IPN Individuální projekty národní pro oblast terciárního vzdělávání, výzkumu, vývoje a inovací

23.6.2014

Evaluation Methodology for Research Infrastructures

esf evropský sociální fond v ČR
EVROPSKÁ UNIE
MINISTERSTVO ŠKOLSTVÍ, MLÁDEŽE A TĚLOVÝCHOVY
OP Vzdělávání pro konkurenceschopnost
INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

Evaluation Methodology for Research Infrastructures

Contents

I. Introduction

Background description:

Research infrastructures (RIs) are the backbone of excellent research and development (R&D), they represent a key element of the European Research Area and a pre-requisite for maintaining the competitiveness of the Czech Republic. The main purpose of RIs is to serve the scientific community, respond to its requirements and provide long-term support to top-quality R&D. Research infrastructures also serve as mediators for enhancing students' knowledge and transferring knowledge between the academic and application spheres. RIs are established and subsequently supported according to institutional and national needs and strategies. RIs also represent a platform for different types of co-operation between educational and research organisations, partners from the industrial sphere and individual researchers or research teams solving research and development issues. RIs constitute a place for cutting-edge research and technology development.

Objective of the evaluation methodology:

The key objective of this evaluation methodology is to give RI providers a tool enabling them to unambiguously define, characterise and evaluate RIs in the individual life phases of their existence and to decide whether it corresponds to genuine and remarkable research infrastructure characters. By setting proper criteria and indicators we may direct RIs strategically and ensure their maximum added value, therefore enhancing the position of RIs and, moreover, through project competitions for access to infrastructures the RI is able to contribute substantially to increasing the quality of scientific teams and therefore the competitiveness of the Czech Republic in general.

Directing and strategic management of RIs require thorough evaluation based on a unified **evaluation methodology**. Such a RIs evaluation provides the best foundation for strategic decision-making related to establishment, support and termination of RIs and contributes to increasing efficiency and investment planning towards RIs on a national level. The evaluation methodology has significant importance for:

- preparation of a strategic outlook for RIs,
- RIs transition from preparation to implementation phase,
- evaluation of efficiency, benefits and quality of existing RIs,
- evaluation of needs for substantial upgrades to existing RIs,
- decisions on phasing-out and terminating existing RIs,
- preparation of the national budget, chapter on RIs financing.

The evaluation methodology thus forms a basis for decision-making on RI financing in the individual phases of its existence. Systematic, high-quality and recurrent evaluation exercises enable timely estimates of needs and strategic investments in RIs, upgrades thereof and adjustments of their operating costs according to changing needs and usage of their potential. This methodology aims to unify and strategically structure the RIs area and to improve the support for RIs in the Czech Republic meeting the criteria of exceptional quality, social necessity and utilisation, contributing to a better position of the

Czech Republic in the European Research Area and thus enhancing the competitiveness of user groups in the Czech Republic in international terms.

This document aims to prepare materials for RIs evaluation and on this basis:

- create a set of unified rules and a transparent evaluation mechanism,
- enhance the quality and structure of the preparation process (and update) of the Roadmap in relation to the strategic relevance and indisputable research quality,
- link the implementation process with an informed political decision-making of the Government,
- initiate legislative changes in the RIs sphere.

II. Definition and characteristics of RIs

Definition of RIs for the current evaluation methodology:

Research infrastructures that may be established in any research field are unique facilities or virtual platforms providing the research community with resources and services required for cutting-edge research and development. Such RIs may be "single-sited", "distributed" or "virtual", integrated in transnational networks and may have various legal forms. RIs are established also to be used by other research organisations and other users under pre-defined and transparent terms[1].

According to their nature RIs may be grouped as follows:

- "national RIs" located in the Czech Republic, usually having an international impact (e.g. an international RI or its part or an organisation managing or otherwise providing the RI's operations);
- "national node" of a distributed pan-European RI (firstly the Czech ESFRI RI node) or a part or an access point to international RI networks;
- Czech involvement (Czech part of a RI) in an international RI located in another state[2].

[1] This definition is based on the definition of large infrastructure that is listed in the Act No. 130/2002 Coll., on the Support of Research, Experimental Development and Innovation from Public Funds and on the Amendment to some Related Acts (the Act on the Support of Research and Development), as amended. These two definitions do not contradict each other. Major objective of this evaluation is an appraisal of all research infrastructure proposals, not just these that unconditionally fulfil the definition of large infrastructure (needs to be approved by the Government) and are supported by targeted support according to the Act No. 130.

[2] A Czech involvement may be treated as a RI provided that Czech researchers contribute to a foreign RI by their equipment, operate a part of the RI, assume responsibility for operation of a part of a RI, provide their know-how etc. In case of foreign RIs, where Czech researchers use foreign equipment and they do not contribute to operations of the RI or its parts, such an involvement cannot be treated as a RI. For the purpose of evaluation of such specific RIs the evaluation itself refers to the Czech involvement only. Therefore the RI is not evaluated in general but only with respect to the Czech contribution.

The definition and characterstics as well as the concept of 6 research areas are in accordance with the ESFRI approach.

RI characteristics:

All RIs striving to receive public support or to be included into the Roadmap of the Czech Republic of Large Infrastructures for Research, Experimental Development and Innovation (hereinafter referred to as "RIs Roadmap") must comply with the above stated definition of a RI and other RI attributes that are integrated into the evaluation process and considered in the evaluation criteria. These attributes include especially the following:

- **Stable and efficient management** – RIs must always have a sufficient, clear and transparent management structure. An optimum management structure has three levels with clearly defined:
  - executive powers and responsibilities,
  - directing and controlling user roles (supervisory and/or management board or general meeting),
  - scientific representation warranting quality (scientific board, international advisory committee etc.),
  - in case that a research infrastructure forms a part of a research organisation, its position within the organisation must be clearly defined and must meet the above stated requirements,
- **IPR strategy** – The RI must prepare procedures dealing with protection of intellectual property rights. This strategy deals also with rules and issues of the use of results (e.g. publications and patents) and the open access to data.
- **User strategy** – Notwithstanding whether the RI operates in a national or transnational environment, it must have a clearly articulated and transparent strategy for providing access to the RI to various groups of users. A substantial part of RI users should come from areas beyond the host institution. This strategy includes also a definition of the manner and terms of co-operation with other R&D entities.
  - **Access strategy** – The user strategy includes a clear definition of open access arrangements („*open access*" and „*trans-national access*"), methods for capacity allocation and the degree of financing based on scientific excellence of the proposal[3]. In accordance with the recommendation of the Research, Development and Innovation Council a RI is obliged to provide open access to results of research supported by public resources[4]. The strategy includes solutions to issues of ethics, security and misuse of results, if relevant.

[3] In top-quality RIs a substantial portion of users comes from international environments and the RI must be able to cope with this situation.

[4] Open Access Recommendation regarding published results of research financed by public resources, http://www.evropskyvyzkum.cz/cs/novinky/doporuceni-k-otevrenemu-pristupu-k-publikovanym-vysledkum.

- **Development strategy** – The RI has a clearly developed strategy including relevant balance sheets and studies:
    - **sustainability and development strategy,** including short-term annual budgeting horizon, as well as a long-term outlook – generally based on the lifespan of key instrumentation (e.g. 2–3 years for ICT or 5–10 years for standard equipment),
    - **HR development strategy** – the RI must have a clear and transparent employment strategy, defined career procedures (rules) targeted at professional development of employees, it should also participate in scientific education,
    - **communication strategy** – in its communication strategy the RI considers an international dimension, internationalisation and promotion, PR strategy.
- **Internal strategic research** – The RI, unlike research centres, research institutions, networks and other projects devoting most of their activities to their own internal research, focuses a substantial portion of its research on:
    - research aiming at improvement of services to users,
    - research serving to capacity development of the infrastructure itself,
    - support to user research, including its direct involvement,
    - collaborative and contractual research, within a limited scope.

These attributes shall be subject to evaluation and must be verifiably documented.

III. Evaluation process

Responsibilities for the RI evaluation have been assigned to the Ministry of Education, Youth and Sports. The Ministry has also been charged with the concept of support to RIs; it supervises the entire evaluation process and will, periodically and sufficiently in advance, publish calls for new research infrastructure proposals. Administrative aspects of the evaluation shall be provided by the MEYS, Department of Research and Development. RIs proposals may be prepared for five or seven year periods. All RIs applying for public support or inclusion into the RIs Roadmap will be evaluated by the current methodology.

The evaluation shall cover:

- existing RIs, applying for public support to cover their operating expenses,
- existing RIs proposals applying for investment funds for a substantial update, upgrade or decommissioning,
- RIs proposals applying for involvement in international RIs (particularly ESFRI RIs) or international networks (access point),
- proposals of new RIs applying for the inclusion into the RI Roadmap update.

Every RI proposal shall firstly be submitted to an **ex-ante evaluation** ("ex-ante" here refers to the financial period, i.e. the life phase of the RI does not matter). During this evaluation the proposal shall be assessed according to criteria specified in the dossier for proposal drafting and the outcome shall be:

- non/recommendation of the RI for financing, to be decided by the Government on the basis of a proposal submitted by MEYS,
- non/recommendation of the RI for financing from approved programmes (e.g. a international co-operation project – usually the preparation phase), to be decided by MEYS,
- non/recommendation of the RI for commencement of negotiations on access to an international (or ESFRI) infrastructure or network,
- non/recommendation of the RI for inclusion into the RIs Roadmap, to be decided by MEYS.

The text below describing the evaluation process refers mostly to this ex-ante evaluation. Successful RIs to be financed shall undergo **interim evaluations**[5], which will concentrate particularly on the progress of the RI implementation according to the evaluated RI proposal. After the RI implementation ends or after the financing period approved by the Government elapses the RI shall be assessed in an **ex-post evaluation**.

Research areas:

Research areas covered by Scientific Boards are divided as follows:

- social science and humanities,
- environmental science,
- materials physics and space science,
- energy,
- biomedicine,
- informatics / e-infrastructure.

The research focus of RIs may include more of the above stated areas. For evaluation purposes RIs shall be assigned to the relevant most corresponding research area.

[5] Interim evaluation focused on assessment of already implemented results and accomplished targets will be proceeded in the 3rd and 5th year from the commencement of the financial period (for proposals submitted for a 5-year term the second interim evaluation is not relevant). Particularly the third year evaluation has a substantial regulative meaning. If it discovers a marked discrepancy between the RI proposal and the actual state of implementation, it will allow for restricted financing arrangements in the next two years, during which the RI shall adjust its operation scope. Budget amendments may reach 50 % of planned expenses. In case of recurrent non-accomplishment of objectives MEYS will commence a procedure to terminate the project early. Therefore even a RI proposed for a 7-year term may not be financed fully for the entire period, unless it fulfills its obligations satisfactorily.

Ex-ante evaluation process:

The evaluation process includes 2 interlinked evaluation stages. In the first stage the applicants will elaborate Part A of the proposal, dealing with rather more general concepts of the proposed RI, and will prove that the RI fulfils all the criteria set for RIs; the evaluation will cover mostly formal and contextual aspects including the strategic significance of the RI. The second evaluation stage (Parts B and C) requires a more detailed presentation of the RI project and serves particularly for assessment the various RI aspects in terms of their importance, quality and user potential.

Foreign experts in relevant fields will participate in the evaluation process. In administrative matters the evaluation process will be supported by Department of Research and Development officers. Other actors include:

- ***Expert reviewers*** **–** Each RI project will be submitted to 2 - 3 independent, internationally renowned foreign experts in the particularly field, who will provide scientific review. Projects will be assigned for assessments by the relevant Scientific Board.
- ***Scientific Board*** **–** For every research area a panel of usually 3 experts in the relevant field will be established. In addition to 2 foreign experts the panel will include also a Czech expert. These experts will assess all the proposed projects (evaluation stage I), evaluate every proposal individually on the basis of reviewer opinions and their own knowledge and they will elaborate a summary report for the Evaluation committee (basis for evaluation stage II).
- ***Evaluation Committee*** **–** The Evaluation Committee will consist of chairmen of the branch panels and the chairman of the Evaluation Committee appointed by MEYS. The Committee assigns proposed projects for assessment to individual Scientific Boards, confirms the results of the evaluation stage I (evaluation criteria in Part A), approves results of the evaluation by the Scientific Board in evaluation stage II[6] (evaluation criteria in Parts B and C) and decides on the final recommendation to be submitted to MEYS.
- ***Government of the Czech Republic*** In accordance with the relevant legislation the Government, upon a proposal submitted by MEYS, approves and decides individual RI proposals. The Government also approves the updated RIs Roadmap of the Czech Republic to be created on the basis of RI evaluations.

A member of a Scientific Board cannot simultaneously act as an expert reviewer.

Time schedule of the *ex-ante* evaluation process:

- Preparation of the RI evaluation methodology RI and forms. These materials will be submitted to the chairman of the Evaluation Committee. After a discussion with experts working on

[6] In the evaluation stage II, RI representatives will be allowed to present their project at Science Board's assessment. On this occasion the Committee may address additional questions to the RI representatives.

preparation of these documents, the materials may be amended on the basis of comments by the chairman of the Evaluation Committee.

- Publication of the dossier and instructions for elaboration of RI proposals (MEYS), setting the time framework, announcing an information day for applicants.
- Elaboration of RI proposals by individual applicants. In this step applicants fill in Part A of the evaluation form, which focuses on general criteria and, inter alia, answers the question whether the particular facility really corresponds to RI characteristics in the relevant research area.
- Receipt of proposals and control of materials completeness, structuring of proposals into 6 specified expert areas (MEYS).
- Nomination of Scientific Boards.
- Evaluation of proposals by Scientific Boards.
- Meeting of Scientific Boards. The meeting shall result in a report containing proposals assessed as RIs, to be referred to evaluation stage II, and a first suggestion of reviewers. Conclusions of the Scientific Board will be consulted with the chairman of the Evaluation Committee. The final report will also contain a recommendation and comments by the chairman of the Evaluation Committee with respect to the evaluation process itself, to be implemented in evaluation stage II.
- Preparation of other parts of RI proposals by the individual applicants who successfully pass the first evaluation stage. The applicants will elaborate Part B and address users (or potential users) with a request for filling in the user survey (Part C).
- Addressing expert reviewers to individual proposals (MEYS).
- Evaluation of proposals by reviewers and Scientific Boards.
- Meeting of the Scientific Boards.
- Meeting of the Evaluation Committee. The meeting shall result in a report containing opinions to projects as a basis for evaluation stage II final part. The final report will contain comments and recommendations, if any, by members of the Evaluation Committee with respect to the entire evaluation process and its course.
- Final part of evaluation, preparation of documents and materials for the Government (MEYS).

An expected final output of the ex-ante evaluation consists in a set of recommended RI proposals assessed by the expert committee as projects showing quality in European or worldwide terms. The Evaluation Committee will consider financial resources of the Czech Republic and funds allocated for RIs financing, however, the evaluation will primarily refer to scientific quality, defined particularly as a combination of the quality of scientific outputs produced in co-operation with RIs and the quality of the strategic research of RIs. The financing of proposals will be decided by MEYS. The Ministry shall submit its financing proposal regarding the recommended RIs to the Government for approval.

IV. Evaluation criteria in ex-ante evaluation

On the basis of documents elaborated by RI representatives using forms A, B and form C elaborated by RI users the reviewers and experts engaged in evaluation bodies will produce evaluation reports. The proposals will primarily be assessed in scientific terms. The key aspects shall be:

- Research and innovation potential and quality;
- Utilisation and impact of the RI (including education) on the research community in the Czech Republic;
- Relevance for Czech research environment and research organisations;
- Relevance for Czech and international industry and other spheres of applied research;
- Relevance for technology and innovation development;
- Importance within the international research area;
- Feasibility.

Upon assessing the submitted proposals the evaluators will be asked to reflect the requirements on RIs as stated in chapter "Definition and Characteristics of RIs".

Form A is used namely in evaluation stage I and constitutes a platform for a relatively brief presentation of the RI. The form covers a wide array of issues; however, the aim is not to describe individual areas in detail. It serves for a relatively easy orientation within the research focus of the RI, involvement of the RI in national and international research activities, robustness of the RI strategy etc.

The form addresses the following areas:

- DESCRIPTION OF THE RESEARCH INFRASTRUCTURE;
- USAGE AND APPLICATION OF THE RI;
- IMPLEMENTATION LEVEL OF THE RI AND ITS INTEGRATION INTO NATIONAL AND INTERNATIONAL PROGRAMMES;
- RELATION TO THE RESEARCH ENVIRONMENT AND RESEARCH ORGANISATIONS IN THE CZECH REPUBLIC;
- MANAGEMENT AND SWOT ANALYSIS;
- RI IMPLEMENTATION – EXPENSES.

Form B requires much more detailed data. In addition to a more detailed mapping of areas already included in Form A this part must state, inter alia, comparisons to similarly focused research organisations (*benchmarking*), a detailed budget, specific information enabling feasibility assessment of the proposed RI. On the basis of documented data evaluators will be able to recognise truly unique proposals that may be crucial for the further evolution of R&D in the Czech Republic.

Areas addressed by Form B:

- DESCRIPTION OF THE RESEARCH INFRASTRUCTURE;
- SIGNIFICANCE OF THE RESEARCH INFRASTRUCTURE;
- LINKS TO THE INTERNATIONAL RESEARCH AREA;
- UTILISATION AND OUTPUTS OF THE RI INCLUDING ITS SIGNIFICANCE FOR NEW TECHNOLOGY DEVELOPMENT;
- BENCHMARKING OF THE RI;
- RESEARCH AND OTHER COOPERATION OF THE RI;
- FEASIBILITY AND MANAGEMENT;
- RI's EXPENSES AND BUDGET;
- PORTFOLIO OF INDICATORS.

Form C consists of 2 parts – a very brief form (FormulářC_VIs.docx), in which the RI records institutions addressed with a request for filling in a user survey (FormulářC_uživatel.docx). Subsequently the questionnaire will be administered by MEYS (the filled-in form will not be returned to the RI, the users will send it directly to MEYS according to attached instructions). The user questionnaire will provide information on the RI users, services provided by the RI, user evaluation of the RI's benefits, possible proposals to improve or extend the provided services etc.

The evaluators will comment on individual areas in a verbal evaluation, which may include also recommendations addressed to the RI. For selected issues, there will be appended evaluation points according to the below stated scale.

In the conclusion of each evaluation the evaluator / the committee will evaluate the proposal according to the below stated evaluation scale by 1 – 5 points. The evaluation may use half-points, as well. If the proposal in certain aspects exceeds the description of stage 2 but in others does not reach the quality as described for stage 3, the proposal may be evaluated as 2.5. This option does not apply to the interval 0 – 1, where unsatisfactory proposals must be differentiated from the array of satisfactory proposals showing different quality levels.

Evaluation scale	
5	The RI is of excellent quality compared to leading actors worldwide with respect to originality, importance, quality and impact on the user community. The RI is highly relevant for the Czech research environment and inevitable for the accomplishment of priorities of the national strategies of support to R&D&I and for the competitiveness of Czech research.
4	The RI shows high quality and research potential but does not reach the top standards of international excellence. The RI is highly relevant for the Czech research environment, substantially contributing to the competitiveness of Czech research. It is crucial for accomplishment of priorities of the national strategies of support to R&D&I.
3	The RI's quality and research potential enable good quality services to be provided in the given sphere. The RI shows significant usage possibilities and is relevant for the Czech research environment, however, it is not crucial for the competitiveness of Czech research.
2	The RI's quality and research potential enable it to contribute to the provision of sufficient quality services in the given sphere. The use of the RI is significant, particularly on the national level. The RI is relevant for the Czech research environment; however it lacks crucial strategic importance.
1	The RI's quality and research potential enables it to contribute to the provision of services in the given sphere. The RI is of minor use or has only a limited relevance for the Czech research environment and it lacks any strategic importance.
0	The RI does not attain the level required for provision of relevant services at the national level or it lacks sufficient potential for use in national strategies of support to R&D&I.

V. List of annexes

Annex 1	Form A
Annex 2	Form B
Annex 3	FormC_RI
Annex 4	FormC_User