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"Context Counts: Pathways to Master Big and Little Data"

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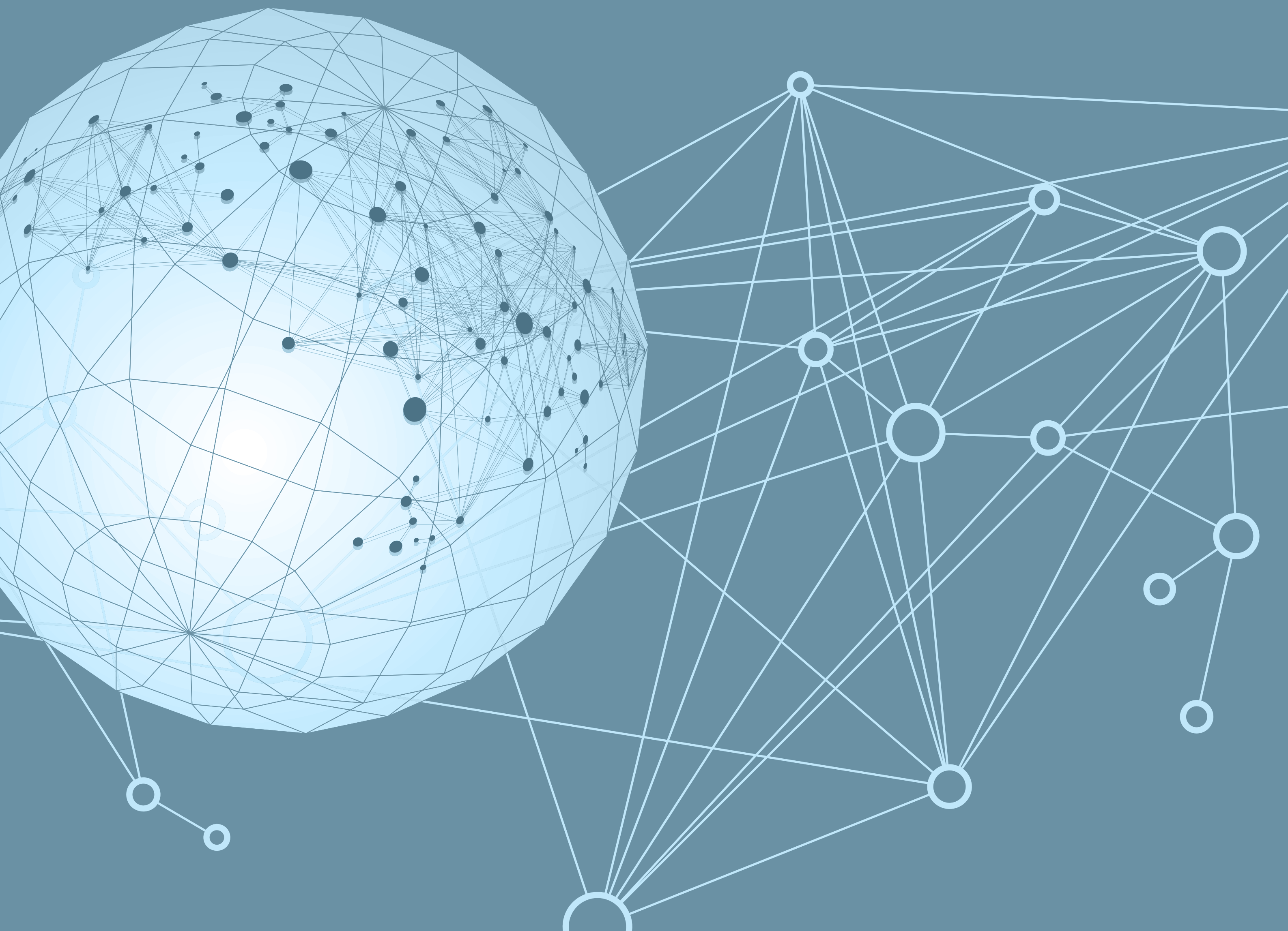

Preface

This year, the Science and Technology Indicators (STI) conference is held in Leiden, the Netherlands, in collaboration with the European Network of Indicators Developers (ENID). The conference takes place in a period of historic transformations to the scientific and scholarly system. The conference motto “Context Counts – Pathways to Master Big and Little Data” aptly captures some of the most important changes.

First, we are witnessing the rise of new paradigms with respect to the economic and societal role of research. This is for example visible in the emphasis on societal relevance, the policy speak about Grand Challenges in Europe and the US, and the practices of new (and older) generations of researchers who try to combine breakthrough fundamental work with contributions to the solution of urgent problems. Although blue-sky research will remain crucial for scientific and scholarly progress, the new generations of researchers will work in a very different context from the generation that came out of World War II.

Second, the cumulative creation of data-generating machines and scientific instruments has led to a flood of data -- all challenging, not all meaningful. This data flood also has ramifications for our own field. With the shift towards web-based and computer-supported work in virtually all disciplines, the traces researchers leave in their daily work can increasingly be turned into data and indicators. In addition, social media are creating more (pressure on) the communicative activities of researchers, as exemplified by the rising sub-field of altmetrics.

Combined, the changing economic and societal role of research and the increasing availability of digital information lead to a rising demand for scientometric expertise. The present hunger for data and for indicators also lays bare a need for a meaningful interpretation. Scientometricians can no longer merely be data providers or indicator builders. They need to be able to put the data in the right context. And increasingly, they will also need to self-critically examine the use of their own products by the scientific and scholarly communities at large.

Indeed, context counts **–** in more than one way.

For the STI-ENID 2014 conference 125 papers were submitted. We accepted 70 oral presentations and 30 posters. Along with the regular indicators topics, the two trends discussed above are well represented in various sessions and in the 5 special events we scheduled on top of the regular program.

We are grateful to all authors for submitting their papers, posters and special events as well as to all members of the scientific committee for reviewing them. We also wish to thank Suze van der Luijt for producing and editing this book of proceedings.

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Assessment of expertise overlap between an expert panel and research groups[1]

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Abstract

Discipline-specific research evaluation exercises are typically carried out by committees of peers, expert panels. Currently, there are no available methods that can measure overlap in expertise between a panel and the units of assessment. This research in progress paper explores a bibliometric approach to determining the overlap of expertise, using the 2010 research evaluation of nine physics research groups of the University of Antwerp as a test case. Overlay maps were applied to visualize to what extent the groups and panel members publish in different Web of Science subject categories. There seems to be a moderate disparity between the panel's and the groups' expertise. The panel was not as diverse as the groups that needed to be assessed. Future research will focus on journal level overlay maps, similarity testing, and a comparison with other disciplines.

Keywords: Research assessment, Expert panel, Research group

Introduction

Discipline-specific research evaluations are a common practice at many universities worldwide. These evaluations are carried out by committees of peers. As is the case with research proposals submitted to research funding organizations, expert panel review is considered the standard for determining research quality of individuals and groups (Nedeva, et al, 1996; Butler & McAllister, 2011; Lawrenz, Thao, & Johnson, 2012). The principal objective of such evaluations is to improve the quality of scientific research. The University of Antwerp, Belgium, implemented evaluative site visits by expert panels in 2007. Using data collected in the frame of one of these evaluations, this papers explores the expertise overlap

[1] This research has been made possible by, among others, the financial support of the Flemish Government to the ECOOM. The opinions in the paper are the authors' and not necessarily those of the government.

between the expert panel and physics research groups involved in the evaluation. To the best of our knowledge, no methods have been established to measure and quantify overlap in expertise between panels and the units of assessment. However, in research evaluation the extent to which the expertise of the panel members charged with research assessment is congruent with the research of the units, is crucial to the trustworthiness of the assessment (Engels et al., 2013). Only panel members that are credible experts in the field can deliver an assessment that can contribute to the improvement of the quality of the research. Moreover, Langfeldt (2004) explored expert panel evaluation and decision making processes, and concluded that overlap of expertise between experts is highly needed in order to foster cooperation among panel members. For the evaluation of research groups, it is expected that the research of each group is well covered by the expertise of the panel members.

The goal of this research in progress is to inform the process of expert panel composition. In this paper, we present a bibliometric analysis of the overlap of expertise between the physics expert panel and the (whole of the) units of assessments in the Department of Physics of the University of Antwerp. Hence, the research questions are:

1) To what extent is there overlap between the panel's expertise and the whole of the research to be assessed?
2) To what extent is the individual research group expertise covered by the panel's expertise?

Data and Methodology

As a test case we present an analysis of the 2010 assessment of the Department of Physics' nine research groups of the University of Antwerp. The reference period is a time interval of eight years preceding the evaluation. The citable items from the Science Citation Index Expanded of the Web of Science (WoS) published by the research groups in the period 2002 to 2009 have been taken into account.

The panel was composed of six members including the chair. All the publications of the panel members since their respective first scientific publication to the year 2009 have been taken into account. Potential panel members had no prior involvement with the research groups that were evaluated (i.e. no prior affiliations, no co-publications, no common projects). In total, the six panel members have 1,104 publications, none of which are co-authored with another panel member. The number of publications per panel member ranges from 117 to 282. In total, these publications were published in 204 journals.

Table 1: Publication profile of the physics research groups

Group code	Number of Publications	Number of WoS categories	Number of Journals
Physics group A	125	44	53
Physics group B	486	25	66
Physics group C	525	46	147
Physics group D	269	7	17
Physics group E	159	28	55

Group code	Number of Publications	Number of WoS categories	Number of Journals
Physics group F	42	13	23
Physics group G	43	12	26
Physics group H	132	12	31
Physics group I	115	49	63
Total	**1732**	**102**	**353**

Table 1 summarizes the number of publications for the nine research groups. A total of 164 publications was co-authored by members of two or more groups.

The VOSviewer computer program is used to visualize the overlap of groups and panel publications based on a global map of science incorporating the new WoS subject categories (Leydesdorff, Carley, & Rafols, 2013) Overlay maps were created for the panel, the separate research groups, and the nine research groups taken together. The Spearman's rank correlation coefficient is calculated between the panel's and groups' publications based on WoS subject categories.

Analysis and Results

a) Panel profile versus Groups profile

The overlay maps for the panel and the groups as a whole (figure 1 and 2) visually show that the groups taken together publish more widely than the panel members. The panel members publications are strong (58.54%) in the categories of 'Physics condensed matter', 'Physics multidisciplinary', 'Chemistry physical', 'Physics applied' whereas, the groups' publications are mostly (44.92%) concentrated in the 'Physics condensed matter', 'Physics multidisciplinary', 'Physics applied', and 'Materials science multidisciplinary' subject categories.

Figure 1: Panel members publications overlay map

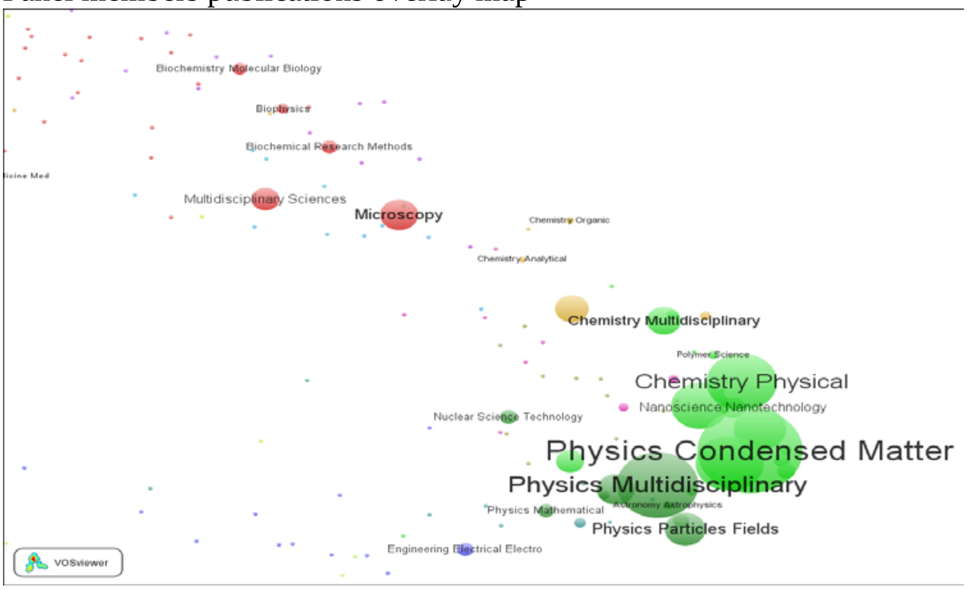
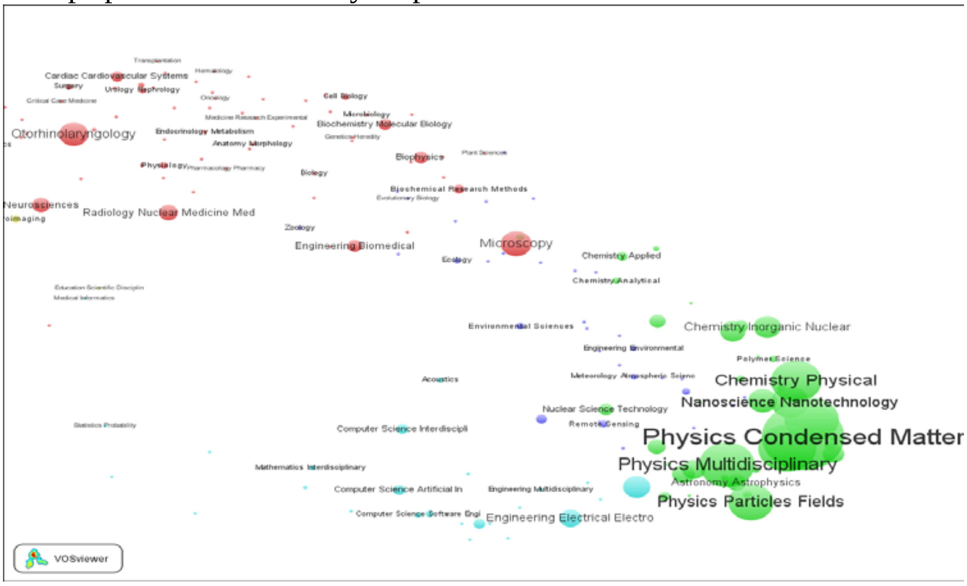


Figure 2: Groups publications overlay map



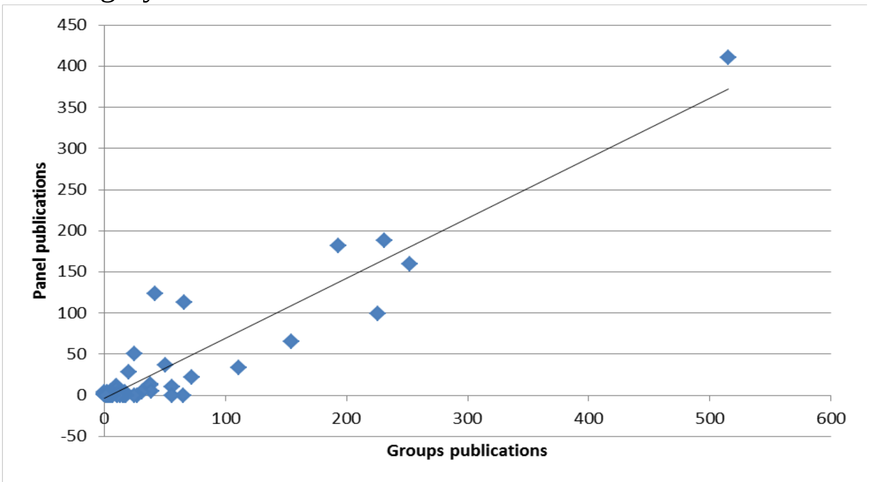
Panel publications fall in 39 WoS subject categories whereas the groups cover 102 WoS subject categories. Table 2 shows that the panel (23.58%) and the groups (18.9%) have the majority of their publications in ‘Physics condensed matter’, followed by ‘Physics multidisciplinary’ (panel 14.28%, groups 8.48%)’, ‘Chemistry physical’ (panel 10.65%, groups 7%)’ and ‘Physics applied’ (panel 10.03%, groups 9.25%).

Table 2: Top ten WoS subject categories

Panel publications			Groups publications		
Web of Science Categories	**Number of records**	**%**	**Web of Science Categories**	**Number of records**	**%**
Physics condensed matter	416	23.58	Physics condensed matter	515	18.90
Physics multidisciplinary	252	14.28	Physics applied	252	9.25
Chemistry physical	188	10.65	Physics multidisciplinary	231	8.48
Physics applied	177	10.03	Materials science multidisciplinary	226	8.29
Physics atomic molecular chemical	125	7.08	Chemistry physical	193	7.0
Materials science multidisciplinary	104	5.89	Physics particles fields	154	5.6
Physics particles fields	65	3.68	Nanoscience nanotechnology	111	4.09
Microscopy	56	3.17	Microscopy	72	2.64
Optics	56	3.17	Physics atomic molecular chemical	66	2.42
Chemistry multidisciplinary	45	2.55	Otorhinolaryngology	65	2.3

The Spearman’s rank correlation coefficient is 0.524. This indicates a positive yet moderate correlation between the panel’s and the groups’ publications occurrence in the WoS subject categories.

Figure 3: Scatter plot of the panel's and the groups' publication numbers per WoS subject category

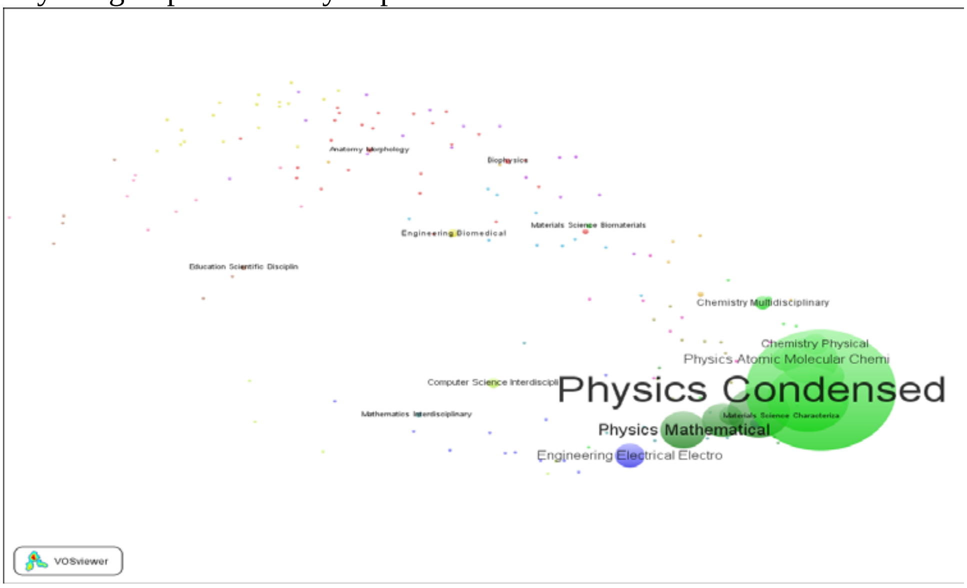


From the above discussion, it appears that there is visible disparity between panel and group publications according to WoS subject categories. The groups publish more diversely than the panel, which might be due to the interdisciplinary orientation of some of the groups.

b) Panel versus Individual groups

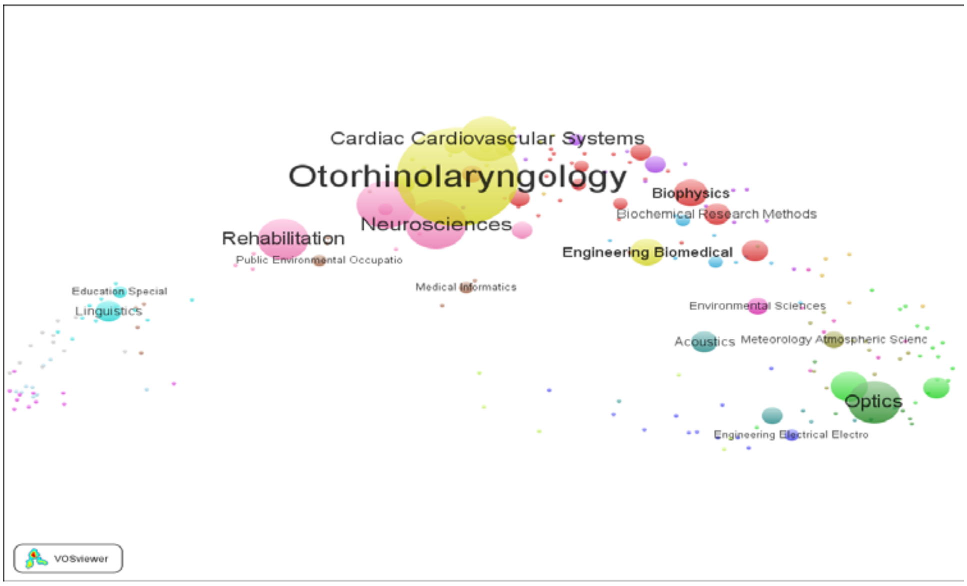
We have created overlay maps of individual group publications in the WoS subject categories, and compare them with the panel overlay map (Figure 2). Group 'B' focuses on 'Physics condensed matter' (45.24%), and 'Physics applied' (14.66%) subject categories (Figure 4). Similarly, group 'C' focuses on 'Materials science multidisciplinary' (19.04%), 'Chemistry physical' (15.99%), and 'Physics condensed matter' (13.54%); group 'E' focuses on 'Physics multidisciplinary' (14.39%), 'Physics particles fields' (14.03%), and 'Physics condensed matter' (11.87%); group 'F' focuses on 'Physics Multidisciplinary' (37.88%); and group 'H' focuses on 'Physics condensed matter' (47.06%). Physics groups 'B', 'C', 'E', 'F', and 'H' are well covered by the panel's expertise, as the panel's publications mostly fall into these subject categories.

Figure 4: Physics group 'B' overlay of publications



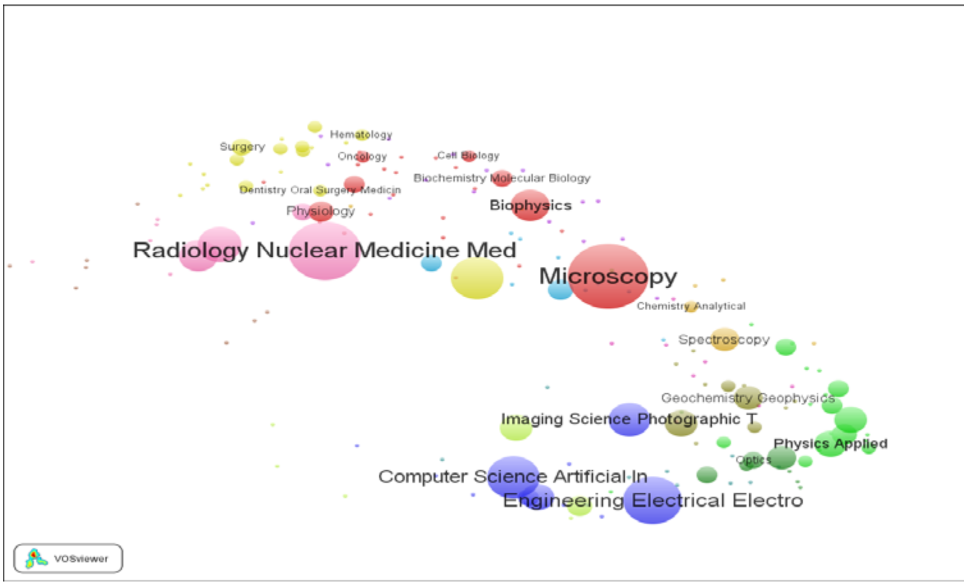
The publications of group ‘A’ fall in 42 subject categories with a focus on ‘Otorhinolaryngology’ (29.23%; Figure 5). Physics group ‘D’ publications fall in only seven subject categories, and focus on ‘Physics particles fields’ (47.96%) and ‘Physics multidisciplinary’ (34.48%) subject categories. The panel has few publications in these subject categories, therefore groups ‘A’ and ‘D’ are partially covered by the panel expertise.

Figure 5: Physics group ‘A’ overlay of publications



Physics group ‘G’ publications are concentrated in 12 WoS subject categories; this group focuses on ‘Physics atomic molecular chemical’ (22.06%) and ‘Chemistry physical’ (20.59%). Physics group ‘I’ publications belong to 49 subject categories; this group focuses on ‘Microscopy’ (13.95%) and ‘Radiology nuclear medicine medical imaging’ (11.16%), as shown in Figure 6. However, the panel has no overlap with the categories where group ‘G’ and ‘I’ have a largest share of their publications.

Figure 6: Physics group ‘I’ overlay of publications



Conclusion

The results indicate that there is some disparity between the panel's and the groups' publications according to WoS subject categories, and the visual map supported by the Spearman's rank correlation coefficient indicates a moderate correlation. In future research, we may explore other correlation coefficients, since the large number of zeroes may influence Spearman's rho. The panel was not as diverse as the groups that needed to be assessed. This could be expected, as the panel members have been selected primarily because of their expertise and not necessarily because of the match thereof with the research in the groups. In subsequent analysis we will look at overlay maps on the journal level (Leydesdorff, Rafols, & Chen, 2013), and will quantify the similarity between groups and panel at this level. The results will be compared with at least one other discipline to identify what overlap leads to the best standard for evaluation, as well as to find a suitable method for the expert panel composition.

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