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Vec : Všeobecné odporúčania Meta-panelu na zvýšenie úrovne vedeckého výskumu

Zdôvodnenie:

Materiál sa predkladá v súvislosti s ukončením hodnotenia vedeckých organizácií SAV panelmi zahraničných posudzovateľov a Meta-panelom.

Materiál je predložený v súlade s bodom rokovania P SAV.

Návrh uznesení:

Predsedníctvo SAV:

Berie na vedomie informáciu o všeobecných odporúčaniach Meta-panelu na zvýšenie úrovne vedeckého výskumu

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Príloha: 1

Predkladá:

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Po ukončení hodnotení vedeckých ústavov SAV panelmi zahraničných hodnotiteľov Meta-panel vypracoval Správu s názvom:

**Regular assessment of the Research Institutes of the Slovak Academy of Sciences
2012 – 2015.**

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Členovia akreditačnej komisie boli taktiež oboznámení s predloženou časťou správy.

V Bratislave, 16.2.2017

Ing. Mária Omastová, DrSc.
Predsedníčka Akreditačnej komisie

5. General Recommendations

The members of the three Panels of Experts and the Meta-Panel made observations on a number of cross-cutting issues, based on discussions with the leadership, researchers, PhD candidates and post-doctoral fellows present on the site-visits of the SAS Research Institutes. The Meta-Panel had an opportunity to make observations on high-level issues in discussions with the leadership of SAS. In the following chapters, the Meta-Panel has translated the observations into general recommendations, which extend from PhD candidates and young researchers' working conditions all the way to the Slovakian research system. Consequently, the recommendations are addressed to the Directors of the Research Institutes, to SAS, to the Slovak Research and Development Agency, and to the Ministry of Education, Science, Research and Sport of the Slovak Republic.

5.1. Training of PhD Candidates, Careers of Post-Doctoral Fellows and Empowerment of the Next Generation of Researchers

Young talented students and young researchers are the most valuable asset of a country. SAS is in a key position in training of the next generation of researchers and innovators. Therefore, the PhD candidates and post-doctoral fellows of SAS should be supported and their personal development enhanced to maximise their potential.

During the site visits, each Panel discussed with the Institutes' Directors the issue of doctoral training and met with PhD candidates and post-doctoral fellows. It was gratifying to learn that the early career researchers are generally well-motivated and are a great asset to their Institutes.

The position, training and role of PhD candidates working at SAS needs further analysis and, if needed, changed. *SAS is recommended to ensure high standards of PhD supervision and to entrust PhD supervision only to actively publishing researchers.*

The Panels observed that the nature of the PhD work was quite traditional in format and (typically) did not benefit from good practices developed elsewhere in Europe. Most commonly, the PhD candidates had one single supervisor, and enjoyed only limited external guidance and limited mobility. Only a few PhD candidates benefited from structured training in substance issues and general (transferable) skills. The early career researchers need wider orientation to prepare them also for the job market outside of academia. It also appeared that they are not always equally entitled to some activities, such as the Erasmus program. *SAS is recommended to include to the PhD curricula teaching of general skills, such as laboratory and project management, research integrity/ethics, scientific writing and presenting and research proposal writing.*

The PhD candidates as well as their supervisors are predominantly Slovakian, with some coming from neighbouring countries in the main. Therefore, a diversity of peers with different

backgrounds, who would enrich the Slovakian PhD candidates' research experience, is largely lacking. Difficulties in the management of visas for non-European researchers were also observed. It would be greatly beneficial to empower European and non-European researchers to work in Slovakia. *The SAS Research Institutes are recommended to build relationships with international doctoral schools and training programmes*, in order to support the SAS PhD candidates and to enlarge the international networks of SAS. For instance, co-supervision resulting in a double PhD degree from a Slovakian and a foreign university (*cotutelle de thèse*), should be strived for.

The Panels felt that the SASPRO Marie Skłodowska Curie CO-FUND programme started in 2014 as a first step towards internationalization is extremely important for Slovakia. The programme supports post-doctoral positions for Slovak and foreign young researchers. Out of the 38 Marie Curie Fellows so far, 16 have been Slovak and 22 from Hungary, Germany, Norway, India, Ukraine Croatia, Sweden, Austria, Poland, Brazil, Greece, Netherlands, Romania and Serbia. SAS has a post-doctoral programme (Stefan Schwartz fellowships) since 2004, where SAS covers half of the salary for up to 20 post-doctoral fellows per year. The continuation of this programme is deemed by the Panels to be of utmost importance.

It would be beneficial for SAS to embrace a greater awareness of the Charter and the Code of Conduct for Researchers, and to experience the benefits of open recruitment and competitive remuneration of doctoral candidates and post-doctoral fellows. *It is recommended that SAS look into international examples of good practices that promote the empowerment of young researchers*. Setting up a “Young Academy” composed of a balanced selection of early career researchers across the Institutes would provide a common platform to discuss issues of mutual interest, and even to promote multidisciplinary research. Various models for such a young academy are available, and they could serve as examples of good practice that SAS might want to study and make good use of. The Presidium of SAS could organize regular meetings with the Young Academy to listen to their proposals and vision on future research agendas.

5.2. Relationship between SAS and the Slovak Universities

Especially in a binary research system, with the co-existence of a national academy of sciences and research universities, a functional and synergistic relationship between the SAS Research Institutes and the universities is crucial for the optimal use of the scarce R&D resources that are available in Slovakia.

Even though the collaboration between certain individual SAS Institutes and the universities were found to be good, the Panels identified several challenges that need to be solved. In a number of cases high quality research groups at SAS Institutes lacked PhD candidates. This was the case especially in the Institutes of Physical, Space, Earth and Engineering Sciences, and the Institutes of Life, Medical and Environmental Sciences. This appeared to be due to the fact that unless there was a qualified professor in a Slovak university in a particular scientific domain, SAS could not host a PhD candidate working in that research domain.

Moreover, a good relationship in general between a SAS Institute and a relevant faculty of a university seems to be a precondition for an Institute to be granted PhD candidates. Again, in a binary research system, students already in the early stages of their studies should be acquainted with the research perspectives that the SAS Institutes have to offer.

Here, the legislation seems to prevent efficient use of public money and to prevent Slovakia from reaching a more prominent position in the European Research Area. *It is recommended that building of a systematically functional relationship between SAS and the universities is addressed by SAS together with the universities and the Ministry of Education, Science, Research and Sport.*

5.3. Diversity of Academic Staff

Diversity of nationalities, cultural backgrounds, career ages and gender increases collective intelligence. As the level of internationality in SAS is very low, special measures should be implemented to increase the number of researchers from abroad. Striving towards gender diversity needs special attention. SAS could have a balanced representation of both men and women in the Research Institutes as well as in the representative and decision-making bodies at the SAS level. The aim is not only to empower women, but to capitalize on the entire talent pool and not only on half of it. Academic female leaders would also inspire female students to embark on ambitious research careers.

Though the Panels met a number of excellent female researchers, most of the Institutes, with the exception of those representing biology, chemistry and social sciences, are dominated by males. *It is recommended that measures are taken for increasing the share of female researchers at SAS Institutes.* The measures should include setting of targets for the share of women, monitoring regularly the progress and publishing the outcomes in the Annual Reviews of SAS.

5.4. Shared Expert Support Regarding EU Funds

The Panels during the site visits the Panels noted a high interest of researchers to apply for ERC Grants. The recognition of ERC Grants as a high-level aim is to be commended. Noted the difficulties for SAS applicants in obtaining competitive external funding from the EU research and innovation programme Horizon2020. Slovakia is paying to H2020 roughly 70 EUR million per year. In 2014 Slovakian researchers fetched back 10.5 EUR million and in 2015 29.5 EUR million. To a certain extent this under-performance has to do with the quality of the research and the limited number of eventual partners for co-applications. However, the lack of success seems also to depend on the lack of administrative support for the applicants.

Most of the individual SAS Research Institutes are too small and lack expertise in applying EU funds. *It is recommended that SAS sets up a central, highly skilled shared expert support centre to support applicants of EU funding instruments.* Such a unit should inform about funding opportunities and deliver professional help with applications and, if successful, program administration.

During the site visits the Panels noted a high interest of researchers to apply for ERC Grants. The recognition of ERC Grants as a high-level aim is to be commended. Applicants for the European Research Council grants need particular attention and support. Best practice in this regard could be learnt from other EU Members States' public research funding organisations. Collaboration, or at least sharing of best practice between the Visegrad countries should be undertaken.

The Ministry of Education, Science, Research and Sport is recommended to identify experts who can serve as National Contact Points (NCPs) influencing the EU programme calls.

5.5. Academic Leadership and Sharing of Good Practice

Leadership of research institutes takes more than just research experience. Special skills in leadership can and should be learnt in programmes. *SAS is recommended to organize management training for directors in seminars where their strategic thinking, governance and leadership skills can be improved, and prioritization, international networking and team building can be discussed and good practice shared.*

The Research Institutes cover a broad range of research themes. They differ in size, research and teaching culture, history, organizational structure, in age distribution of researchers and gender balance, as well as in PhD programs and in international activities. In spite of their differences, and perhaps because of them, Institutes should share good practice. *The Research Institutes are recommended to form stronger ties between each other, beyond the directorial level, between Institutes within a Section and across the Sections.* Joint discussions on PhD programs, funding opportunities at all levels, infrastructure sharing, and administrative challenges will ensure a raising of standards and opportunities.

The Institutes are recommended to enhance intra-institutional and inter-institutional flow of communication in common seminars and workshops. This would support smooth delivery of information about issues such as guest seminars, new equipment and funding opportunities.

5.6. Strategy Foresight

Each Institute should formulate a strategic plan, to be updated on a regular basis. The plan should have ambitious but realistic goals, with an action plan on how to reach these goals, including indicators to be able to track improvements over time. A strategic plan should

include overall strategies regarding recruitment, internationalisation, research quality, quality of PhD training, organisation of research, distribution of resources, funding priorities including EU-funding, publication strategies, renewal of research priorities, gender balance and outreach. In doing so, the Research Institutes will be able to produce more focus and more coherence and to improve upon the present situation where the profile of most of the Institutes is a sum of individual or fragmented research interests rather than a well-founded whole. *It is recommended that all Institutes engage in a long-term (5-10 years) strategy foresight exercise.*

At present planning, including scientific planning, is very much an “in-house” process without taking advantage of external advice. *It is recommended that the Institutes appoint an independent International Advisory Committee, or a shared one where appropriate.*

Strategic planning should also include joint strategies for related Research Institutes. The Panel for Humanities and Social Sciences observed that many Institutes show a strong focus on Slovak culture and tradition, past and present. This is a clear example where a joint strategy in research as well as in terms of public outreach would be welcome. The Panel observed also a lack of theoretical diversity in some of the Institutes visited. Within a strategic planning exercise *it is recommended that the diversity of theoretical frameworks within some of these disciplines become a focal point in future planning.*

5.7 Multidisciplinary Research and Collaboration between Research Institutes

Recalling the SAS Mission of focussing research to tackle global and social challenges, the Panels noted, however, that little or, in some cases, no interest was shown by the Research Institutes for multi/interdisciplinary research, especially such research that would be geared towards Societal Challenges within Horizon 2020. Strategic planning at the SAS and Institutes levels should also be aimed at raising the awareness of the existence and the possibilities that inter/multi/transdisciplinary research offers, in outputs for society as well as in the financial sense. *It is recommended that within the strategy foresight exercise, inter/multi/transdisciplinarity should be given prominence. SAS is recommended to create an enabling environment for multi/interdisciplinary research and establish a competitive budget line for this.*

The Panel for Physical, Space, Earth and Engineering Sciences wishes to put forward Water Research as an example for potential for inter-institutional multidisciplinary collaboration. One of the key topics in global change research is sustainable use of water under changing climate conditions in the 21st century. Research is needed to evaluate the impact of climate change and change of land use on regional and global water budgets. Water research today is multi- or transdisciplinary research including natural, engineering and social sciences. Several Institutes within SAS have some of their research focus on the water cycle, on regional Slovakian water budgets under changing environmental conditions and on the societal impact

of climate change on precipitation patterns, on development of regional draughts and on impact of changing water budgets upon society.

An overarching future research theme such as “Water, landscape evolution and future climate change and its impact on Slovak society” would profit from research expertise in geography, hydrology, earth sciences, social sciences and ecology within SAS across several Institutes. *Close collaboration between the SAS Institutes and relevant units outside of the SAS is recommended.*

Four ministries run and finance sectoral research institutes, among them the Slovak Hydrometeorological Institute, the Research Institute of Water Management and the State Geological Institute. Due to lack of information on the activities and performance of the sectoral research institutes, no recommendations on their role in the Slovak research system could be made.

5.8. Redesign of Research Institutes

The Panels support the continuation of reorganisation of Institutes into larger units of critical mass. As compared to some very small Institutes existing today, larger units can perform better long-term strategic planning and fulfil their administrative tasks and manage human resources more effectively, attract outside expertise and be financially more sustainable by smoothening the yearly funding fluctuations.

SAS is recommended to support the reorganization of Research Institutes into larger units. This must be achieved by redesigning the new units. Reorganizing units is often done by merging existing institutes, while the original independent units remain unchanged, leading to unsatisfactory results and a compounding of poor practice. Simply adding existing structures and operational procedures will not make things better. Only by way of a true redesign new units can do better than the ones they are replacing. This implies redefining the strategic profiles into one common profile, setting clear goals and implementing operations accordingly through strong leadership.

5.9. Research Institutes’ Names

Some of the SAS Research Institutes have up-dated their research agendas over time and, therefore, some of their names do not correspond to their current research activities. Geotechnics, for example was earlier closely linked to mining industry, whereas today the research includes a variety of activities in environmental and soil research, integrating chemical, physical, geological and biological analytical methods.

It is recommended that the names of some of the Institutes be revisited, in order for their names to better correspond to their current research agendas, taking multidisciplinary

approaches into account. Redesignation of some of the Institutes could increase visibility of certain research clusters nationally and at an international level.

5.10. Publication Practices and Incentives

The Panels observed that some Institutes with strong publication output and impact had incentives in place to stimulate publication performance. Since this approach seemed to be correlated with a strong publication output, *further study for mainstreaming and learning from this good practice is recommended. It is also recommended that the Institutes establish a publication, in-house journal and data dissemination strategy* to maximize the impact of their researchers' scientific output.

Many SAS Institutes publish their own scientific journals, some of which are listed as e-journals and others being published as printed journals. *It is recommended that the practice of running in-house journals be carefully reviewed, including analyses of costs and benefits.* Publication in international peer-reviewed journals should be prioritized over in-house publication. The Panels acknowledge that in many cases regional and national scholarly communication remain of importance. Whatever the output, these must be subject to external (preferably international) peer review. *It is recommended that alternate scenarios for publication of such reports be developed.*

The Panel for Humanities and Social Sciences recognizes that there are situations in which journals in the Slovak language are important. In such cases two approaches are advisable. On the one hand, *incentives for publishing in other languages of international scholarly communication should be set up and promoted.* The aim of this would be to achieve a healthier balance between what could be called exclusively 'national' outputs and those outputs which are interesting to wider research communities. This is also the best possible way of promoting Slovak culture and traditions globally. On the other hand, *the Institutes are recommended to look for ways to join forces in the interest of efficiency, quality, and visibility of the in-house journals they publish*, as it is not cost-effective for the Institutes to run their journals individually. It should be ensured that the peer-review process corresponds to the international standard of double blind peer review. *The Humanities and Social Science Institutes are also recommended to define publication categories* such as monographs (authored work), anthologies (edited/co-edited work), special thematic issues (edited/co-edited thematic issue of a journal), proceedings (edited conference papers).

5.11. Use of Intellectual Property Generated by SAS Researchers

The Panels observed that SAS as well as its Institutes lack a clear, coherent and transparent strategy for handling Intellectual Property Rights (IPR). There appeared to be legal restrictions for SAS to invest in innovation and in utilization of intellectual property arising from research at the Institutes of SAS. This has created situations where the intellectual property produced in SAS has been taken over by private companies in the absence of a clear

contractual basis. *SAS should formulate a policy and rules on handing over of IPR to other stakeholders.*

The potential to support early career researchers' innovation activities outside of SAS does not seem to have been considered. In many countries there are innovation centres associated with, but not under the control of major research organisations. Empowerment of young, creative people is a very positive contribution to societal returns. *The Ministry of Education, Science, Research and Sport is recommended to explore the possibility of establishing an innovation center for researchers/innovators of SAS and the universities.*

5.12. Budget Allocation to Research Institutes

Instead of dividing the budget into fixed sub-budgets for e.g. salaries, PhD positions, post-doctoral positions, journals, etc., it would be more efficient to give all Institutes autonomy to use the resources in a more flexible way. This would provide them with opportunities to prioritize different instruments in order to increase quality. Such freedom must be accompanied by quality criteria, against which future evaluations should be undertaken. *SAS is recommended to move from fixed contribution, based mostly on history, to competitive funding, which is based on applications and evaluation/performance of the Institutes, preferentially judged by external experts if possible.*

The SAS salary structure should reward increased experience, mobility and merits and result in higher *de facto* salary to post-doctoral fellows as compared to PhD candidates. *SAS is recommended to support its researchers' career structure and to promote and encourage the envisioned independency of post-doctoral fellows.*

SAS and the Slovak Research and Development Agency (APVV) are recommended to explore the possibility to create specific calls to support young researchers to launch their independent careers after post-doctoral studies, giving priority to those returning home from abroad.

5.13. Budget Allocation to and Management of Research Infrastructures

The Panels for Physical, Space, Earth and Engineering Sciences and for Life, Medical and Environmental Sciences were impressed by the upgrade of research infrastructure that had taken place over the last years with the help of the EU structural funds. The Panels were, however, concerned that such large investments were apparently not done based on national priorities and the consequences of such upgrades were not thought through.

Expensive equipment has a number of components that need to be considered, such as 1) technical skills to operate, 2) maintenance, 3) upgrading, 4) national access and 5) data handling. These appear to not be addressed and consequently, expensive equipment is not

fully utilised. These facilities should be re-enabled to allow the maximum utilisation of the investments.

Large scale research infrastructures have been identified and prioritized for long-term development at the European level in the European Strategy Forum on Research Infrastructure (ESFRI) Roadmaps. A number of EU Member States have developed their national research infrastructure roadmaps which guide investments on the basis of a long-term strategy. An efficient use of structural funds is to co-invest in relevant ESFRI facilities, in order to provide access for the Slovak researcher community to European infrastructures, to attract international researchers to the Slovakian research infrastructure nodes, and to learn how to manage and operate international facilities, and to integrate into international networks. A basic listing of larger units established mostly with the EU structural funds appears to be there, but Slovakia needs a discussion within the scientific community to develop an ESFRI strategy and an implementation plan.

Research infrastructures are not research projects and they demand a whole new way of thinking and collaborating. In essence they provide a complete research eco-system based on “open science” principles. Those researchers who want to take part should be trained and encouraged, as this will potentially have a strong positive impact on Slovak research reputation. *SAS should, in co-operation with universities, train researchers and managers in the operation of research infrastructures*

Future investments in research infrastructure and equipment should be based on national priorities. *Therefore, the Ministry of Education, Science, Research and Sport is recommended to initiate the creation of a National Roadmap for Research Infrastructures, a long term plan on prioritized targets for investments. The Ministry is also recommended to consider state membership in ESFRIs that are the most important ones for Slovak science. The development and maintenance of research infrastructure should be embedded in a national science strategy of Slovakia.*

The Panel for Humanities and Social Sciences was less impressed by the use of the structural funds by the Section III Institutes. It noted that the funds were mostly spent on computer equipment, except in the case of the Institute of Archaeology. No structural funds were directed for co-operation with ESFRI’s Humanities and Social Science infrastructures such as DARIAH and CLARIN, or Europeana.

SAS is recommended to endorse the Open Science principles of the European Commission and insist that its Research Institutes operate the FAIR (Findable, Accessible, Interoperable and Reusable) principles. The researchers should be trained in data sharing, open science and open innovation.

5.14. The Slovak Research Landscape

The present exercise was undertaken by the Meta-Panel and the individual Panels of Experts in a spirit of contributing to the development and further improvement of research in the Research Institutes of SAS. Hopefully, this will lead to a positive development of the entire Slovak research eco-system, better international visibility, and tighter integration of the Slovak research landscape with the European Research Area.

The Ministry of Education, Science, Research and Sport is recommended to undertake in the near future an international, improvement-led nationwide research assessment of the entire research eco-system, including the public universities and the sectoral research institutes, and based on the results, to develop a national science strategy to guide future allocation of public R&D investments.