

# A scientometrics-informed peer-review exercise

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A scientometrics-informed peer review exercise is described, as applied at the “Babeș-Bolyai” University in Romania for an internal young researcher short-term grant competition. The applicants were graded from A (“internationally-leading”) to B (“regionally-leading”), C (“nationally-leading”) and D (“low-impact”). Judgment was delegated to panels of three evaluators per applicant, and was informed by such criteria as number of corresponding-author articles in higher-impact journals (as defined mainly by those in a range of highest impact factors per field, or variations thereof), citations, patents, books present in large numbers of libraries, and others. Importantly, the grade was dictated solely by the applicant’s own achievements within their field, rather than by comparison to other applicants. Furthermore, the criteria specifically rest it upon the evaluators to judge *the quality* of the scientific content, to the extent where a higher grade may be refused in spite of an apparently satisfactory “number of high-impact papers”. Moreover, the evaluators were allowed to consider any type of achievement as argument for any of the grades – ranging from rewarding notable contributions even if not in journals of high impact factors, to such achievements as translations of books of large impact for humanities, key archeological research, and others. At the end of the evaluation procedure, with a small number of exceptions all applicants graded “A” received funding, regardless of their field – even though an imbalance was noted to bias experimental sciences; a small number of applicants with grades ranging from B to A were also funded, within limits set per domain, and within a total of 60 grants per university. For a following competition round, a simplification of the criteria is proposed, defining just three grades – “IE-of significant impact in internationally-accepted terms”, “IR – of significant impact in regionally-accepted terms”, and “IP-of potential impact”. For cases where the number of applicants with maximum grades exceeds the funding resources available, supplementary criteria were proposed – number of papers in internationally recognized papers, age, interdisciplinarity, and practical applications.

*Keywords:* Scientometric exercise, Scientometrics, peer review exercise, Evaluation system

## Introduction

In a context where Romania has experienced continued waves of change in the academic system, the Babeș-Bolyai University (BBU), as one of the largest, oldest, and highest-ranked in the region, has been at the forefront of such attempts (as referenced in e.g. [1,2]). Here, we report on the implementation of an evaluation system for young researchers engaged in a grant competition – though one may foresee extensions of the protocols of wider use.

The executive authorities of the BBU (The Rectorate) initiated in early 2013 an internal competition for young researchers with a budget of 1,000,000 RON (~230,000 EUR) for one year. A target of at most 50 grants was set. The Scientific Council (SC-BBU) – a consultative committee of the Rectorate - managed the competition. The competition rules were proposed by SC-BBU and adopted after some amendment as official documents by the Rectorate and Senate. SC-BBU then was in charge with evaluating the applications, and

proposing a ranking of the applications based on merit. The decision on funding was then made by the Administrative Board of the university – a body comprising the Rector, Vice-Rectors, and deans of the 21 Faculties.

## Application

The **eligibility criteria** included:

1. Age less than 40 at the deadline for submitting the proposals
2. Having been associated with BBU for the two years prior to the competition; interruptions of at most 3 months in total were accepted. This “association” was defined as either one of the following – PhD student, post-doc, and other types of employee.
3. A demonstration of having published their own research results in international journals, with BBU affiliation

#### 4. Not a member of the SC-BBU

The applicants were requested to **provide a CV** and a brief application, in digital as well as written (and signed) form. The CV was required to highlight the applicant's key achievements within the past two years, as these were taken into consideration during the evaluation.

A **grant application** was also required from the applicants, and requested to entail two parts. Thus, an introductory section of at least two pages, describing the state of the art and the author's previous contributions, was followed by a section of at least three pages describing the planned research – including methodology, goals and basic financial details. No further format limitations were imposed.

### Evaluation

The proposals were divided into **three tracks**, with an estimated upper limit of accepted proposals of 20 for exact/experimental sciences, 20 for social and economic sciences, and 10 for humanities.

A panel of three experts evaluated each application. The list of experts and their evaluation assignments were chosen by a committee consisting of the president and two vice-presidents of the SC-BBU, and was also made available to the Rector of the University; given the relatively small number of applications, it was deemed that full publication of the list of evaluators would provide too direct clues

as to the identity of the evaluator for certain of the grant applications, jeopardizing the confidentiality of the process. One of the three experts was a member of the SC-BBU for each application. Furthermore, as a general requirement, the experts needed to be recognized specialists in their field, preferably at the level of Full or Associate Professor. Given the relatively reduced scope of the competition as well as the very large size of the institution, the majority of the experts were BBU faculty. Conflicts of interests were avoided; these included collaborators (even if not yet co-authors), co-authors of publications, colleagues within the same research group or from a competing research group, family, and others.

Table 1 illustrates the criteria employed in the evaluation. The applicants were graded from A (“internationally-leading”) to B (“regionally-leading”), C (“nationally-leading”) and D (“low-impact”). Importantly, the evaluators judged the quality of the scientific content based on specific criteria, to the extent where a higher grade may be refused in spite of an apparently satisfactory “number of high-impact papers”. Moreover, the evaluators were allowed to consider any type of achievement as criterion for any of the grade-ranging. Thus, notable contributions were rewarded, even if not in journals of high impact factors, such as translations of large impact books for humanities, key archeological research, and others. The evaluators were instructed to judge the proposal based on its potential to generate output of the types and qualities illustrated in Table 1.

Table 1. Criteria involved in the evaluation.

Grade	Justification elements
A (internationally-leading)	<ul style="list-style-type: none"> <li>i) Books or book chapters present in at least 100 libraries according to a database such as WorldCat (<a href="http://www.worldcat.org">www.worldcat.org</a>), published within the past two years;</li> <li>ii) One article as corresponding author in a journal of the ‘red’ zone according to the most recent definitions of the Romanian National Council for Scientific Research (<a href="http://uefiscdi.gov.ro/articole/2882/Pachet-informatii-Articole-2012.html">http://uefiscdi.gov.ro/articole/2882/Pachet-informatii-Articole-2012.html</a>), within the past two years; the red/yellow/grey classification of the NCSR is based on impact factors or derivatives thereof</li> <li>iii) Publication in Science/Nature within the past two years;</li> <li>iv) ~ 40 citations in international databases (Scopus, Thomson-Reuters, or of similar standing) within the past two years;</li> <li>v) Fulfills the Habilitation criteria for the respective field according to the Romanian National Council for Attestation of the University Titles, Diplomas and Certificates (Romanian Government documents OMECTS Nr.3697/2012 and OM Nr.05351/2011, publicly available and supplied to the candidates as attached files);</li> <li>vi) Any other evidence that the results, ideas and concepts of the candidate are generally accepted and utilized at the top of the respective field and/or in society in general, with major impact (including cases where such impact is national or local); examples may be, among others, important translations into the local official language (Romanian), books and chapters of books whose impact is clearly demonstrated by means other than the presence</li> </ul>

	in WoldCat-indexed libraries, articles in journals of high scientific standing which are not yet included in the NCSR red/yellow/grey classification (i.e., do not have a high impact factor), and others.
B (regionally-leading)	<ul style="list-style-type: none"> <li>i) More than one article (and at least one as corresponding author) in a journal of the 'yellow' zone according to the most recent definitions of the Romanian National Council for Scientific Research), within the past two years;</li> <li>ii) ~ 40 citations in international databases (Scopus, Thomson-Reuters, or of similar standing) within the past two years;</li> <li>iii) Books or book chapters present in at least ~20 libraries according to a database such as WorldCat (www.worldcat.org), published within the past two years;</li> <li>iv) Any other evidence for a regionally-leading character, cf. ideas illustrated at item vi) above;</li> <li>v) Fulfills the Associate Professor criteria for the respective field according to the Romanian National Council for Attestation of the University Titles, Diplomas and Certificates .</li> </ul>
C (nationally-leading)	<ul style="list-style-type: none"> <li>i) Fulfills the Assistant Professor criteria for the respective field according to the Romanian National Council for Attestation of the University Titles, Diplomas and Certificates ;</li> <li>ii) One article as corresponding author in a journal of the 'yellow' zone according to the most recent definitions of the Romanian National Council for Scientific Research), within the past two years;</li> <li>iii) Any other evidence for a nationally-leading character, cf. ideas illustrated at item vi) above</li> </ul>
D (low-impact)	All others

Additional criteria were used in cases where candidates would be tied at equal grades, in the following order of importance:

- 1) Number of scientific papers published in prestigious international journals within the past two years;
- 2) Age (younger candidates have priority);
- 3) Interdisciplinary character of the project;
- 4) Potential practical applicability of the project.

The evaluators maintained all their confidential communication (mostly electronic, with verbal communications only occasionally and only for reminders) directly with the president of the SC-BBU; this way, full confidentiality was ensured throughout the process, to the extent that the three evaluators working on the same application did not even have access to each other's results or comments. The final results, without the names of the evaluators, were presented to the 21 members of the SC-BBU, assisted by the vice-rector responsible for research activities. The candidates were ranked based on their average grades - equating A, B, C and D with numerical grades 1, 2, 3, and 4, where 1 was the highest-ranking value. For example, a candidate awarded A, A and B, would be assigned a total qualification of A, but ranked below a candidate whose three grades were A, A, and A. Also, A/B (or

B/C, C/D) was employed as final output in cases where the average was in between two grades (some evaluators proposed awarding a mixed grade, such as A/B – in which case a candidate with grades A, B and A/B would receive A/B as their final qualification). The final list, approved by the SC-BBU, was made public with the proposal to fund candidates with A grades and, in the case of under-represented fields, a limited number of candidates with lower grades. Contestations were allowed from the candidates on the evaluation procedure. Reevaluation was undertaken for all cases where the grades were contested, following the same rules and criteria.

## Results

There were 222 candidates - 97 in the area of Experimental Sciences, 97 in Social Sciences, and 38 in Humanities. Their average age was 32 (with applicants ranging from 24 to 40, and winners from 26 to 37). Following completion of the contestation procedure, the University's Administration Board decided to award a total of 60 grants, covering candidates with a total grade of A, as well as some candidates with A/B and even B grades from Humanities and Social Sciences – fields that would otherwise have been under-represented among the

awardees. The total count was thus 12 for the Humanities (of which 4 A, 4 A/B and 4 B), 22 for Social Sciences (9 A, 10 A/B and 3 B), and 26 for Experimental Sciences (all A; 8 additional candidates graded A did not receive the funds, following ranking by the secondary criteria). All four of the secondary criteria, in their respective order of priority, needed to be applied upon elaboration of the three lists. The Administration Council of the University approved this decision, and legal contracts were signed afterwards between the University and the 60 grant holders, as a funding basis.

Time-wise, before the publication of the preliminary results, the procedure entailed several phases: registration (during the month of August), administrative verification (first week of September), and evaluation (remaining three weeks of September). Contestations, and administrative processing through the Administration Council and the Senate, took approximately one more month.

Upon completion of the grants (12 months after signing the contracts), the holders were requested to submit final reports depicting the degree to which the goals of the grants were achieved (including a summary financial account). In total, the grants allowed 115 publications to be submitted (on average ~2 per grant) of which 52 were already accepted. A total of 57 of these manuscripts were sent to journals indexed by Thomson-Reuters ISI, 28 were indexed in other international databases, and 30 were books or book chapters. There were 137 conferences attended by the grant holders, of which 99 outside Romania.

More than half of the grants were found to produce results that would fit the most straightforward scientometric criteria mentioned in Table 1 for categories A and B (books and book chapters in 100 libraries cf. WorldCat, articles in the red/yellow regions of the impact-based classifications). In interpreting this, one must keep in mind that the journal classification is mainly applicable to Experimental and some Social Sciences; thus, the percentage was 80% among the Experimental Sciences, and 58% for the total number of grants. By comparison, in the same time, only 14% of the candidates who were denied funding produced red/yellow articles or +100-WorldCat books; the majority of these were the candidates graded A in the competition, but rejected based on secondary criteria.

## Conclusions

The Scientific Council noted the results of the grants to be indicative of success, and proposed that the competition be continued in following years. For a following competition round, a simplification of the criteria is proposed, defining just three grades – “IE-of significant impact in internationally-accepted terms”, “IR – of significant impact in regionally-accepted terms”, and “IP-of potential impact”. For cases where the number of applicants with maximum grades exceeds the funding resources available, supplementary criteria were proposed – number of papers in internationally recognized papers, age, interdisciplinarity, and practical applications. A stronger emphasis was proposed on the identification of those researchers who have already proven to be truly independent investigators with sustainable own high-impact results.

## References

- [1] R. Silaghi-Dumitrescu, A. Sabau, *Scientometrics*, 99, Scientometric analysis of relative performance in a key University in Romania, 463(2014).
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