary of how the outgoing programs overlap in their coverage with the new ones as well as some comparison to an "optimal" portfolio of programs.⁴ Wouldn't it be appropriate to comment on the goal of the reform to design targeted programs based on "consistent evaluations of preceding programs" (p. 55)? My sense is the reform failed on this account.
- 3) The reform intends to increase the share of R&D funding at the expense of basic science support, but the report concludes that the Czech Republic has a perfectly healthy (typical) level of R&D support to industry (p. 33).
- 4) The reform intended to strengthen science-industry links, but the report argues that allocating 100% of institutional funding according to the reductionist Evaluation Methodology undermines the ability of the system to respond to societal and industrial signals (pp. 33, 41, 49).
- 5) The reform (at least implicitly) aimed to lower the share of 'soft' science funding, but the report shows that funding shares of Czech social sciences and humanities is low in international perspective.
- 6) The reform intended to limit the number of 'budget chapters' but the report apparently does not see this as a major priority (p. 25).
- 7) The reform was supposed to promote excellence, but its reductionist Evaluation Methodology works against this goal in many fields of science⁵ as well as at the system

⁴ In particular, I believe the report needs to stress further the issue of disappearing sources of funding for doctoral studies (given the low-level of per-student government funding in SSH).

⁵ I take issue with the statement on p. 62 that the Evaluation Methodology "addresses the issue of low productivity in some research organizations". This is a mirage. Since the Evaluation Methodology introduced a plethora of easy-to-produce, often pseudo-scientific types of output, that are automatically rewarded, it gave the low-productivity organizations, which otherwise have little useful to do, a new foundation and a new business growth model. Similarly, arguing that the (annual) changes to the EM introduced thus far were to "correct the most obvious imbalances" may implicitly suggest that this was achieved. The main point should be that the changes, however arbitrary, ex post, chaotic, etc. chiefly failed to address the large cross-field funding unfairness as well as the perverse incentives to produce low-quality output. And that it's unrealistic to expect the current governance structure to do any better any time soon. Finally, the main issue with the implementation of the EM within organizations (bottom of p. 62) isn't fragmentation; it's the gradual but effective wiping out of quality research in some fields of science (those where it does not pay / is not feasible to produce quality output given the parameters of the EM). Overall, the Final Report continues to take the position that the use of the EM should be discontinued; in contrast to the 2nd

Recommendations

The report convincingly argues that there is significant lack of useful strategic governance of R&D&I and that analytical support of policy making in this area in the Czech Republic is inadequate. As a result, and reinforcing the problem, the 2008 reform introduced reductionist and backward evaluations and major funding uncertainty (through both the changing landscape of targeted funding and arbitrary and unpredictable funding effects of the Evaluation Methodology (EM)). This combines with incentives against quality research built into the EM to jointly threaten the recent growth in internationally relevant R&D output in the country.

The key recommendation of the need for an overhaul of the R&D&I Council's responsibilities, however, is not sufficiently developed (in both Annex 3 and Section 7 of the Final Report). This is a key issue, in my view, because I see all of the other recommendations as being functionally linked to a change in the quality of governance at the top, i.e., at the R&D&I Council. The report's recommendations then naturally remain mostly silent on key *implementation* issues:

1. What is the nature of the *mechanism* for making allocation decisions across providers?
2. What is the *basis* for allocation decisions across science fields at central/provider level?
3. What is the *process* for achieving a cultural paradigm shift from the current 'money for points' behavior in presence of inadequate human capital at most providers as well as the R&D&I Council for conducting informed and informative evaluations?
 - Such shift would not be achieved under any crude/naïve formula funding (suggested in Annex 3) as any formula based on counts (of books, students, etc.) leads to a race to the bottom (quality) unless budgetary limits are specified for cheap-to-produce items, and little guidance is suggested for choosing field-specific cost-of-research indicators.
 - The 'soft' influence of informed peer review would degenerate (as it did in the past) unless one specifies water-tight implementation details and these are not suggested.
 - Without an adequately staffed office in charge, even a well specified process (with rules) will degenerate.⁶ Why should providers do a better job? Similarly, one level below, I do not see why "Universities and institutes" should "improve their research management" (p. 66) if they will continue being subject to the Evaluation Methodology.

Interim Report, however, the discontinuation is not explicitly recommended as immediate (with the earlier argument being that level.

⁵ Further, many of the excellent research groups studied in detail by the Audit worked in "challenging environments" under often "difficult circumstances" (p. 44).⁵ failing to do so would generate irrevocable damage). I do not understand this shift in emphasis. If it is intentional, it may be worth an explanatory footnote for those familiar with the 2nd Interim Report's recommendations.

⁶ For example, suggesting (in Annex 3) that performance-based contracts use a foreign expert as negotiation supervisor shifts the issue one level up--who and how selects the foreign expert and how does one ensure harmonization of quality criteria across contracts (within and across fields of science covered by a given provider)? Who provides what kind of quantitative data that the foreign experts will be able to use? One needs both rules and expertise to conduct such an evaluation successfully. And external pressure. Will providers be assisted/supervised by an independent evaluation office? This brings us back to issue 1.

- Looking forward, is it realistic to expect that sufficient strategic intelligence will be generated by the recently commissioned study to be performed by the Technology Centre (footnote n. 69) – will this approach overcome the insufficient analytical capacity of the virtual science ministry with 20 full-time employees?

Bibliometric Analysis

- I would really like to obtain factual answers to my questions about the Bibliometric analysis (Annex 7) that I submitted at the time of evaluating the 2nd interim report. I assume the final version of this work will appear as Annex 8 to the Final Report.
- I believe the Final Report should at least pay lip service to the issue of local vs. international citations (and easily manipulated citation impacts) in SSH. May I point out that according to the WoS, the 3rd highest IF journal in the field of Economics on this planet is a bogus Lithuanian journal by the name "Technological and Economic Development of Economy", which nobody in the profession ever hear of, with editors coming from local technical universities in Lithuania and Latvia. Several other journals from these countries do very well in terms of IF, as do some Czech journals 'specializing' in local citations. Ignoring this issue is simply wrong.
- I would really like to see the list of journals that dominate the bibliometric statistics that are used to argue in the Final Report that Czech researchers reach international quality levels in the fields of literature and management. I suspect both statistics are affected in a major way by the presence of local journals (and Management citation impact may be largely due to work in Operations Research, again, in large part local). Is this the message the report wishes to send?
- The bibliometric analysis goes to 2009, not 2000 as stated on p. 41 of the Final report.

The CPP/FSCm indicator used in Fig 18 is never explained in the Final Rep

prof. Mgr. Miloslav Klíma

I did not find any problems for the various annexes where I am in the team for the field. Now we are also going through the Final Report in a similar way, but I do not have any comments from an art point of view. In addition, I studied and also had the Consultation on Draft Panel Criteria and Working Methods material partially translated – parts 27-36; primarily 34-36, on art, and I have been finding that their reasoning often have the wording, "...covers research in all areas of music, drama, dance, theatre, performing arts, live art, film and television..." or "...practice-based research..." and "...covers the broadest understanding of the subject disciplines within any cultural, geographical or historical context...", which could be understood similarly to the principles on recognising the function of art in recent years...

With this, I just mean that this line of thinking is not entirely unique.

prof. RNDr. Julius Lukeš, Csc.

Overall the Technopolis report leaves an impression of a highly professional work and I do not see major reasons why its conclusions and recommendations should not be seriously considered in future research policy of the CR. That policy is bound to change, unless we want to see our research output slowing down again, which would be particularly painful at a moment when it started to be internationally competitive and at least approaching the historical position of Czech R. in R&D.

Here I present comments to the Annexes, not to the final report, which does not mean these are not going to be (partially) overlapping. The two deadlines and the delayed submission of the Final Report are reasons for that.

I subdivided my comments and some questions so that they follow, at least partially, the individual Annexes.

Annex 1.

Some important numbers: CR R&D approaches EU-27 median, yet with 1.53 % HDP only Greece, Cyprus, Spain and Italy are behind us from the old members, while only Slovenia is ahead of us from the new members. This is very telling! (Situation in Slovakia can be considered catastrophic – drop from 0.66 to 0.48! Total in mil EUR 939, Slovakia 190 – p. 30, Austria 2200, yet its science is still more competitive than what these numbers are saying (see also below). Interestingly, CR does not have underinvestment from business as some try to postulate – p. 25.

Different national models: Swiss – state does not directly finance industrial R&D, while Italy (and also France) are on the other side of the continuum and invest in private business (p. 36 etc.). What is recommendation by Technopolis for CR? I did not find any unambiguous statements, maybe overlooked them. Should it be the Swiss model? Against the former minister Jahn's opinion? If so, how to achieve that?

Technopolis recommends to open topics and programs oriented to R&D, which would increase connections between industry and research. How much money shall get into that? What % of R&D spending?

Strict evaluation of programs, centers of excellence and regional R&D center is recommended (p. 15). But how to force the system to do that? It is stated elsewhere (and below) that evaluations by the AVCR should be instrumental, but there is no recommendation how to force all providers into such evaluations.

The report states missing money from student fees (p. 37). No recommendations here, but I gather this is a very politically charged issue and Technopolis does not want to go into it. Yet – what would be the generally/roughly recommended fee?

Governmental institute-based funding should not decrease more – with 60% we are already below the average of developed countries; f.e. Weiss has 75%, with Belgium with only 40% being the other extreme. What is the simple overall recommendation here – leave it as it is or go for change?

In international comparison of R&D performance if private vs gov. sector are compared (p. 55) - we are in the middle. Since 2000 the position of AVCR is stable. In high education about 60% goes into basic research, which is more than in Austria or Japan, but less than in the US. It is stated elsewhere that in general countries dividing their universities into teaching and research have this ratio lower. Shall it stay this way or in which direction shall we move? Perhaps this is addressed, but I was not sure whether in ambiguously.

What is the opinion of Technopolis about the subdivision of universities into research and teaching? Is this recommended? If so, should it be on the level of individual universities or individual faculties (an example – scientifically excellent Faculty of Sciences of University of South Bohemia exists next to other faculties very poor in research output – branding this university as teaching only would heavily hurt Faculty of Science). What is the optimal/suitable % of research universities? Did Technopolis talk to the top expert specifically appointed by the Czech government (I forgot his name) to deal with this issue?

Annex 2:

Key statement is that the R&D&I council (=virtual science ministry) has with a very limited staff huge breadth of duties and tasks, internationally a very unique situation, when research of a whole country depends on the decisions of a handful of individuals (most of which are just part-time employees).

This is pretty surprising in the eyes of Technopolis and would be barely acceptable. Yet to make matters worse, it is well known that in the past this council was composed of several individuals with zero (!) record in science and patenting, and that it was the secretary of this council (dr. Blazka), who was running the show! The report states low internal analytical capacity of this council, extremely low number of its expert committee meetings (p. 42), especially in last couple of years, and the loss of its balanced composition (which I call the *époque* of Martin Jahn). Very insightful is the note that the business of the council was organized hastily, with insufficient time for discussions of reports (p. 46).

Unfortunately, I miss in the report some bold statements about the view of Technopolis on the major controversies that were so extensively discussed by Czech science and research community. It only states that these came up during various discussions, mentions the existence of round tables motivated by the former prime minister (p. 48), but takes no stands on their outcome.

Elsewhere it says that a 40:60 ratio between targeted vs. institutional funding, one of the aims of the council, has already been achieved in 2011 and is in fact high in international comparison. A very important statement is that funding for basic research is lower than in comparable countries (p. 7) and shall be increased.

Another key statement concerns the evaluations of especially National Research Programmes, stating that these were almost non-existent, causing lack of strategic intelligence (p. 9). Indeed, there is so far virtually no punishment for not fulfilling the aims and having no publication output in all other funding in CR except GACR and former GAAV. This is extremely frustrating, as poor labs and

even institutes or whole faculties keep getting funding. I would like to be pointed to parts of the report that take notice of this important problem of non-efficiency of funding.

From the various recommendations (page 11) I consider the following two most paramount – 1. the R&D&I shall focus primarily on long term strategies and consensus building.

2. evaluation shall not be overly mechanistic. It is detailed elsewhere (especially p. 45) that the EM (= evaluation methodology) has changed too often, and the latest version caused huge controversy. Furthermore, the report states that currently 7 ministries (page 50) hold management responsibilities for their R&D&I. Is this good or bad in the eyes of Technopolis?

Annex 3:

Contains the best bibliometric analysis of the CR research in the light of international comparison I have seen so far. It overall applauds major improvement in the last 15 years, with at least tripled number of papers and 6x higher impact (page 3). However, it states that a major gap between CR and western countries of similar size still exists. Also, CR is still below world median impact. Best field of CR science are mathematics, physics and material science and increasingly natural sciences. Clinical medicine remains low and is singled out as under-performing (page 6)! The level of international collaborations is considered sufficient, yet still its increase is duly recommended, as this research is more visible and better cited. Importantly, the CR research used to have same impact as that of Hungary and Slovenia (given its scale in the latter case), yet that has changed lately by improved performance of CR (also p. 26).

One has to ask the obvious question here. If the improvement in publication number and impact was so significant in the CR, than the scientific policy was not so bad if just this output is concerned. Now with any large change (f.e. stressing patenting, funding primarily industry-oriented research etc.), there is a risk that this trend will be terminated. What is the view of Technopolis about this?

The report noticed the much increasing output of universities, which grew faster than that of AVCR. Could Technopolis comment on the well known fact that this is very often at the expenses of AVCR (research paid and performed by AVCR, yet counted equally by the universities due to the simple fact that they “own” PhD students)? This is a trend especially at UK, which improves its production in this way. This is very pertinent and has to be addressed to rectify the unfairness towards AVCR.

Even top research groups are subject to discontinuous support, caused by too different and frequent evaluations. Universities block advancement of the AVCR persons to part-time or full professors (page 14) – Charles U. is (in)famous for that – however, this is not stated! Again, what is the recommendation here? Technopolis repeatedly proposes to strengthen the collaboration between AVCR and universities, but unless this is rectified, it can’t happen. However, this does not seem to be apparent from this report.

Many jobs are handed to self-bred postdocs and most are not properly (not speaking of internationally) advertised (page 12). These jobs are not competitive enough (page 15).

Current EM has too short a horizon and too crude its indicators (page 13), supports short-termism (!)(page 21). Scientists are not allowed to move funds between different budget items (page 13) – this is a big difference from NIH (not stated in the report).

Current EM favors short term goals (!) and low impact journals (page 15), which is clearly wrong in the view of Technopolis. In its clarity this is relatively rear statement. The evaluation encourages competition between universities and Academy (page 16), which is clearly wrong. There is no gender policy.

Summary of various evaluations of the AVCR (from page 117 on) says that it is still not known how the latest evaluation will influence the Academy institutes. It says that if there are no consequences of any evaluation, than it is just an empty exercise – a point that shall be brought to the attention of representatives of AVCR.

In fact the 1993 evaluation belonged to the most efficient ones, at least in my eyes, as it lead to the efficient termination of the poorly performing institutes. It is clearly stated that it is important that these AVCR evaluations are much broader than just the points mechanistically counted by currnt EM. I find one recommendation particularly important and insightful from Technopolis - key international peer reviewers shall not come from countries close to the CR and especially, shall be selected solely by an external and independent party! This never happened so far and is in my opinion one of the few weaknesses (but a major one) of the evaluations. Main critique, and to the point in my view, of most Czech research programs/projects (page 128) rests in their too wide and non-focused nature, poor human resource policies and low research productivity.

Evaluation of current EM (!) (page 130 and on) dares to say that this widely criticized methodology also has a strength – first time it gave a clear signal that any output matters! I fully subscribe to that view, yet also agree with the following range of weaknesses that shall terminate it in its present form. The list is long and I will not repeat it here but would like to stress that new EM has to be made based on previous Czech as well as international experience. The main issue at hand is – to stimulate productivity, but not to allow opportunistic behavior and instead stimulate long-term planning and capacity building. The current EM shall not be improved bit by bit, but rather be discontinued.

There is a problem with this proposal, which Technopolis does not deal with. What will happen before new evaluation is established? How shall everybody be forced into evaluations, such as those passed by the AVCR? How to deal with those organizations which have no or very little output in RIV already in the last couple of years? Is it realistic to perform peer review combined with bibliographic evaluation and based on performance contracts in all research institutions of the CR?

Annex 4:

Applications of patents slowly grow, but the difference from f.e. Ireland is 10x! When country of origin of the applicant is taken into account, the difference from Ireland is about 5x, but to Germany 20x! Technopolis found that licensing activities are generally not considered as important, which is a clear remnant of communist times. IPR deteriorates rapidly when one leaves main few centers, such as UOCHB. The role of IPR in the evaluations has to be reconsidered.

Annex 5:

Science industry linkages are weak in general, but very good in a few centers, which shall be used as lighthouses. Very important recommendation is to make industrial internships mandatory in specific fields of study and incentivize PhD funding from industry, and stimulating spin-offs. Universities should start using Alumni-based networks. Is there a way to stimulate/force them into this?

Annexes 6 + 7:

International Co-operation in R&D: Pressure has to be applied especially at universities, as so far collaborations are clearly lead by UK and AVCR, and are limited elsewhere. With the exception of UK and Academy, no one employs competitive foreigners.

Czechs have the lowest success rate from comparable countries, except Slovakia, much lower than f.e. Hungary. Moreover, bids led by Czech scientists have extremely low success, has to be changed and thus needs incentives! Which incentives Technopolis specifically recommends I could not find. Could they elaborate on that?

In comparison with other similar-sized countries, the scientific landscape is highly dominated by Academy and UK (page 22 and on). This is a fact and hardly can be changed.

A key finding (page 16) is that in 2000 CR and Hungary had 2146 and 2097 publications, respectively, while in 2009 it was 4518 for the former and only 2810 for the latter! This very good trend has to be retained, if we shall catch up with Austria etc.

Annex 8:

Human resources:

85% of all recruited PhDs are inbreeding of some sort. Salary is lower but not a major problem; it already pretty much depends on personal performance.

There is a rigid career structure that has to be streamlined. I gather that based on various criteria, the Czech institutions have to be forced to advertise internationally. How does Technopolis want to do that? Is that essential?

Technopolis reports on multiple bureaucratic barriers, difficulties with foreign police etc.

I did not find any mentions about the newly opened governmental program for returning scientists. Evaluation of this new program by Technopolis is very important and should be included, or at least explained why it is missing!

Julius Lukes – Evaluation of the Technopolis – Synthesis report

I have provided my evaluation of the Annexes in an earlier report, and reading the Synthesis report does not lead me to change or alter any of my points.

Based on it, I would like to add just a few more concerns and/or comments.

There is no doubt on my side that the report is of high standard and potentially very useful for the R&D policy making bodies. It is critical that members of these bodies are actually motivated/forced to read this report, so that its impact is not limited to a small number of people at the Ministry of Education and R&D&I council.

Certain weakness of the report is its careful wording. I would appreciate if a list of key recommendation, i/in the order of their importance, ii/ in the proposed order of their implementation is provided.

However, I have following major concern that I would like to discuss with Technopolis and find worth addressing in the revised version of the report (apart from the main points requested above). The auditors used all the available information over scientific output of the Czech research, all available statistics etc., and made good use of them. They also talked in detailed to 15 unspecified research groups (actually providing some basic information about them would be useful – in which city are they based; which is their research area), of which they just say that they were above the international average, meaning they represented the cream of Czech research. They strongly criticized the current Evaluation Methodology (EM) and asked for more balanced evaluation including peer review and elements of prospective thinking. I fully subscribe to that BUT there is one major problem. The current EM was able to evaluate quickly and efficiently (and for the 1st time!) virtually all output of Czech research, while a complex evaluation involving all the requested aspects makes the overall evaluation almost impossible. Technopolis does not say how to do that. They fell into the trap of evaluating the best, who have already been (repeatedly) evaluated – and are not afraid of being evaluated. This concerns the AVCR and 3-4 universities, while the huge rest remains untouched.

The key issue – namely how to evaluate the “silent” and “invisible” segment of Czech research with a complex methodology (who will pay for it? Who will do it? who will force all these institutions – private universities, research under ministries? etc.) remains put aside. Technopolis failed to resist the general rejection of the EM and stress its general impact, and does not propose to improve and rectify its weaknesses. Fair enough, but they did not say how to perform the “complex” evaluation of everyone. This is critical, otherwise huge fraction of the R&D funding will keep going to the never evaluated – and likely nothing-producing – institutions, while the well evaluated above-world average part will struggle for limited resources. I want to hear from Technopolis how to identify this segment, the existence of which is undeniable, and cut it off funding.

For the rest I agree that most of the recommendation by Technopolis are valid, and upon addressing the points raised by its reviewers shall be seriously considered by future policy making of the R&D&I council, the Ministry of Education and the government.

doc. Ing. Jaroslav Machan, CSc.

The audit report has been drawn up in a very comprehensive way and is well-founded. The conclusions are supported by plenty of statistics, characteristics, diagrams, etc. In my opinion, the authors have accurately described the situation, assessed this situation and proposed realistic and feasible measures.

I have only the following comments and recommendations:

Formal comments:

- Missing list of abbreviations.
- I recommend that links to explanatory tables or charts be added in "Recommendations".
- I recommend that the reported statistics, characteristics, etc. be accompanied by a commentary or explanation.

Recommendations for organizing the selection of projects to address:

1. A short time between call announcement and completion of the application collecting process. I recommend that the same time for all calls be defined.
2. A disproportionately long time between the deadline for submitting applications and the announcement of results.
3. Varying quality of the evaluators. I recommend a clear explanation of the criteria when training the evaluators.
4. Imbalanced rating of the evaluation criteria applied to submitted applications. I recommend that the criteria where the rating is well above average should be divided into several ones.
5. Overvalued rating of inexact criteria, where the subjective opinion of the evaluator is prevailing. I recommend that quantifiable (measurable) and thus exactly evaluable criteria be substantially strengthened in order to eliminate the subjective opinion of the evaluator as much as possible.
6. When assessing performance, I recommend using clearly defined indicators for the assessment.
7. To prevent efforts associated with reporting activities to exceed efforts required to implement the project as such.

Other comments:

1. Criteria for institutional support in the CR should be aligned with common rules in the EU.

Major recommendations:

1. All recommendations and comments in the presented audit should be reflected in the evaluation criteria for assessing submitted projects (applications) in future calls.
2. Any recommendations on the management of science and research in the CR should be reflected in practice

I have paid significant attention to Annex 5

Science-Industry Linkages, Annex 5 to the Final Report**Overall assessment of the Annex:**

The document has been drawn up in a very comprehensive way and is well-founded. It correctly and accurately describes the current situation in the area of cooperation between science/research and companies in the Czech Republic.

I have only the following comments.

Substantive comments

- Page 3, paragraph six ... **transition from pure education institutes to research organisations....**

Cooperation was promoted, central state research institutes existed with which companies were forced to cooperate (e.g. ÚVMV, VÚOSO etc.).

- p.117 Section H

- Introducing tax incentive for enterprises on R&D cooperation with research organisations (discussion has already started).

Tax incentives for cooperation between universities and industrial enterprises should primarily be added.

- p.117-118

I miss recommendations for industrial companies

Recommendations

A. Increase priority and awareness measures of SIL at all levels of the R&D&I system in the CR.

On a strategic level.....

On the level of research organisations

Missing:

On the level of industry

Prof. Ing. Jiří Málek, DrSc.

The final report of this very comprehensive study of research, development and innovation in the Czech Republic is made up of very large structured texts accompanied by tables and graphic presentations that handle topics specified in the initial documentation in a well-arranged way (hereinafter the "Report"):

- a) Assessment of public expenditure for R&D&I in the Czech Republic, assessment as to whether such expenditure is effective and comparable with the European level (**Annex 1**).
- b) Evaluation of state administration of research and development (**Annex 2**)
- c) Evaluation of R&D programmes – the subject of assessment will be the procedure used for preparation, interim and final evaluation of R&D programmes and of R&D programme management, in particular at the level of providers; an analysis of relations between priorities encompassed in strategic documents approved by the Government (strategic documents, R&D&I priorities, economic policies, research policies of individual ministers – R&D concept) and published programmes (**Annex 1 and Annex 2**)
- d) The level of research and development institutions (**Annex 3** and partly some sections given in **Annex 4**)

- e) The relation between research and application spheres, barriers of cooperation and, on the other hand, instruments supporting such cooperation, motivation towards target behaviour, and knowledge transfer (**Annex 5**).
- f) Human resources (**Annex 7**)
- g) International cooperation in research and development (**Annex 6a, 6b**)
- h) Comparison of the current system of management and administration in the field of R&D&I in the Czech Republic with principles of *Reform of the R&D&I System in the Czech Republic; Guidelines for Evaluating R&D Results*, and *National Policy of R&D&I in the Czech Republic between 2009 and 2015* (**Final Synthesis** and partly also **Annex 1 - 7**).

All Annexes to the Report are designed as separate documents containing an analytical section, relevant data, their analysis and relevant recommendations. The most important points are emphasized in the summary text of the Report titled **Final Synthesis**.

The introductory part of this text is very interesting, summarizing the most important facts about national systems of organizing and financing research and development. On an international scale, the position taken by the CR in the quality of research and educational institutions, in the ability of cooperation between research institutions and the industry, and in innovative activities is approximately equivalent to the degree of economic development and does not deviate significantly from the cultural framework of the relevant civilization range. However, the perception of the Czech Republic is very different in terms of public trust in politicians, transparency of government decisions, the degree of dependence on government regulations, and trust in the ways how public funds are managed. In all these respects, the Czech Republic's position is much worse than what would correspond to the development of the economy and the expected cultural level. Thus, the authors of the Report correctly point out that research, development and innovation in the CR are at a reasonable level but the degree of trust, especially in government decisions, is considerably low.

Not surprisingly, therefore, one of the main recommendations in the final part of the Report is to increase the generally low level of confidence in the way of financing research, development and innovation. Another important recommendation is that the difficult economic situation should not lead to budgetary constraints on research, development and innovation. Another suggestion is directed toward research organizations which, after the privatization wave of the early nineties, are still operating and, in the opinion of the authors of the Report, can play a much bigger role in communication between different sectors of industry.

In comparison with previous partial reports, in my opinion, the authors are somewhat cautious in the wording of recommendations regarding how to deal with the current evaluation methodology of research and development. One of the most serious objections is related to the fact that consistent

application of methodologies may lead to significant fluctuations in the level of institutional financing which can somewhat limit the long-term strategic planning of research. This argument is relevant. But the previous system of research plans was not ideal, either. It made research as such virtually impossible for some institutions, as it in fact did not allow for certain sites to receive institutional funds. Faculties of some universities that repeatedly and unsuccessfully applied for research plans have the experience. But I agree with the suggestion that the current system based on the Assessment Methodology should gradually be replaced with a new system combining bibliometric and other indicators, assessment by the evaluators taking into account the expected development of research institutions. However, I join the subtle (and not openly stated) warning message from the authors of the Report that the whole process must be transparent and that it cannot be implemented without agreement and closer cooperation between universities and the Czech Academy of Sciences.

I agree with the clearly stated idea that one of the obstacles to achieving a world-class status in many fields the CR is the fragmentation of research groups. This fact has its deeper causes resulting from the specific development of CR in the last 20 years and I'm afraid it will not be easy to overcome.

Another recommendation in the Report is to create clear international strategies of cooperation that will help to develop research and increase publication activities. This is truly one of the weaknesses of research in the CR and, in particular, the participation of Czech teams in FP projects is very low. Another point is the recommendation that research institutions centralize human resources management. It is certainly a well-intentioned advice, but I would still wait with this step in CR for some time. All those who have direct experience with how central human resources management is realized at some faculties are probably aware of the risks associated with centralization.

Recommendations regarding IPR are correct and very useful.

I do like the proposed shift of the RDC scope from micro-management to activities based rather on the long-term vision of research in the CR. The question is, what institution would then prepare the R&D&I chapter in the state budget and conduct negotiations with all relevant partners. The answer to this question is not trivial and is closely connected with the first recommendation in the Report relating to the generally low level of confidence in the method of financing R & D and innovation in the country.

In the Report, I miss (or maybe I have not noticed) any comparison of the performance of individual scientific disciplines with the world. In this respect, I am referring to outcomes related to financial resources used. Furthermore, a number of small inconsistencies and minor errors can be found in the

Report. Given the huge range of all the documents, though, I will not mention them in this brief commentary. Overall, however, my position on the Report including its annexes is positive.

prof. Ing. Vladimír Mařík, DrSc.

Despite I have been under strong time pressure to prepare this evaluation, I have to state:

1. The report is well written and summarizes a large volume of facts, opinion and experience in a visibly fair, objective way (despite I would like to discuss some of the findings and conclusions within the frame of the forthcoming workshops). Thanks for it.
2. Comparing to the initial requirements, the painful problem of the impact of the large scale projects financed from operational programs on R&D&I policies and funding in the near future was not covered at all, despite this factor is expected to influence the R&D&I in a substantial, maybe decisive way. The sensitive situation of Prague (in connection with the Structural Funding) and potential impact of this situation on the overall R&D&I performance of the country is not even mentioned in the Synthesis Report.
3. Similarly, the linkages between the EU funded research and national R&D&I policies were not covered and discussed thoroughly – I feel the enhanced linkages between the EU research programs and the Czech R&D&I policies and practices should be much stronger, we need to synchronize the strategies, policies and funding and much better profit from this synergy.
4. The final conclusions should be much more sound, much better organized. The prime minister should get quite clear, explicit recommendations what has to be done in particular on which level, maybe with some alternatives. The key issue is the role of the R&D&I Council in the NRIS governance – the changes needed (or alternatives recommended) should be explicitly stressed in the very first paragraph of the conclusions. Why not to consider converting the R&D&I Council into a regular ministry? The alternative proposal(s)/recommendations should be much more advanced than just to recommend changes in the style of work of the Council.
5. The recommended role of Ministries and Agencies and steps to be taken should follow. I would expect more specific steps to be recommended.
6. I couldn't find any strong recommendations concerning IPR protection. The role of it is underestimated in the report. IPR protection is of key importance for achieving competitiveness in the world-wide scale, once we aim our efforts towards technology frontiers.
7. The legislative changes needed are not stressed in the extent they deserve. The law No. 130 is not flexible enough to allow diverse methods of funding of start-ups and spin-offs, it puts a lot of obstacles in the activities of the Agencies (as I am aware from my personal involvement in the Technology Agency). The legislative changes/modifications should appear as one of the key recommendations.

Toulouse, August 30, 2011

RNDr. Jan Nedělník, Ph.D.

Final Report

Great effort made by the team of the submitter on the total of 71 pages

On page 1, there is statement that the CR is one of the most developed countries in the world. This is a realistic statement that sometimes disappears in the narrow-minded disputes in the domestic political, but unfortunately also the research, scene.

In Chapter 2, there is a fairly extensive description of the research and innovation systems and the role of research in the society. It reads well, the reader realizes many associations, yet a fairly long chapter, it could be more concise.

In Chapter 3, there is an interesting and largely realistic look into the history of research in the Czech lands. Though, again, often just transcripts of the objectives and plans of national policies, etc.

To avoid repeating myself with respect to other chapters, except Chapter 7, all the other ones are quite descriptive. I expected summaries of each WP and their further detailing in the annexes and, of course, recommendations.

Those that are mentioned in Chap. 7 are understandable, clear and often expectable:

A discussion about priorities involving all the stakeholders, a proposal, if possible, to increase the state support for research, a change in the evaluation methodology, an emphasis on cooperation at the national level, new people in research, stabilization of research teams. A significant role for the RDC. Restructuring of this Council, redefining the objectives of its work.

On a general level, I agree. In spite of that, some hesitation exists that I probably cannot define at this moment. I will be interested in the responses of my colleagues. I tried to avoid direct opposition, this is maybe even impossible in these audits, if they are based on objective data input, as I say in the conclusion. The most valuable output that should emerge is a view from the outside. This is what we are missing.

Annex 1

In the opening paragraph, there are only two types of R&D entities - universities, government R&D, any mention of private R&D completely missing, they are presented in BES here, which is then explained in the final report.

In the introduction, there is a gratifying statement about four times the increase in the R&D budget, comparable to the EU27.

The need for the growth of private sources highlighted - yes, the tools, indirect support for investment in research, tax incentives.

In the EU, 60% from business sources, while in the CR only 45.8% in 2009.

The first recommendation - incomprehensible?

Distribution of public money - three sectors. In the public sector, comparable to the EU, 90%, in the business sector below the EU average - support?!

Recommendation on page 6 - indirect instruments. To increase funds for social sciences, humanities and engineering, yes.

On page 7, the description of private institutions, yes, given historically, the majority of applied research in these organizations. This statement is missing. On the same page, any mention of the MoA programmes is missing, which are the only departmental programmes for the field of agricultural sciences and are necessarily supported by public budgets throughout Europe.

Ch. 1.3.

54% of funds distributed through projects, 46 institutionally, in contrast with Chapter 3.3.3., which states the opposite: 2008 54% through institutions, 46% through projects.

A statement that in international comparison, this ratio is higher in favour of spending on specific purposes.

Ch. 1.4.

A statement that university research began to increasingly develop in the nineties, while a drastic reduction of the Academy at the same time? And the other departmental research? Even more drastic measures!

The chapter about the priorities of the state - agreement with the recommendations

Kap.3.2

Description of individual stakeholders – for the BES where all the research institutes are private, where a crucial part of the applied research is done, for instance in the TIP programme, a significant portion within departmental programmes, as well as TA. Then, perhaps, slightly different arguments concerning the amount of money into the BES would be possible?

The BES contribution to the total funding is positive - more than 46% in 2009

Little interaction between BES and PS

High income of AV from licenses - 1.13 billion a year? This is over ten per cent of the budget. Even in developed countries, according to the statement on page 45 in per cent? Much appreciated! Followed, however, by a corrective statement mentioning that in the vast majority this concerns licenses for the patents of prof. Holý.

Extent of research at universities in a system with no FC. Can it even be estimated?

Income to universities - of the total budget, or the research budget? Is there any?

Chart 19: Two types of universities - technical and public. What is it?

Figure 25 - non-oriented research prevailing in the state sector, 72% - is it good?

Fig.28 - the importance of indirect tax and other tools

Ch. 4.2. reference to EARTO - major European prestigious association - gives weight to arguments

Ch. 5.2. basic documents mentioned - the repetition of "science makes knowledge out of money, innovation makes money out of knowledge". A description of providers. The issue of linking broadly defined priorities and programmes?! Probably yes, descriptions of existing programs, yes, plus examples from other European countries, maybe unnecessary repetition. For GACR, it identifies what is missing - the thematic focus on page 91

TIP and Alpha - any effort to link together completely missing!!

Missing systematic approach to aligning the programmes on page 96. Bad conceptual work

In Ch. 5.4. overview of international programs - varied offer, sometimes an impression that something will be announced, then it ends and something else is done, a lot of programs - centres of excellence, competence centres, platforms,

Annex 2

On page 11 institutional vs. targeted, goal 40:60, yes, correct. Comparison with the description in Annex 1?? In 2009, does it correspond?

Strengthening the influence of users on the formulation of priorities, better at the level of ministries than the Government Council

absence of ministries in the Government Council

Comparison of the composition and functions of research councils, including the wide role of users - it was like this in this country, now inclination again and academic?? Committees or the Council not to be an arena for its members, but a source of strategic plans, page 34

Recommendations for the RDC on page 34 - consensus, a broad platform to discuss strategic goals, etc.

The division into basic and applied - on page 36 a statement that it is bizarre

Annex 4

In the introduction of Chapter 1.1 description of the four basic types + 2 others - utility model,

Ch. 1.2. pros and cons of patenting, good. The example of Coca Cola.

2.1. the number of patents per applicant - BES is best

An increase in the number of patents, utility models and industrial designs after the introduction of the methodology or into the methodology of this result

The example of the Institute of Organic Chemistry and Biochemistry - a beacon compared to the rest, is it the only income of the AS from licenses? Confirmed later.

Based on a questionnaire, 105 respondents, views on intellectual property protection, barriers

A separate chapter on the Academy - why?

Ch. 2.3. confirmation that 98% of licensing revenues come from a single source, prof. Holý

Ch. 3.2 description of institutions such as the Patent Office, South Moravian Innovation Centre etc.

Examples from the countries of Hungary, Austria, what is the support and structures to support patenting

Recommendation: in the HR field, education yes

Annex 5

Recommendations for stronger political and later financial support to the transfer of results and cooperation between research and the industry, yes.

Emphasis on human resources.

General remarks

- I personally approached the material as an independent analysis. We have to believe that in assessing the project specification and each partial report, the processors and we managed to ensure a representative range of opinions on each theme. The statistical data must also be taken for credible.
- Therefore, from my side there are no factual comments, the report and its annexes provide an overview of the current situation, which often is not as tragic as it may be seen from our subjective viewpoints. I would put an emphasis on communication between all stakeholders - politicians, users, researchers. Negotiation is a way to set up better and more objective rules. Strong words exchanged through the media will not help a lot.
- I expected the Czech version of all materials. I thought that it has been agreed. After all, the materials would be easier to study. Although I am used to reading several hundred pages of

documents in a foreign language, in the implementation phase Czech cannot be avoided, anyway. With all the risks of inaccuracies in the translation.

RNDr. Jiří Rákosník, CSc.

The report and its annexes are elaborated in a way analogous to the precious interim reports and – as expected – form a very comprehensive complex. It is important to note that the core is in the annexes which do not represent only a complementary surveys of data and findings. The reports itself has an apt title: *Synthesis report*. It is not a mere executive summary but rather kind of keystone and complement. I particularly value the observation of lack of trust and a necessity of open constructive discussions preceding formulation of strategic documents and resolutions. This might be even more emphasized because no necessary changes can be dome without overcoming these barriers.

Of course, we cannot expect that findings in extremely broad scope of topics and areas can be summarized in a very few pages. However, at the same time, one cannot expect that all stakeholders (in particular politicians) would read the many hundreds pages. Therefore it is recommended

- to add a separate document with a well arranged list of main recommendations formulated in a very concise way (a kind of watchwords index) arranged according to their importance and provided with references to corresponding pages in the annexes; chapter 7 of the report might be used as a basis;
- to arrange all annexes in the same way as the first ones corresponding to WPs which were finished several months ago and already went through one or two rounds of review process; i.e., to add an executive summary at the beginning (not just a general introduction) and a summary of conclusions and recommendations at the end (in some of the annexes the recommendations are scattered within the text, sometimes they are highlighted by boldface, sometimes by italics – the former seems better);
- to unify abbreviations (cf., e.g., ASCR – AS CR – CAS) and to append their list;
- provide individual annexes with references to other annexes where appropriate (some topics are tackled in several annexes).

The rôle of the previous interim reports and their annexes is not quite clear. Are they overridden by the final report and its annexes? At least the appendices to Annex 2 of the first interim report containing the bibliometric analyses should be added to the final report.

Comments on the Synthesis report

P.1, last but one par.: What is the meaning of the asterisk by the word “rate”? Misprint in “102nr for diversion...”

P.5? missing references in footnotes

P.6, 2nd par.: “(Figure 1Figure 1)” – ?

P.10, below the bullets concerning Levels 1–4: “From the Figure it is clear...” – which figure?

P.23–24, 1st par. in 3.2: Besides the Research Intentions funded by the MEYS, 63 Research Intentions started on 1 January 1999 in the institutes of the Academy of Sciences. The new set of RIs funded across ministries and the ASCR started in 2005 (the previous set which had to finish in 2003 had to be extended by another year till 2004 since the R&D Council and MEYS did not launch the procedure for preparation and evaluation of new RIs in time). Therefore it cannot be said that theses RIs “were funded in 2004”. Similarly, the further tranche of RIS (98% of which were funded at universities) started in 2006.

P.36, 1st line: “Teplicy” should read “Teplice”

P.49, last par.: The high proportion of researchers claiming to cooperate with industry is surprising, indeed. This, together with the finding that university researchers more likely use formal mechanisms for SIL, seems in contradiction with the extremely low financial support coming from the business segment to the university segment. It should be perhaps explained or at least commented.

Comments on Annex 1

Figure 1: Is the graph correct? What is the meaning of the negligible portion for HES?

Figure 9: Wouldn't be more natural to turn the orientation of the x-axis in the opposite way?

P.32: The indexes in formula for RCA should be changed in order to distinguish the fixed ones and the variable ones (moreover, there is the second index missing in the numerator):

$$RCA_{mn} = 100 \times \tanh \ln \left(\frac{X_{mn} / \sum_i X_{mi}}{\sum_k X_{kn} / \sum_{ki} X_{ki}} \right)$$

(I cannot forbear a comment on the formula: I understand that it comes from an established sources and the explanation is formally correct, even though the word “symmetry” should be understood in a proper way. However, “deciphering” the formula we get that simply $\tanh \ln \left(\frac{X^2 - 1}{X^2 + 1} \right)$, which may look less mysterious for non-mathematicians.)

Figures 23 and 24: It should be mentioned which year the data concern and if it concerns only operational costs or it includes also capital expenses. This is important especially with respect to the Operational Programmes. There is a misprint in “National Research Proqrammes”. The caption for the orange part in the graph is missing. The data for the ASCR in Fig. 24 seems contradict the one in Fig. 23 (40 vs. 60 % for institutional part). So much of institutional funding cannot “disappear” in the institutes management. If the data comes from interviews then it only shows the wrong awareness

of the real expenses structure (for instance, are the basic salaries included in Fig. 24?) What is included in the sector “Other Research Institutes” in Fig. 23 and in the sector “Other (Partly) Public R&D Organizations” in Fig. 24? Are the sectors the same? If yes, they should be named in the same way, if not, there should be an explanation. What is the meaning of “Partly”?

P.86, line 6: delete the repeated word :information”

P.86–87: The grey background is too dark. It is difficult to read the text. The same repeats on further pages.

Comments on Annex 4

This annex concerning IPR issues is very useful not only by the analysis of the present (non)existent IPR system in the Czech Republic but also by its educative content which should be read by all participants of the R&D&I system – researchers, managers, politicians and particularly those who assert their simplistic belief that efficiency of the so called applied research and innovations and of the state economy rests mainly in formal patenting, manufacturing so called utility models etc.

Title page: the subtitle should be “Annex 4 to the Final Report” (not “to the Second Interim report”)

P.39, Figure 11: translate the title of the law in item 11 into English

Comments on Annex 5

P.16, line 3 in the last par.: missing reference or footnote

P.31, footnote 16: See my comment on Annex 1, p.32 above. Moreover, here in Annex 5 a reference to the explanation in Annex 1, p.32 should be included.

P.115, line 4: The item 4 repeats item 1 from the previous page and is typeset in a way different from the other items.

Comments on Annex 7

This annex is quite extensive and somewhat labyrinthine. A list of clear conclusions and recommendations will be useful.

Title page: remove the word “Subtitle” from the subtitle

P.27: I can understand why the authors interpreted and regrouped the six issues formulated in the Tender Document, some of them might have not been formulated in a fully sensible way. Nevertheless, they have to be at least mentioned or commented in the report annex. For instance, item ii) “Assessment of remuneration of researchers and the impact of this on the quality of research

and development results; comparison with the European level within the context of the given country” is only touched in 3.4.1. If the authors find impossible or meaningless to make the comparison of salaries, they should mention it. On the other hand, a comparison of the Czech Republic and other countries of the salaries structure in the scale postdoc – researcher – senior researcher or a comparison of salaries of leading researchers in different scientific fields would be useful.

P.39: The translation *pracovní poměry* → *permanent contracts* and *dohody* → *temporary contracts* might be misleading. The difference between these two types of contracts is not in their durability but rather in purpose. The contract of type of *Pracovní poměr* is usually concluded for a rather narrowly specified work task (the official translation of the Labour Code calls it “agreement on working activity”). On the other hand, the standard work contract (“employment contract” in the Labour Code) can be both fixed-term or open-end one.

Figure 6: The relationship of the text overlapping the drawing is not clear.

P.65, the frame in 4.2.3.2: remove the abbreviation “ASCR” from “Academy of Sciences ASCR”

P.156: The figure is repeated Figure 6 (without a label). Is it intentional? See also the above comment to Figure 6.

prof. MUDr. Aleksi Šedo, DrSc.

The final report, including its eight annexes, is a very valuable compilation of relevant information based on the knowledge and broad analysis of the local "reality" and its incorporation into the international context and comparison and benchmarking with (differently) functioning national models of scientific structures and policies. This material can undoubtedly be used (and I hope that this will be the case) to discuss and, in particular, to reconfigure a number of parameters in our scientific scene. Personally, I believe that a significant portion of the described negative aspects or disproportions is known to our scientific community, however, is very good, if they are articulated in one place, with a strong argumentative apparatus and by an "uninvolved" player. The quality of the Report is apparent from the good "alignment" of its annexes - where the analysed areas overlap due to logical reasons, the submitters arrive at the same or complementary conclusions.

I think that the prepared report, with its documentary apparatus, completely fulfilled its assignment. Yet, I have some notes and comments.

Individual comments:

The low level of cooperation between the industry and the academic area mentioned in the report is largely due to the low absorption capacity of the industry, given by its national structure. It would be interesting to know how many patents (or otherwise protected intellectual property) are in the end used in the domestic and the "foreign" industry. The dialogue of science with the industry, therefore, must be facilitated not only from the "scientific" side but also - and perhaps primarily - from the "industrial" side. Although the report recognizes the novelty of industrial "grant" agencies, the need

of their on-going audit and evaluation of effectiveness should probably be expressly stated (as stated for the providers of science funding in general). The report perfectly highlights the current inappropriateness of the existing "adoring" assessment of patents, etc., in the "Methodology of evaluation – coffee grinder".

With the statement of the lagging educational structure in the country compared with Europe, it is necessary to emphasize the need for strict accreditation procedures. The level of PGS as well as lower programme graduates dramatically depends on the school. Similarly, the value of habilitation and appointment procedures varies significantly in terms of their criteria. In parallel, in several annexes to the Report, documentation of possible long-term consequences of inadequate financing of university studies can be found. It should be noted that in some faculties the grant "per student" does not even cover the real costs of study. A growing number of schools, the pressure on broad access to university education and a lack of teacher evaluation will lead to inflationary impacts in this area. At the same time, it is the cause of the low numbers of "in-coming" foreign teachers and the related lack of internationalization of our science as such, as stated elsewhere in the report. Anyway, the totally inadequate funding of PhD programs is noteworthy. It is one of the areas in which the declaratory support of education, real measures implemented only in terms of the electoral period and the absence of long-term social vision have extremely adverse impact.

Fundamentally inaccurate statements are in Annex HR - comparing the PGS situation at universities and in the AS (5.2.4, p. 82). I know from my own experience that this is one of the sensitive points in the relations between the AS and Universities and this is also why I consider it very important to be correct in the description of the situation, breaking away from traditional entrenched practices and, instead, seeking the benefits of maintaining the model of coexistence of scientific institutions of the Academy and universities. And it is an independent audit that should - as opposed to episodic local "involved" analyses - enable real information to be presented and analysed.

I see some lack of systemic approach in the section dealing with the evaluation of science. Sometimes the view of "science" evaluation overlaps with the evaluation of "institutions" and the model of "science funding." It is a conceptual question whether we look for ways to evaluate institutions (in this case it is necessary to take into account other aspects, e.g. teaching activities, preventive health care, etc., depending on the institution). This view is important for the founders and for the objectification of comparing institutions of their kind. However, if you are looking for an algorithm of "science" evaluation, supposed to be an instrument to distribute funds, it is useful (where comparability is rational) to evaluate the productivity and prospects of scientific activities of the relevant site WITHOUT its other activities.

The majority of us agree on some drawbacks of the "coffee grinder", particularly when used as the ONLY parameter of evaluation. However, it is possible that its condemnation by foreign auditors is caused by their subjective experience as well; in the top centres abroad, it is A MATTER OF COURSE to publish in high-quality media. I want to say that something COMPLETELY overcome in a certain system can be (if parameters and further evaluation context are properly set) at some time beneficial in a system that is less advanced. This is also evidenced by the rise of high-quality publications in the last decade, which is used by the authors of the audit as an illustration of the growing quality of Czech science. However, the missing evaluation of impact factor which, just like licenses in industrial research, is an indicator of publication "benefits", is a serious issue.

Personally, I believe that quantitative evaluation of the results achieved is an essential **part** of site performance assessment and its proper setting can mitigate such negative aspects as publishing opportunism, "short-term benefit" approach etc. Parametric evaluation also prevents nepotism and "extra-scientific" influences in the evaluation. The importance of peer review in evaluation - hopefully - will rise gradually, but it should be noted that not only it is necessary to learn to accept it, as stated in the audit, but also to provide it correctly. I know from experience that some grant agencies, for instance, receive for **most** project applications the rating of 95-100% from (domestic) intellectual evaluators...

The fundamental insight is the need to assess **providers**, from the perspective of the benefits resulting from the outcome of projects supported by them; thus, not only e.g. from the formal viewpoint. We know cases of absurd projects (some of them even appeared in the media due to their bizarre nature) which, although conducted in a proper administrative regime, were unproductive. There are undoubtedly more of them in the area of applied research and experimental development than in basic research.

The section devoted to the evaluation of scientific institutions is burdened with site selection method in terms of interpretability – only those sites were audited which were selected by a method undocumented in the report and subsequently granted (and some did not grant) their consent. However, from the viewpoint of a "native" the results describe the situation in our country well and the conclusions based on them are consistent with our experience. Unfortunately, most of the described negative aspects have no solution in the management of the audited workplaces, but in system changes in the administration of Czech science. It should be stressed that the "on-site visit" group was very well selected (e.g. one of its members has his own experience from the conversion of "East German" to "German science"), and the work with auditors was not only pleasant but also beneficial for our own further considerations and direction.

In the "Governance" section, which I actually consider the most critical part of the audit, I would welcome more explicit recommendations for further action. Several national models for illustration in the analytical section suggest that there is more than one solution... A general memento is the fact that one system can have more good and workable solutions (such as the administrative framework of science), while some solutions are exclusively poor. It is essential, however, to fulfil the agreed rules in real life (the difference between declaration and implementation), which is traditionally of varying reliability in different geographical areas. Therefore, a number of open questions remain: how to facilitate a productive discussion between the government departments administering science-related chapters, how (according to what criteria) to route financial flows between disciplines, how to recruit managers of science competent not only formally, etc.

I think it is necessary to warn against - often politically motivated - adoration of the "innovation" mantra. It should be seriously admitted that there are a number of useful and commercially valuable innovations that are "not rocket science" and many research results that will not serve as innovations while being a necessary step in the process of cognition. From this point of view, the quip "the steam engine was discovered and exploited usefully long before it was explained thermodynamically" quoted in the final report is demagogic. The drugs of prof. Holý were developed in the opposite logic; the theoretical work of an ingenious synthetic chemist has found its practical use without being previously expected. A similar story is the discovery of semiconductors, the concept of a PC, etc., the

benefits of which (including economic) are not subject to the smallest doubt. From this perspective, I consider the discussion of the term "basic research" at the beginning of the report possibly interesting, but materially misleading and I hope that it was not a purpose, as it is the bottom line of the audit assignment.

Let me make a note in conclusion: I worked in corporate R & D of a multinational company for several years. One of the senior directors used to joyfully repeat that "Our R & D is not here for us to have the best technology, but to prove that our technology is the best." Therefore, it must be admitted that many innovations, as the mentioned by the authors, originate by a minimal modification of what the company already owns (and therefore does not have to look for and, primarily, buy) and not as a product of scientific research which should be subsidized by public funds. Therefore, this part of the innovation process should not be included in discussions about science policy of the state, but in marketing and innovation activities of industrial enterprises. Thus, the distribution of funds between basic and applied research and experimental development should be rationally analysed, with regard to long-term effects, not politically or even in a utilitarian way.

doc. Ing. František Štěpánek, Ph.D.

Overall Impression

Unquestionably, this Report and its Appendices represent the most comprehensive analysis of the Czech R&D system ever carried out, and they contain many interesting ideas and valuable data that deserve to be carefully studied by policymakers as well as the wider R&D community and other stakeholders. I found the reports to be unbiased, professionally written and demonstrating that the authors really know the R&D field. It is evident that the authors not only have a good understanding of how other R&D systems in Europe and the rest of the world work and they are aware of the related historical background, but also that their findings and recommendations are based on a deep analysis of the specific Czech situation. I think the authors managed to identify areas for improvement of the Czech R&D system that should be seriously discussed by policymakers and other stakeholders at all levels, and if implemented, I believe they stand a good chance of providing the basis for a stable and functional R&D system for years to come. In my opinion, a potential drawback of the Report and the Appendices is their sheer length. If the recommendations contained in the reports are to have some impact, then the key decision-makers must be able to read and understand them in the limited time they typically have. I am worried that the length and structure of the reports may lead to fragmentation – a situation whereby different stakeholders will pick different sections of the reports based on their particular interests, and in the subsequent discussion there will be little common ground. If a discussion of the findings of this study is to be constructive and lead to policy decisions, then all parties participating in the discussion should ideally read the same material, or at least there should be substantial overlap. The more voluminous are the reports, the less likely this is. Overall though, I think the authors of the reports have done an excellent job, they have “hit the nail on the head” in many areas, and I hope their conclusions and recommendations will be implemented into policy.

Individual Comments and Recommendations

On Format

1. Executive Summary

While the Appendices have Executive Summaries, the Synthesis Report does not. In order to maximize the impact of this report and to facilitate discussions about its content, I would recommend that an Executive

Summary (in both English and Czech) be added to the start of the Synthesis Report.

2. Use of Cross-Referencing

The Synthesis Report is based on the more detailed analyses contained in the Appendices. However, there do not seem to be any references to the Appendices in the Synthesis Report. I think it would be useful to add some cross-references, so that if a particular conclusion or recommendation is based on data or analysis contained in an Appendix (or several Appendices), the appropriate locations are pointed out and can be quickly looked up by the reader.

Factual Comments

I have not come across any sections or statements that I would consider factually incorrect. My comments are therefore mainly related to the relative importance placed on various parts of the reports and the findings and recommendations contained therein.

1. Perspectives on Innovation Systems

I found especially Section 2.1 to be very interesting and I think it would deserve to be highlighted more – it should almost be a “compulsory reading” for anyone engaged in formulating research policy. The forward linear model (basic to applied to innovation to well-being) indeed seems to be prevalent here and understandably it tends to alienate people from industry who tend to see the relationship between basic research and business success from a rather different angle. On the other hand, if I look at Chapter 2 as a whole, it is rather general and gives a somewhat too ‘academic’ feeling, which may be off-putting for the practical policy-maker who reads these Reports and hopes to answer the question “what should be changed in the Czech R&D system”.

2. History of Czech Reforms

I find that Sections 3.1-3.4 are not so crucial and the Summary Report could probably do without them. The historical evolution of hard numbers is interesting though – if chapter 3 started with Section 3.5 I think it would be fine.

3. Human resources issues

I very much agree with the observations expressed in Sections 5.2 (p.45) and 5.6 of the Synthesis Report and if I should single out one problem with the Czech R&D system (or the public sector part of

it, to be exact), then this would be it. The big question of course is how to address this issue, and I would welcome some suggestions or examples of how a transition from in-breeding to an open, transparent system can be made. A related issue, which I do not see highlighted in the Report but which in my experience is rather important, is the age structure of various panels and committees at both institutional and government level whose decisions, ultimately, determine where funding ends up and therefore have the power to twist research policy and influence careers. There are of course exceptions, but on many occasions these panels tend to be populated by members who are no longer research-active and therefore somewhat detached from reality; sadly, they often do not live through the impact of their decisions.

4. Science-Industry Links

The Report correctly highlights the importance of collaboration between research organizations and industry. In this context Figure 15 is a revealing illustration of the fact that unfortunately there aren't many companies in CR who do any R&D themselves. Collaboration only works if both parties recognize it as beneficial to their business, and I am afraid most Czech companies have other worries. In this respect, I think the recommendations on the industrial collaboration may not be entirely realistic. It would be interesting to first analyze how many Czech companies actually see R&D as an important part of their business models and corporate strategy – i.e., what is the actual demand?

5. Final Recommendations

I understand that detailed recommendations in each category are contained in the Appendices, but I would nevertheless prefer if the recommendations contained in the Synthesis Reports were less abstract and also contained some prioritization. Based on all the analysis performed, what are the Top 5 or Top 10 specific things that should be changed in order to have the most positive impact on the Czech R&D environment? This prioritization may or may not eventually be accepted by the policy-makers, but I think this an opportunity to spell them out.

Date: 27 August 2011

Dr. David Uhlíř

Overall, I was genuinely impressed by the quality of the synthesis report and its annexes. It is very informative, based on original data from surveys and interviews and places the problems of Czech RDI system in the international context. I believe this document represents a very valuable contribution to the debate about future direction of reform of Czech R&D&I system and as such should be paid due attention from the side of responsible authorities, mainly the MEYS and Council for R&D. In a number of cases the authors are giving clear hints and recommendation as to the follow up policy actions. However, the actual decision in this respect remains at hand of the relevant policy-making bodies in the Czech Republic.

For most part, the diagnosis of the Czech RDI system, as well as the presented conclusions, are in line with my own observations and perception of the state Czech RDI system. Most of my comments are thus of a technical nature. Only in a few cases they question some of the observations or conclusions made by the project team.

Synthesis report:

Fully agree with the lack of trust being one of the major underlying problems in the system. Equally, the absence of qualified public administration staff in the relevant fields is key. This latter point is mentioned in the text, but to my mind would deserve a more explicit emphasis, especially in the recommendations. It should also be stressed that developing a competent public administration is long term goal, certainly longer than the electoral cycle. But without reforming public administration, there will be nobody to implement the proposed reform steps and hence no improvement of the RDI system will ever take place (just consider who will actually take and read this report at the Ministry of Education that actually commissioned this report – most probably nobody!). Since the prime minister (according to the information from Jitka Moravcová) demands explicit and concrete recommendations from this report, this – to my mind - is the one he should hear in the first instance. Overall, I believe some descriptive sections of the Final Report leading to no clear conclusions could be shortened / dropped.

p. 19 – 2nd para from the bottom states: “In doing so, they face a significant risk of locking research performing systems in to static patterns by over-focusing on excellence.” The meaning of this sentence is not entirely clear to me. I guess the message is that we should not pick the winners and support them for too long regardless of the broader development in the system (other research teams improving, some previously good declining), but I am not sure if this is a correct reading.

p. 36 – in the 2nd para there is an error in reference to Vítkovice –výzkum which no longer bears that name (now called Material and Metallurgical Research). It is no longer owned by Vítkovice. The same error occurs in the relevant Annex. The info in ERAWATCH is clearly out-dated.

p. 38 – the data presented in Fig.15 is clearly incomplete, missing on some key corporate R&D performers. Admittedly, the error originates from the Industrial R&D Scoreboard, but nevertheless, many of the key performers with much higher R&D budgets do not appear here. The data can be obtained from the Czech Statistical Office from their survey (although anonymous, but the biggest ones can be identified by their location and NACE class).

p. 49 – 3rd para – the information on programme TIP is not correct. This was not the first programme aiming to promote bilateral SIL. Its predecessor was the programme called TANDEM (and I believe there was something even before that one – before my time).

p. 52 – the whole section on the challenges in investing in HR for R&D&I would be worth an overall revision. Concretely:

5th para – I am somewhat puzzled by the statement “A spatial analysis would suggest a need for a polycentric hub region in the central belt area (North East, South East) capable of supporting a dynamic urban hierarchy in Central Moravia....”. What does this imply? And what is the “central

belt”? Equally, the following sentence (“The revitalisation of the North West and Moravia-Silesia is a substantial longer-term challenge...”) is confusing. What is the actual diagnosis? And what is the implication for policy-making, if any?

In the 6th para, the sentence “New investments risk duplicating existing technology transfer structures...” – it is not clear to what investments this refers to; neither is it clear what would such investments actually duplicate (currently, there is actually very little in terms of tech transfer structures on the ground – as stated elsewhere in the report).

In the 7th (last) para – I find the link between limited involvement of graduates and lack of venture capital as somewhat overstating the importance of venture capital. In my opinion, a much bigger hindrance is a lack of entrepreneurship (as correctly stated on p. 53 – but in the third order of importance). The few existing examples of successful awareness raising activities (such as the Microsoft Innovation Centre activities in Brno) clearly show that students can, with the appropriate guidance and role models, be very successful start up entrepreneurs, even without venture capital funding.

The recommendations would benefit if they were structured according to the sub-themes (i.e. following the logic of the annexes). Also, I personally would welcome some more explicit recommendations concerning the proposed changes to the governance system and the position of the Council in the whole system, as well as the recommendation concerning the ex-post evaluations of programmes (as highlighted in the Annex 2 – but not appearing in the Final Report recommendations).

Annex 1:

I only skimmed through this one and hence no observations.

Annex 2:

p. 15-16 – I agree with most recommendations concerning the R&D Council. However, the recommendation to remove the responsibility for R&D budget from the Council does not, at the same time, indicate where this responsibility should be transferred to. Ministry of Finance? Ministry of Education? Or who else?

Annex 3:

p. 12 – 1st para - the recommendation to strengthen relations between the Academy and universities by having joint positions is actually referring to the state of play in the Czech system. Although this is on an informal basis, most key researchers in the Academy have simultaneous teaching jobs at universities (sometimes at several at the same time). What is not regulated though is the number of contracts. So in practice some academics have 2 full-time employment contracts, sometimes even more (!).

p. 122, 2nd para – refers to the evaluation at the Academy of Sciences expected to be available in March/April 2011. The results are already available.

Annex 4:

p. 52 – the last sentence is incomplete.

Annex 5:

p. 5 – 3rd para – the text refers to both programmes TIP and ALFA, yet it does not mention / question the fact that both programmes actually fund almost identical type of projects (a fact that I myself find very surprising, at the time of austerity measures). At the end of the same para the text incorrectly refers to the ESF (European Social Fund) as a source of funding for R&D infrastructure while in reality it is the ERDF (European Regional Development Fund).

p. 9 – 2nd para – I do not understand the meaning of the following sentence: “This increases understanding and applying of science-industry linkages for researchers to encounter the declining awareness curve from people heavily involved in science-industry linkages to researchers actually applying science-industry linkages.”

p. 10 – 3rd bullet point – it is not clear to which ministry the recommendation is assigned (“To fostering awareness and coordination of science-industry linkages on *ministry* level”. I believe that this ambiguity in competence is actually a major part of the unsatisfactory state of science-industry linkages. Industry is clearly the competence of MIT, research is for MYES, but the “space in-between” is no one’s land. I would welcome some more comments / observations / recommendations in this topic too.

p. 33 – 2nd para – The authors link the developments in the Manufacture of electrical and optical equipment to the developments in the automotive industry. I believe this is only partly true since there are several interesting, internationally active Czech companies (both MNCs, but also locally owned) that play a major role in the dynamism of this NACE sector. This would require a more in-depth analysis. So I would suggest – for sake of correctness – to soften the above statement.

p. 37 – 6th para – Vítkovice výzkum no longer bears that name (see the comments above). 7th para – the last sentence is unfinished.

p. 38 – 4th para – there seems to be a contradiction within the same para: the share of students in technical and natural science is close to the EU average, while in the last sentence mentions that the CR has a significantly lower share of graduates in these very field per 1000 inhabitants. In that case, this must be the case also for other disciplines – i.e. the problem is a low percentage of young people having a university degree (?). Moreover, the recent statistics indicate that the CR has actually surpassed already the EU average when comparing the share of 18 year olds entering higher education (due to a very dramatic increase in enrolment rate, combined with a dramatic drop in the size of relevant population cohorts in the last years).

p. 55 - the last para refers to the fact that the R&D Council should assess the legal, financial and other options for establishment of venture capital with the private and public funds participation. I have no information about this but find it strange since this is clearly not the job of the Council (to my knowledge, both Ministry of Industry, CzechInvest and Ministry of Education are working on this in parallel).

p. 61 – Table 10 – it is not clear what the last two columns (“Staff”) refer to. Overall, no source is given for this table (yet some of the data seem rather different from my empirical experience), no explanations of the variables are given (e.g. what does the following data represents: “no. of organisations (businesses, research institutions)”).

p. 61-62 – the information and maps representing the Centres of Excellence and the Regional R&D Centres are outdated and represent those that passed to the second stage of evaluation, not those actually funded (i.e. they include also those that were rejected during the international peer review stage).

p. 63 – 3rd para – it is not clear what the first sentence refers to (“Furthermore, technology transfer centres are already implemented from this programme.”). In fact, several TTOs have been in existence (in just a handful of universities), in some cases they were established with the assistance from ERDF in the programming period 2004-2006. In the current programming period (2007-2013) these are only supported under OP RDI (the call mentioned in the 2nd para on p. 63). However, the results of the call have yet to be published (apparently in the next days/weeks). The implementation is due to start later this year (2011).

4th para –the information is incorrect. In fact, Prague is also eligible for funding from both ESF and ERDF (just like all regions in the EU, including the richest ones), although with much smaller intensity. Research, innovation, as well as tech transfer are also supported under the Operational Programmes for Prague. The budget allocations for these programme are sizable, however, the allocations for the RDI-type of interventions are fairly limited (between 80 - 100 mil. Euro). This, however, is a consequence of political preferences of the City of Prague which acts as the managing authority for these two programmes.

p. 64 – table 12 – it is not clear what this table refers to. What frequency (frequency of what) does it present? In fact, business entities are not eligible under the OP RDI. Which “other” programmes of the MYES? Please explain /correct.

p. 66 – bullet point no. 4 at the bottom – although it is true that the OPs do not support joint projects as such, they nonetheless require fulfilment of certain performance indicators (in the case of OP RDI), which includes also a volume of contract research. This is a part of a performance contract the fulfilment of which is contingent on payment of the grant. So indirectly, the programme creates incentives for joint projects.

p. 94-95 – I agree that more awareness among researchers is needed in respect of SIL. However, it should also be mentioned that there is a huge amount of activity of this sort going on, mainly funded from the OP Education for Competitiveness (ESF). However, the quality of such activities is very variable and often creates inflation of such activities and reduces the credibility of the whole SIL theme. The same relates to later sections when the need for awareness raising is mentioned. Yes, but top quality is key! Otherwise no action is better than lots of sub-standard awareness raising events.

p. 111 – 3rd para – repeats the incorrect information mentioned earlier. The OPs fund also tech transfer activities. Prague is not excluded from this, several tech transfer activities (at universities and research institutes) have been funded from the Prague OPs up to date.

p. 120 – 3rd para – the statement “so far public R&D expenditure in Prague are limited” is clearly an overstatement. Prague currently accounts for roughly 60 per cent of all public R&D expenditure in the Czech Republic. The investment from Structural Funds is likely to reduce somewhat Prague’s domination in public research funding. However, one should not overestimate this: the investment in non-Prague regions from the OPs will account for roughly 10 billion CZK/year, of which some 15 % will come from the public R&D budget, the rest coming from EU funds (in addition to public R&D budget). This compares to roughly 25 billion CZK/year of public funding for the entire CR, of which some 1.5 billion will for co-funding the OPs and out of the remaining 23.5 billion CZK some 60 per cent is still likely to end up in Prague (i.e. some 13 billion).

Annex 6a:

No observations.

Annex 7:

p.103-105 – I am not very comfortable with the description of the evolution of Czech high-tech landscape in the period 1990-2010. It takes a far too “macro” view, ignoring the fact that also within the declining regions there are pockets of high growth high tech economies and entrepreneurship, e.g. in the regions of Pardubice, Zlín, Highlands, etc. Also, it seems to rely too much on the geographical location (peripherality) to explain the diverging economic fortunes whereas clearly there is a very strong correlation between the indicators of the quality of HR and the economic development of the given region (e.g. Northwest would have a location which is geographically very advantageous but very poor standing in terms of HR). The second para on p. 105 fails to appreciate the role of FDI in Northern Bohemia (especially Ústí region) which was in fact one of the largest recipients of FDI in the last two decades (mainly the industrial zones in Žatec, Litoměřice, Most, Chomutov).

p. 121, 2nd to 4th para – from my own experience, I cannot agree with the statement on the importance of venture capital for the development of entrepreneurship. It certainly plays a role, however, I would certainly see the lack of adequate (and high quality) training and incentives for students and young academics as the main obstacle. I find the statement concerning the lack of VC provision insufficiently substantiated.

p. 122, 2nd para – the first sentence is not correct where it states that “all of the Czech Republic except for Prague was eligible for Structural Funds”. Prague has always been at least partly eligible for SF funding, even in the period 2004-06 (as correctly stated in the subsequent sentences).

p. 125-127 – the maps showing the location of the Centres of Excellence and Regional R&D Centres are not correct. In fact, they show proposal that passed to the international stage of the evaluation process, not those that were ultimately selected. Moreover, in the case of Regional Centres they only show proposals submitted (funded) under the second call and those selected under the first call. Equally, the text on p. 125 is referring to the centre of excellence based on the partnership with ESA/ESO which was ultimately rejected by international reviewers. Also, the location of ELI (p. 125) is not Prague but Dolní Břežany, a site just outside of Prague but in the region of Central Bohemia.

p. 128, last para – the text repeatedly refers to the experience of South Bohemia in developing regional innovation system whereas in all likelihood the authors mean the region of South Moravia (Brno not České Budějovice).

p. 129, 3rd para – the text refers to the increased number of jobs created due to the interventions from OP RDI. However, this ignores the fact that these are not net newly created jobs but gross, i.e. jobs that are in existence but only are “transferred” to the new centres count as well. The net increase is thus hard to estimate but is likely to be a fraction of the figure 2,700 given here.

p. 130, SWOT – among the strengths the authors mention “Regional development agencies with understanding of regional needs”. I believe this is completely contrary to the current state of play. What the Czech RDI system is lacking is professional development / innovation agencies at the regional level that could effectively form and upgrade regional research, innovation and business environment. Although I am in a conflicting role here, I guess the only possible exception is my employer – South Moravian Innovation Centre - which is often quoted in this context as a role model, but this is one such a single agency for the entire Czech Republic which sadly, has no parallel in other regions. I think this statement needs a qualification (and probably a re-classification into a weakness).