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Is the expertise of evaluation panels congruent with the research interests of the research groups: A quantitative approach based on barycenters

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ABSTRACT

Discipline-specific research evaluation exercises are typically carried out by panels of peers, known as expert panels. To the best of our knowledge, no methods are available to measure overlap in expertise between an expert panel and the units under evaluation. This paper explores bibliometric approaches to determine this overlap, using two research evaluations of the departments of Chemistry (2009) and Physics (2010) of the University of Antwerp as a test case. We explore the usefulness of overlay mapping on a global map of science (with Web of Science subject categories) to gauge overlap of expertise and introduce a set of methods to determine an entity's barycenter according to its publication output. Barycenters can be calculated starting from a similarity matrix of subject categories (N dimensions) or from a visualization thereof (2 dimensions). We compare the results of the *N*-dimensional method with those of two 2-dimensional ones (Kamada–Kawai maps and VOS maps) and find that they yield very similar results. The distance between barycenters is used as an indicator of expertise overlap. The results reveal that there is some discrepancy between the panel's and the groups' publications in both the Chemistry and the Physics departments. The panels were not as diverse as the groups that were assessed. The match between the Chemistry panel and the Department was better than that between the Physics panel and the Department.

1. Introduction

Discipline-specific research evaluations carried out by panels of peers are a common practice at many universities. The focus of these evaluations is research, in particular research quality. Expert panel review is considered the standard for determining research quality of individuals and groups (Nedeva, Georghiou, Loveridge, & Cameron, 1996; Rons, De Bruyn, & Cornelis, 2008; Butler & McAllister, 2011; Lawrenz, Thao, & Johnson, 2012), but also, for instance, for research proposals submitted to research funding organizations (Li & Agha, 2015). In 2007, the University of Antwerp, Belgium, decided to

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introduce evaluative site visits by expert panels, during which the panel meets the spokesperson of each research group and other relevant stakeholders, and panel members are given the opportunity to ask additional questions or request clarification of specific points described in the self-evaluation report they received in advance. The site visits thus guarantee interaction and involvement between experts and research groups.

Using data collected in the framework of two completed research evaluations, this paper studies the expertise overlap between expert panels and the research groups involved in the evaluation. To the best of our knowledge, no methods are available to measure and quantify overlap in expertise between panels and units under assessment. Yet, a sufficiently high degree of congruence between the expertise of the panel members charged with research assessment and the research of the units is a prerequisite for a sound, reliable assessment (Engels, Goos, Dexters, & Spruyt, 2013). Only panel members who are credible experts in the field will be able to provide valuable, relevant recommendations and suggestions that should lead to improved research quality. In this respect, Langfeldt (2004) explored expert panel evaluation and decision-making processes, and concluded that overlap of expertise between experts is highly desirable in order to foster cooperation among panel members. Moreover, each group expects its research interests to be well covered by the expertise of at least one panel member.

Research groups at the University of Antwerp (Belgium) consist of professors (of all ranks), research and teaching assistants, and researchers (PhD students and postdocs). A research group consists either of one professor assisted by junior and/or senior researchers, or of a group of professors and a number of researchers linked to them. The overall annual research output of the University of Antwerp comprises over 2000 peer-reviewed publications, the large majority of which are included in the Web of Science (Engels et al., 2013).

Research evaluations carried out at the University of Antwerp are organized by its Department of Research Affairs. At the start of a research evaluation, a department – typically encompassing several research groups – is invited to suggest potential panel chairs in addition to those suggested by the Department of Research Affairs. Preferably, chairs are appointed as full professor, have an excellent publication record, have experience in research evaluations, are editors or board members of important journals, and possess academic management experience. The Department of Research Affairs verifies whether proposed panel chairs and members have no prior involvement (i.e. no prior joint affiliations, no co-publications, no common projects) with the assessed research groups, and further checks if they are scholars with a prominent publication record in recent years, a proven track record of training young researchers, and sufficient experience in research policy, preferably in academic leadership positions. Furthermore, proposed panel chairs and members are preferably not affiliated with any Flemish institution of higher education and have no formal links to the University of Antwerp. The department that is being evaluated is also allowed to suggest potential panel members, but it should be noted that it is eventually the chair's prerogative to decide on the final composition of the panel.

The combined expertise of all panel members is to cover all subdomains in the discipline that is being evaluated and the panel is preferably balanced in terms of gender and nationality. When a sufficient number of professors have agreed to be on the panel, the university's research council ratifies the panel composition. Furthermore, all research groups belonging to a specific department (e.g., Physics) are to be evaluated by the same panel and the language of communication is English. Following the Dutch Standard Evaluation Protocol (SEP: VSNU, 2003, 2009), the peer panels assess the quality, the productivity, the relevance and the viability of each research group.

An expert panel, typically consists of independent specialists, and is multidisciplinary and/or interdisciplinary in its composition; each of the members are recognized experts in at least one of the fields addressed by the department under evaluation. Surprisingly, the degree to which the expertise of the panel (members) overlaps with the expertise of the research groups has not been quantified to date. The goal of this paper is therefore to present a bibliometric methodology to assess the congruence of panel expertise and research interests in the units under assessment. As such, we present a bibliometric analysis of the overlap of expertise between research groups in the Departments of Chemistry and Physics and the respective expert panels based on two research evaluations carried out at the University of Antwerp. We focus on the following research questions:

(i) How can we visualize the expertise of two entities (e.g., a research group and a panel) using publication data?
(ii) How can we quantify the overlap of expertise between two entities (e.g., a research group and a panel) using publication data?

We address these questions in the context of expert panel reviews. Specifically, we focus on comparing:

- panel and individual research group;
- panel member and individual research group (even if the panel does not cover a group's expertise well, it may suffice that one panel member does); and
- panel and all reviewed research groups (e.g., all physics research groups).

This article is an improved and extended version of (Rahman, Guns, Rousseau, & Engels, 2014) presented at the 2014 STI-ENID conference in Leiden, the Netherlands.