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Experience report

Developing an evaluation scheme for the National Academy of Sciences of Ukraine based on experiences of the Leibniz Association

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About the project

The "Eval-Science" project is a bi-lateral project funded by the Federal Ministry of Research and Education (BMBF) as part of the funding scheme "*WTZ – Wissenschaftlich-Technische Zusammenarbeit*", and the Ukrainian Ministry of Research and Education in order to strengthen the bi-lateral cooperation and exchange in favour of structural reforms in Ukraine. The project team in Germany is financially supported by the BMBF in Germany for a period of 18 months from the 1st of March 2017 to the 31st of August 2018, and the project team in Ukraine is financially supported by the Ukrainian Ministry of Research and Education.

The team on the German side is formed by the working group of Prof. Dr. Jutta Günther (coordinator), Evaconsult Berlin (Dr. Dagmar Simon), and Prof. Dr. Drs. h.c. mult. Ernst Th. Rietschel as important experts in the field of science policy. The team on the Ukrainian side is set up by Prof. Dr. Igor Yegorov from the Institute for Economy and Forecasting at the National Academy of Sciences of Ukraine (NASU), and Dr. Alexandra Antoniuk from the Institute of Mathematics at the NASU.

The "Eval-Science" project deals with the further development of an evaluation procedure for the Institutes within the National Academy of Sciences of Ukraine (NASU). It is based on a pilot evaluation of selected institutes of the NASU during summer 2016 and the further evaluation rounds that took place so far within the NASU. The new NASU evaluation adopts a number of elements of the evaluation scheme of the Leibniz Association in Germany and is the first approach to evaluate the institutes of the NASU according to this new procedure. The "Eval-Science" project will be an "evaluation of an evaluation" in the sense that it critically assesses and helps to further develop the reforms of the NASU evaluation and the progress made. Recommendations should be given against the background of the experience of the evaluation within the Leibniz Association and against the scientific work done in the field of science evaluation and science policy more generally.

The project team is grateful for helpful comments provided by the Leibniz Association's unit "Evaluation" during a work meeting in Berlin in September 2017 where the project team presented the current stage of implementation and the results of the first evaluation activities undertaken in Ukraine.

1. Background of the new evaluation procedure at NASU

In 2015, the decision was taken to change the procedure of evaluation of the institutes of the National Academy of Sciences in the context of a general reform of the Ukrainian scientific system. The new evaluation procedure had a variety of aspects that were considered necessary to be taken into account. The intention was to base the new evaluation scheme on international experience using both national and international indicators. Furthermore, it should exhibit transparent and democratic procedures, exclude conflicts of interest, give the evaluated research organization the possibility to appeal the evaluation results, be more flexible by not using only one indicator for the ranking as was being done so far. Further, the involvement of external evaluators was considered as a key precondition of success. In the course of time, Ukraine decided to utilize the German experience of the **Leibniz Association** due to the (in many respects) similar organization of the Leibniz Association and the National Academy.

The German Leibniz association and the National Academy of Sciences of Ukraine (NASU) have some similarities in their main directions of activities, which opens the way for the implementation and use of positive experiences of the Leibniz association in Ukraine. The NASU and the Leibniz association have research institutes of a multi-disciplinary nature in different scientific disciplines and both, additionally, rely predominantly on public funding as the main source of their activities. The NASU is larger than the Leibniz association in terms of its research personnel (31 thousand employees against 15 thousand), and its number of institutes (approximately 180 against 90)¹, while the Leibniz association has a larger budget (approximately 4-5 times larger in purchasing power parities)². Institutes of NASU have a number of difficulties, inherited from the Soviet times and greatly aggravated in the last 25 years, especially in the financial sphere. This means that they urgently need structural changes in order to provide a more rational distribution of scarce money so as to improve their performance and to justify a potential increase of state support. The Leibniz association has substantial experience in the transformation and integration of research organizations because a number of its institutes are the direct successors of the research institutes of the GDR and the “*Blaue Liste*” institutes of West Germany. For these reasons, the Leibniz Association serves as an international reference point for establishing a new evaluation scheme for NASU in Ukraine.

¹ <https://www.research-in-germany.org/en/research-landscape/research-organisations/leibniz-association.html>

² Naukova y naukovo-tehnichna Diyalnist v Ukraini, - State Statistical Service of Ukraine, 2017, p.16
<https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD>

2. Previous NASU Evaluation

Before the reformation of the evaluation procedure in Ukraine, the only responsible actor for conducting evaluations was the **Presidium of the NASU**. All research institutes which received public funding were subject to an evaluation. The evaluations took place every five years and were required for the institutes to be included in the state register of scientific institutes.

The evaluation included a survey of scientific organizations and their supporting technical institutions, an evaluation at the departmental level collecting additional information, and the checking of the surveyed forms. At the level of the presidium, multidisciplinary expertise was taken into account and resulted in a ranking of the research institutes.

The survey included information on aspects such as employee structure, main scientific outputs, applications of results in practice, financing, the extent of scientific and technical services, recognition of results on the national and international level, the number of foreign grants, and embeddedness in the scientific community. The indicators were surveyed on a quantitative level and were normalized using weighting factors, resulting in one final number as a result and the according ranking of the individual institutes.

The state certification of research institutes was the aim of the evaluation procedure. The importance accorded to this resulted from the fact that this certification was necessary for the inclusion in the state register of scientific institutes.

3. The New Approach of Evaluation within the NASU

There were a variety of reasons why the NASU evaluation scheme had to be reshaped. One reason is that the Ukrainian science system is falling behind in an international context, which is both caused by and causing a lack of international contacts and embeddedness in the international science system. This called for an evaluation procedure which takes international indicators and experts into account, to align the Ukrainian science system with international requirements. In particular, the lack of financial resources is problematic, leading to the necessity of having a differentiated evaluation paving the way for a strategic allocation of aforementioned resources. An evaluation scheme should therefore be both differentiated and able to distinguish between institutes worthy of support and those which are not, so as to allow targeted consequences in response to evaluation results. Ultimately, a significant issue were potential conflicts of interest in the evaluation process which led to the demand for an evaluation procedure which is transparent and includes the institutes with the intention of avoiding conflicts of interest.

Adopting a new evaluation procedure required the consideration of a variety of aspects. The key elements and goals of the new procedure shape the structure and design of the relevant boards and the evaluation process as a whole.

The new evaluation of the NASU started as a pilot project in the summer of 2016, evaluating the first 13 institutes according to the new procedure. After this, in the year 2017, 28 institutes were under evaluation.³

In between evaluations, quality assurance is provided by internal quality management at the institute and by assessment of the institute through the relevant Department of the NASU. The results of the evaluation can be compared with the 'routine' assessment of the work of the institutes. It is based on the annual reports, which are supplied by the Institutes to the Presidium of NASU.

a. Key principles

The new NASU approach has some key principles. One is that **international experience** as well as both **national and international indicators** are used. Secondly, the evaluation procedures are conducted in a more transparent manner, so as to avoid the potential conflicts of interest systematically. Thirdly, the research organization has the possibility to question the procedure and results of the evaluation. Furthermore, the procedure is being made more flexible by not making it dependent on a single indicator for ranking, as was the case before in the evaluation procedure of NASU. Finally, external evaluators are now involved, including (in the optimal scenario) foreigners.

b. Organs and stages of the evaluation

Within the new evaluation procedure, there are **three relevant organs or stages** of the procedure. The first stage is formed by the **expert group**, the second stage is built by the **Permanent Expert Committee on a Relevant Field of Science (PECRES)**, and the third stage is represented by the **Permanent Evaluation Committee** of the NASU (PEC).

The **expert group, in hierarchical terms**, is located at the third stage, seeing as the five to six member group is formed by the PECRES along with the institutes. The expert group evaluates the scientific activities of the institute. The group visits the institutes and inspects the activities, analyses the inquiry form filled out by the institute beforehand, verifies the accuracy of the materials submitted by the institute, and prepares their conclusion according to the selected criteria. The wording of this report cannot be changed. The pendant of expert group in the evaluation procedure of the Leibniz Association is the *"Bewertungsgruppe"*.

The **PECRES**, along with the "Office of Evaluation", forms an expert group after a consultation with the institute, prepares a presentation on the activities of the institute in accordance with the report of the expert group and the consultations with the institute regarding the conclusions of the expert group. Thus, the PECRES draws a conclusion of the expert group's work, which can be commented on by the institute. It reviews the evaluation materials i.e. the presentation of the institute, the conclusion of the first-level review board, and the statement of the institute concerning this conclusion. The pendant of PECRES in the evaluation procedure of the Leibniz Association is the *"Senatsausschuss Evaluierung"*.

The **PEC** takes into account the presentation by the PECRES, the conclusion of the expert group as well as the statement of the institute. The PEC should prepare a report evaluating the institute's activities

³ Evaluation (visits of experts to the research institutes) had to be over in late November 2017.

and making a recommendation on the further public financing of the institute. This report should be based on the results of the earlier evaluation stages. The pendant of PEC in the evaluation procedure of the Leibniz Association is the "Senat".

The PEC publishes the relevant documents on the website of the NASU, including: (1) the report of the PEC, (2) the presentation prepared by the PECRES, (3) the conclusion of the expert group, and (4) the statement of the institute regarding the conclusion of the expert group.

Chart 1: Hierarchy of evaluation organs and their formation

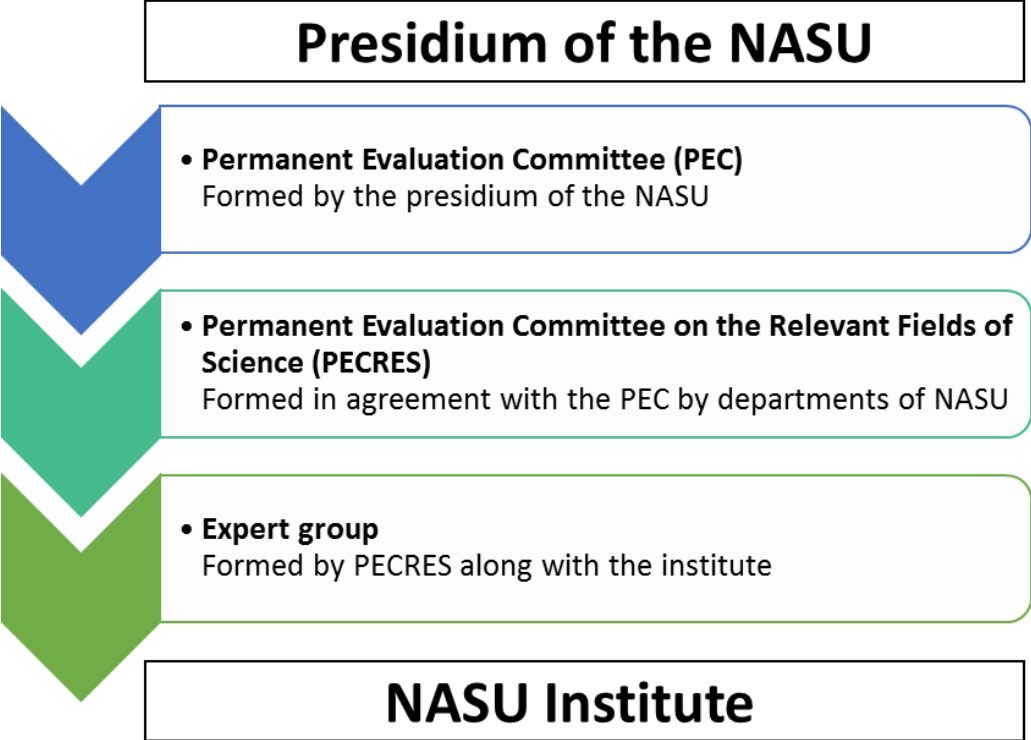
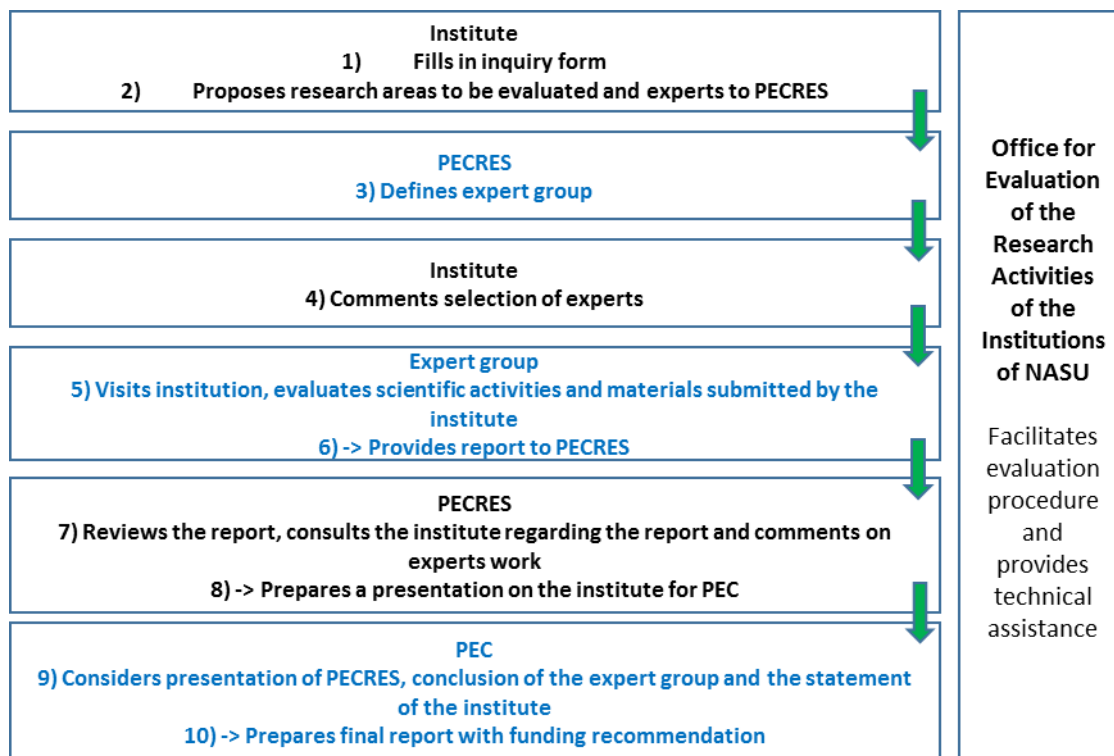


Chart 2: Flow diagram of the evaluation procedure (own diagram)



Source of Chart 1 and 2: own design.

c. Formation of the review boards

An important feature of the new evaluation procedure is the installation of three review boards, the inclusion of foreign experts as well as avoiding conflicts of interest in the new structure.

The **PEC** is formed through the presidium of the NASU. The PEC is suggested to be an independent agency, consisting of:

- 3 representatives of department 1 of the NASU and 2 representatives of both department 2 and 3 of the NASU⁴; they should not be members of the presidium of NASU
- 1 representative of the special group of institutions of the NASU that includes libraries and museums,
- 1 representative of national nature parks, arboreta etc.,
- 1 representative of the Ministry of Education and Science of Ukraine,
- 1 representative of the Council of Rectors of institutions of higher education,
- 1 representative of Ukrainian employers (Ukrainian League of Industrialists or similar organization),

⁴ The three departments are: Physical-Technical and Mathematical Sciences, Chemical and Biological Sciences, Social Sciences and Humanities

- 1 representative of science-oriented business (e.g. ICT sector),
- 1 representative of the relevant department of the Ministry of Finance of Ukraine,
- a representative of the relevant department of the Ministry of Economic Development and Trade of Ukraine,
- a representative of the National Institute for Strategic Studies.

The PEC may also include foreign experts.

The **PECRES** is formed by the departments of the NASU by resolution of the relevant bureaus of the departments, after agreement with the PEC. The current activities of the PEC and the PECRES are provided by the scientific management department of the presidium of the NASU and the office of evaluation.

The PECRES consists of at least eight members:

- 4 representatives of the relevant Department,
- 1 or 2 representatives of other subdivisions and institutions,
- at least 2 representatives of foreign scientific institutions.

With respect to the inclusion of foreign representatives, in practice they are foreign members of the NASU or by representatives of the "scientific diaspora", which usually includes scientists from Ukraine, who are working abroad, typically in Western countries.

d. Participation of the institutes in the evaluation procedure

The institute has several opportunities to take part in its evaluation, in fact at three stages of the evaluation process. First, prior to the selection of experts by the PECRES. Second, after the selection of experts by the second-level review board. Finally, after the conclusion of the expert group.

Before the selection of the expert group by the PECRES, the institute can propose a list of main research areas to be covered in the evaluation procedure, and suggest experts in those research areas in accordance with the rules to avoid conflicts of interest.

After the selection of the experts by the PECRES, the institute can comment whether the experts cover the research areas of the institute, and the institute can comment on potential conflicts of interest with respect to the experts. If there arises a conflict between the institute and the second-level review board which cannot be solved after a discussion of the comments, the first-order review board (PEC) should make the final decision, e.g. whether a certain expert is being involved in the procedure.

From the PECRES, the institute will then obtain a mandatory copy of the conclusion of the expert group, and is obliged to prepare a statement concerning this conclusion.

e. Mission of the expert group

The expert group is supposed to evaluate both the **quality of the past and current work** of the institute and its **potential for the future**. To evaluate these aspects, the expert group is obliged to take a variety of criteria into account, such as:

- relevance of thematic focus,
- the development of the institute in previous years as well as its research strategy for the next years,
- scientific results (output),
- scientific events and public outreach,
- appropriateness of facilities and the financial provision,
- special attention is being paid to collaboration and networking.

Scientific **performance indicators** of the institutes are being analyzed to determine the yield of the institutes' activities. This relates to:

- the number of publications (depending on the "publication culture" of the specific disciplines, which are to be taken into account: peer-reviewed journals, peer-reviewed conferences, monographs etc.),
- the number of documents on commercial property rights and patents, as well as the number of consulting contracts and expert reviews,
- the amount of third party funds raised for research, consulting, services etc.,
- the income from commercial activity,
- the public awareness of the institute (interviews, articles in journals, TV etc.)
- further indicators.

As part of the NASU, a relevant question for the evaluation is whether the institute is of **strategic significance** for the overall structure and goals of the NASU. To assess this aspect, based on the evaluation, the following points are taken into account in order to assess the NASU's goals' strategic significance:

- ... for the further development of a particular field and its environment.
- ... as a hub for specialists or regional clusters.
- ... for the further development of fields of technology, information and other services, such as consulting, and social-political tasks.
- ... for the profiling of programs of the NASU.

In fact, these aspects are assessed on all three stages of evaluation. Initially, experts express their opinion. Then it has to be verified or changed by the PECRES. Final decision is taken by the PEC.

4. Open questions

The NASU has started recently to apply this new evaluation procedure. It is obvious that the process generates questions and issues to be further developed. There are a variety of aspects in the NASU evaluation, where a closer look at the experiences of the Leibniz Association is useful to identify potential solutions and experiences from which NASU can benefit. In the following, the report documents currently open questions and possible lessons to be learned from the Leibniz experience.

a. Evaluation of institutes versus research units of institutes

The evaluation cannot only look at the entire institute, but should pay attention to the performance and potential of single research units. The new evaluation scheme of NASU already takes the assessment of units into account. In case of a critical evaluation of an institute and the consideration of closing it down, the topic of “single units” becomes important. Well performing research units may be kept, should this prove possible. Therefore, in such cases, there exists the relevant question of how such research units may be kept, e.g. through a merger into other institutes. In other cases, the institutes may be good, but certain units that did not pass the assessment should be closed in order to set free resources for more efficiently functioning units. For such cases, the identification of these units and unwinding is needed. The evaluation of single research units opens the way for structural changes within the institute.

As a result of the first evaluation round of the NASU, two Ukrainian institutes received relatively low marks. However, so far no specific measures were proposed to them, except recommendations to improve the work and to make internal changes within their structures.

i. Winding up and merging institutes – experiences from the Leibniz Association

If an institute of the Leibniz Association is considered not to fulfill the funding criteria, the withdrawal of the institute from the joint funding according to §6 AV-WGL is proposed, meaning that the institute will be jointly wound up in up to three years (GWK, 2013).

An example in the history of Leibniz Association is provided by the **Hamburg Economic Archive (HWWA)**. According to the statement of the senate from the 3rd of March 2004, in reaction to the evaluation of the institute in 2003, the HWWA was not to be further supported as an independent institute. It was recommended to merge the unit “library” into the Central library for economics in Kiel (ZBW). The decision regarding other units of the HWWA, however, was postponed. More explicitly, the evaluation of the Institute for the World Economy in Kiel (IfW) was to be awaited, and the potential to merge units of HWWA to the Kiel institute was to be checked (Leibniz Gemeinschaft – Der Senat, 2004a). During the evaluation of the IfW Kiel, the evaluation group recommended not to merge the HWWA research units at the present moment, but to strengthen the cooperation between research units from the institutes that could mutually support each other. In the evaluation report of the IfW a variety of relevant statements by the evaluation group were made that could serve as potential hints of what to consider when the keeping and merging of certain research units with other institutes is

taken into consideration. As the IfW was itself facing reform needs, the expert panel did not recommend to merge HWWA parts into the IfW in a top-down process, as this could be an extra strain for the IfW. Rather, a two-step approach was proposed. First, in the short-term cooperation between complementary research groups from the institutes should be developed, in a bottom-up process. In the long-run, however, the IfW was willing to check which research groups fit into its research agenda (Leibniz Gemeinschaft – Der Senat, 2005). The financial resources were suggested to be integrated with the complementary institute, namely in case of the archive the ZBW (Leibniz Gemeinschaft – Der Senat, 2005).

A quite recent case is provided by the **IGZ Großbeeren/ Erfurt**. This recent case also shows the link between the evaluation of research units (see ii.) and the decision about the funding of an institute. The site in Erfurt had to take responsibility for three research areas located mainly in Erfurt, all of which were rated as insufficient. This fact led to the recommendation to completely close the site in Erfurt and to concentrate the institute's activities at its location in Großbeeren (Leibniz Gemeinschaft – Der Senat, 2016).

While the closing of poorly performing institutes is the unpleasant side of an evaluation procedure, in Ukraine there would be the potential to also create a promising component by rewarding well performing institutes, which would call for an active application of the scientific policy role by the Permanent Evaluation Committee.

ii. Evaluation of research units

The report of the HWWA evaluation in 2003 contains the description of single research areas and units regarding their successes and failures. Thus, it may serve as a “model” for what should be considered when considering the unwinding of subdivisions.

When evaluating research units in institutes of the Leibniz Association, both their research and service performance are considered. The individual research units are analyzed regarding their project generation process (criteria led or random), the collaboration with other units or outside partners, the collaboration and dependencies with e.g. regional universities and its impact on the research, coherence and focus of the different research plans, the connectedness of main research areas, international visibility and position regarding the research frontier, the concept of resource distribution, the publication performance, and the generation of third party funds. Concerning the provision of informational and documentary services, the institute's mission and strategy, its user orientation as well as the management process guiding the commercialization, its idea generation, conceptualization, generation, provision, and finally the supervision of these services are all considered (Leibniz Gemeinschaft – Der Senat, 2004b).

Currently, the subdivisions are evaluated in a final performance assessment according to the international standards for the concerned disciplines and evaluated as excellent, very good, good or inadequate. If a subdivision is rated as inadequate it can no longer remain in the joint funding (Leibniz Gemeinschaft – Der Senat, 2012a).

In case that certain areas of an institute no longer meet the relevant criteria for it to be further funded, these areas are no longer supposed to be part of the joint funding. Consequently, the core budget (GWK, 2009a) is being realigned. If necessary, a winding up of the components is being financed according to the principles of §6 AV-WGL (GWK, 2013). Since 2014, the senate recommended, in the

case of three subdivisions, the exclusion from the joint funding (Leibniz Gemeinschaft – Der Senat, 2016). However, in such cases where budget is realigned to induce structural changes according to the evaluation, potential distortions when it comes to implementation should be taken into account beforehand.

b. Conflicts of interest

The new evaluation procedure of NASU is strongly oriented towards avoiding conflicts of interest. In this respect, NASU has tried to apply the same criteria as the Leibniz association (no joint projects, no membership in the scientific boards and joint publications during the last five years etc.). However, due to limited monetary and competence resources, not every minor conflict of interest can be fully avoided to maintain a high degree of competence among the experts. To solve this, a wider range of potential experts and further monetary resources for inviting experts would be needed. For example, it is not simply possible to invite best fitting experts from abroad (Western Europe, USA), because of budget constraints.

In the Leibniz evaluation procedure, the leaders of the expert panel have to ensure that the experts for the evaluation do not have conflicts of interest, according to the following criteria (Leibniz Gemeinschaft – Der Senat, 2012b):

- Experts may not be related to one of the institutes employees to the third degree and below
- Within the last seven years prior to the evaluation, experts may not have gained employment at the institute or may not have been the member of a committee
- Experts may not have applied for a position at the institute within the last seven years prior to the evaluation
- Experts may not have been scientific advisors of leading employees or have taken scientific advice by employees of the institute within the last seven years prior to the evaluation
- Experts may not have gained employment at another Leibniz-Institute or at a facility which has applied for inclusion in the Leibniz support scheme

The leaders of the expert group may also exclude someone from taking part in the evaluation group if, in their judgment, one of the following criteria is given:

- Prevalence of close personal relations or conflicts
- Prevalence of close scientific or economic cooperation
- Prevalence of direct scientific or economic competition
- Participation by the expert in the choice of managing staff of the institute
- Assessment of potential expert's scientific projects by members of the institute

c. International expert groups

During the pilot evaluation of NASU, only a few foreign experts were among the evaluators. This may be due to several reasons. As the institutes have limited international contacts, the potential scope of international experts is not too broad. Furthermore, the extremely low availability of financial resources limits the willingness to invite foreign experts, including travel and accommodation costs. Lastly, since the evaluation is primarily conducted in Ukrainian language, there is a significant language barrier to be overcome for the inclusion of international experts. As mentioned earlier, a possible solution is the relatively large number of Ukrainian scientists working abroad and could be considered as a pool for foreign experts understanding the language and being aware of the Ukrainian peculiarities.

However, with respect to international alignment of the science system a complete change to English as language of evaluation might be needed. This would not only facilitate the participation of international experts, but also improve the connection to and visibility in the international science system. Such a measure would also result in implications for education policy.

d. Time horizon of the evaluation procedure

The evaluation of single NASU institutes is often done within only several months. However, this seems not to be enough time as, for example, some institutes did not have enough time to prepare the report in the best way. Here, the time scheme of the Leibniz Association may be adopted.

The Leibniz evaluation procedure follows suggested deadlines to allow for a smooth operation. Prior to the evaluation visit, the following deadlines are considered:

Deadlines prior to the evaluation visit

12 months	SAE	decides on the chair and vice chair of evaluation team
11 months	Leibniz institution	discusses the procedure with the Evaluation Office and, if required, with Leibniz Association headquarters
10 months	Leibniz Institution	suggests a list of focus areas for which expertise should be available on the review board; suggests experts
6 months	Evaluation Office	informs Leibniz institution of the proposed review board members
5.5 months	Leibniz institution	comments on any potential conflicts of interest or failure to cover the focus areas named
4 months	Leibniz institution	sends a preliminary copy of the evaluation package to the Evaluation Office
3 months	Evaluation Office	provides feedback on the evaluation package
2 months	Leibniz institution	sends evaluation package to the review board and the guests involved in the evaluation visit
0,5 months	Evaluation Office	sends the status report to the review board

Source: own modifications, based on: Leibniz Association – The Senate (2012c), p.34

Available online:

https://www.leibniz-gemeinschaft.de/fileadmin/user_upload/downloads/Evaluierung/Grunds%C3%A4tze/Leibniz_Senate_Evaluation_Procedure_-_Basic_Principles_with_attachments_.pdf [accessed: 15.09.2017, 12:35]

After the evaluation visit the following deadlines are proposed:

Deadlines after the evaluation visit

0,5 months	Leibniz institution	raises any objections to the evaluation visit
3 months	Evaluation Office	drafts an evaluation report for review board chair
4 months	Review board chair	critically reviews and approves the evaluation report
5 months	Other review board members	critically review and approve the evaluation report (silence procedure, three-week deadline)
7 months	Leibniz institution	makes statement on the evaluation report
9 months	Senate Evaluation Committee	proposes a statement by the Senate
10 months	Senate	releases a statement by the Senate
12 months	Joint Science Conference GWK	assesses funding eligibility

Source: own modifications, based on: Leibniz Association – The Senate (2012c), p.34

Available online:

https://www.leibniz-gemeinschaft.de/fileadmin/user_upload/downloads/Evaluierung/Grunds%C3%A4tze/Leibniz_Senate_Evaluation_Procedure_-_Basic_Principles_with_attachments_.pdf [accessed: 15.09.2017, 12:35]

However, this evaluation procedure would require a timeframe of two years in order to conduct the whole assessment.

e. Attractiveness of NASU for young scholars

Like many science organizations in transition economies, the NASU faces the problem of aging personnel caused by the ongoing emigration of young scientists, mainly because of the limited attractiveness of the Ukrainian science system. It is not a particularity of the NASU, but a general difficulty of the science system. Low wages and unclear career paths drive young and excellent scientist into other areas within the country or abroad.

A strong challenge for the NASU is that of attracting young scientists into the Ukrainian system of research. The solution requires a broader approach that includes wage policy and academic career paths. It is an important field for coordination between different fields of policymaking.

The institutes of the Leibniz Association do not face such strong difficulties with respect to recruiting young scholars, but the question of competing for the best candidates has long been an issue within

Leibniz as well. Wage incentives are a rather limited tool for early stage candidates. But work place attractiveness, and in the case of PhD candidate, graduate school offers have been taken as actions to recruit researchers with a high potential. Also for the Postdocs the institutes offer support for their scientific careers, for example with mentoring programs or with training for application to professorships.

Within the Leibniz Association, most institutes today offer for their PhD candidates an attractive graduate course program, which suits young scholars' needs to further education in their field of specialization. It takes place in close cooperation with partner universities, typically in the same city or region. The courses can be taught by the university lecturers within their teaching assignment. External (international) lecturers typically add to the course programs. Furthermore, many institutes within the Leibniz Association together with local universities hire Junior Professors (postdoc career) to make an academic career within an institute more attractive.

f. Scientific output

Seeing as the NASU consists of three very different sections in terms of scientific output, and also potentially between the departments of a joint section, differences need to be considered with respect to some relevant indicators. The three main sections are: Physical-technical and mathematical sciences, chemical and biological sciences, and social sciences and humanities. Beyond these differences, some indicators, fundamentally, do not fit to the Ukrainian situation.

i. Measuring the output in different scientific fields

An example for a fundamentally problematic indicator for the Ukrainian situation is the generation of **publication data** from databases such as Web of Science or Google Scholar due to differences in the writing of names (transcription), which deteriorates the proper assignment of publications.

Furthermore, in different disciplines, the assessment of publications and output has to be adjusted. For example, in some areas the revision, commenting and reprinting of classic writings is a regular part of the scientific work and output, however hard they are to account for when e.g. mainly publications in journals are considered. In other areas the policy consultancy may be part of the regular work and output. These differences in the specific way of working has to be taken into account for a proper and expedient consideration of the criteria and indicators. Just using certain publication types would be problematic if one was attempting to take differences between excellence and relevance into account, such as in the case of consultancy activities. Furthermore, in order not to confuse quantity with quality, the review of the best publications should be taken into account, alongside with the full publication lists. The second problem is the implicit or explicit hierarchy of criteria and indicators. In several evaluation systems many indicators are imposed but only some really "count", either these are in institutional evaluations articles in refereed journals or the overall quantity of third-party funding. It is very important to clarify these questions beforehand.

The key issue of the importance of different aspects peaks in the question of weighting the indicators. To properly take into account the relevant qualitative and quantitative aspects, as well as the institutional individuality of each institute with corresponding institute-specific goals, experts are

urgently required. Furthermore, an involvement of peers may be beneficial to further balance the weighting process.

The issue of problematic metrics for research assessment is already confronted in debate. A closer evaluation of the appropriate and inappropriate use of quantitative indicators is given, including the conceptualization of “responsible metrics”. A framework of five dimensions is given to assess appropriate uses of quantitative indicators:

- **robustness:** to base metrics on the best possible data regarding accuracy and scope
- **humility:** qualitative expert assessment should be supported by quantitative evaluation, but not supplanted
- **transparency:** transparency and openness of analytical processes , to allow verification by the evaluated
- **diversity:** usage of a variety of indicators to account for the variety of research fields
- **reflexivity:** recognizing systemic and potential effects of indicators and accordingly updating them

(Wilsdon et al., 2015).

It should not be forgotten that the evaluation procedure can shape the mission, developments and working styles of institutes also in a negative way when obeying to certain indicators becomes more important than doing proper discipline-specific work. These considerations call for a cautious application of quantitative indicators as well as the increased importance of qualitative factors.

In the last “Research Excellence Framework” in Great Britain was a new detail implemented to assess the societal impact of research. The research unit had to submit impact case studies in all disciplines to show how their research results are relevant for policy, economy, public and society. This is a new and interesting way to assess impact with qualitative methods and not only by counting patents and articles in the media (see <http://www.hefce.ac.uk/rsrch/REFimpact/>).

Ukrainian institutes have limited experience in conducting such studies and it is evident that special criteria and indicators, which could be adjusted to the Ukrainian realities, could be proposed for such studies.

ii. Taking into account development and infrastructural changes

In the evaluation of institutes, some structural factors should not be underestimated such as if a context of structural reforming is given as well as the structural context of institutes for regions. If internal development processes are taking place, it is of major importance to not give rise to a trade-off situation between learning and evaluation, but instead to take learning successes and learning processes which are put into place into account. Thus, one avoids only evaluating the matter based on a certain point in time, rather keeping the long-term development of the institute in mind (gradient). Hence, it is critical to take new orientations and priorities that the institute is setting into account, and to check whether these are in line with national priorities. Also, the short and long-term priorities of the institute and the NASU need to be identified and properly accounted for.

Further, to strengthen the developmental aspect of evaluations, the institute could, potentially in cooperation with the NASU, conduct a SWOT-Analysis as one possibility for a self-assessment procedure to identify the needs for the further development which should be put into practice. Hereby

it is made possible to more explicitly take into account the developmental success and changes of the institute at the next evaluation. Internal assessments are generally a very fruitful preparation for the external evaluation. An in-depth SWOT analysis could be useful for a more precise evaluation of the Ukrainian research institutes.

g. Financing the institutes

Today, the institutes of NASU are directly financed through the national budget. The limited budget is a central problem for the NASU and makes many suggestions for improvement impossible at the moment. Naturally, the realization of a better financial foundation is needed.

Leibniz institutes are basically financed through the authorities at national level (*Bund*) and federal level (*Länder*) on a 50:50 basis. The strong financial involvement of the federal state where the institute is located leads to a situation in which the authorities at federal level take action to support the institute and its development. However, the German model of basic financing of Leibniz institutes must be discussed within the decentralization efforts taken in Ukraine. In Germany, Leibniz institutes to a certain degree serve the policy objective of regional harmonization. In the history of Leibniz, it was not rare for structurally weak regions to be targeted with the establishment of a Leibniz institute in order to improve the general regional development. However, scientific excellence of course remains the highest goal of an institute in general. Yet, until today, Leibniz institutes are expected to have a regional and supra-regional (including international) significance.

When discussing the model of basic financing, the embeddedness into the entire financial system needs also to be taken into account. A shift of financial responsibilities to regional units (like federal states or provinces) requires of course that the regions have an incentive to take over financial (and topical) responsibility and that the national financial authorities provide such an incentive structure.

5. Concluding remarks

For the Ukrainian science system, the reforms undertaken within the evaluation system is an important step forward. The adoption of large parts of the Leibniz evaluation scheme holds the advantage that nothing new had to be established from scratch. Furthermore, NASU can benefit from positive and negative experiences made earlier by the Leibniz Association.

After a pilot evaluation, the next regular evaluation round has started in the year 2017. The pace in which NASU carries out the evaluations is much higher than in Germany where the entire procedure per institute takes up to two years. Over time, and once all institutes have gone through a first evaluation according to the new procedure, the time devoted to each institute should be extended.

A major difficulty for NASU are the budget constraints, even impacting the evaluation procedures in the sense that, for example, the invitation of experts from abroad is difficult. Although budget improvements in the short run are not very probable, the creation of knowledge and participation in the international scientific community should enjoy priority.

As mentioned earlier in this report, the public financing of NASU should also be considered within the prevailing decentralizing reforms. It should be subject to further discussion whether the financing model of Leibniz (*Bund-Länder* financing) may serve as a model for Ukraine, in order to also foster the policy goal of regional development.

The experiences collected so far by NASU with the new evaluation scheme are mostly positive. The established procedure needs to be further developed. But this holds true for the Leibniz Association, too. The evaluation scheme has always been subject to further development, and lately, the Leibniz evaluation scheme was subject to an external evaluation itself.

Bi-lateral cooperation and exchange between Ukraine and Germany in the field of science and policy is valuable for both sides. In this sense, the ongoing project “Eval-Science” contributes to mutual understanding and learning.

Although there is no “one fits all” recipe and no solution that can be copied 1:1, the Ukraine may benefit from exchange with German partners about the Leibniz experience, last but not least also against the background of transforming and integrating the science system of the GDR after reunification. It was only after 1990 that the Leibniz Association grew rapidly in terms of number of institutes and scientists. The former institutes or units of the institutes of the Academy of Science of the GDR after strong restructuring and evaluations belong to the “excellence league” of Leibniz today. Although it took time and it included painful decisions too, this experience of the GDR should be perceived as an encouragement for the National Academy of Science of Ukraine. The evaluation as such cannot create excellence, but it can differentiate between “good” and “poor”, and it should ultimately encourage to support the “good”, i.e. the best performing institutes and units.

It remains subject to further discussion whether and how far the new NASU evaluation procedure can serve as a role model for the evaluation of other scientific organizations in Ukraine, especially the higher education institutions, such as universities. Once the new evaluation procedure is firmly established and tested in practice, its adequacy for other science organizations can be discussed.

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