What do researchers think about altmetrics and are they familiar with their abilities?

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Abstract  
The rise of the Web 2.0 (Social web) has given the main incentive to the creation of altmetrics, which are social web metrics for academic purposes. They can, theoretically, be used in an evaluative role and as an information seeking aid, both tasks reserved until recently for traditional bibliometrics. If altmetrics are to be trusted then the claims about both of these tasks must be acceptable and verifiable. Regarding the growing number of scientific publications on altmetrics and its methods, researchers in the field of scientific metrics are now trying to assess this possibility as well. The question is which parts of these new metrics are acceptable for a scientific community? Decades were needed to establish a reasonable confidence in classical bibliometrical methods, such as citation analysis, so how long will it take for altmetrics to gain the same level of trust? This is an important although quite neglected topic. The paper presents a continuation of a survey on information behaviour of Slovenian researchers in 2011 on a random sample obtained from the complete list of researchers in Slovenia. The results confirm the already detected low level of use and acceptance of Web 2.0 tools among Slovenian researchers. On the other hand, the results also show a strong interest in altmetrics and the possibilities for alternative evaluation. This interest calls for further research into the possibilities offered by these new metrics. We need to explore the applicability, use and acceptance of altmetrics and its various possible sources and indicators in the scientific community. Also, we need to inform the scientists about these new possibilities. This should be an important task for all who are involved professionally (research or otherwise) in the field of scientific research evaluation.

Keywords: altmetrics, social web, bibliometrics, evaluation, scientific research

Introduction  
Scientific research can be defined in different ways, depending on which segment of the process someone would like to highlight. Science is primarily a foundation beyond what is today called production of (new) knowledge in the society and the basis of its progress and welfare. Science can also be underlined as a driver of economic, technological and social development, or a process of discovering the new and unveiling the hidden. Scientific research can be defined as an activity through which we educate top experts and professionals, who are capable of the most demanding jobs and tasks in the society.

There is another possible definition of scientific activity: an information activity. Scientist use "information" , which they obtained through their research work, together with the information that was received from work (usually
published) of other scientists and researchers as an evidence for justification and support of the findings. Therefore, the science can now also be understood as information activity: collection, processing and dissemination of information. The basic characteristic of this information process, which is often described as the process of scientific information and communication, is its form, scientific publication. This is normally held and runs through the publication of scientific results, which enables verifiability and repeatability of research and thus the reliability and accuracy of the results thus obtained. This contributes to the development of science, and, consequently, to the technological, economic and social development, and also to general scientific knowledge.

Scientists present their results mostly as papers in international scholarly journals which publish only a small part of the received articles. The manuscripts are peer reviewed through evaluation procedures before publication. The second part of the evaluation and quality control of scientific research is the use of these publications by other scientists, which is reflected in citations. All areas of social services need a system of performance evaluation and quality control. In scientific research, such control is systematic, constant, and above all, independent and transparent. This is done despite the fact that scientific research is not a routine activity, and therefore the results can not easily be measured and evaluated. This is possible by very clear rules of scientific excellence, which are both international and universal. This of course would not be possible without global integration of science that allows virtually unlimited international integration and cooperation.

The debate on how to measure scientific quality and quality of scientific research has been going on for decades. Using citations as an absolute proof of quality has been frequently labelled “controversial”, either if used as an indicator of assessing the quality of research work, both directly (citations individual papers and other publications) and indirectly (journal impact factors -JIF, SJR, SNIP…) in relation to other related criteria used in evaluation procedures of science. This is precisely what excites controversy and debate, as it is a mechanism that can affect success or failure of individual researchers in obtaining research funds or achieving promotion, and similar events, important in a professional career. Therefore, bibliometric methods are often a topic of discussion not only among bibliometricians, but also in a science community as a whole. An important question in this ongoing debate is what is understood as content or feature of scientific research.

Bibliometrical methods have in recent decades developed as one of the principal research methods in information science (library and information science). In many ways it is abandoning its connection to the base in social sciences base is becoming more technical, empirical and objective. This trend ignores the fact that science is a social phenomenon, as are, for example, citations. Contemporary trends in bibliometrics, linking classical bibliometric exploration of social networks in science (Cronin, 2008) and altmetrics are important harbingers of new trends, which might bring social dimensions back into the bibliometrics’ research.

**Literature review**

Evaluation studies of research and scientific advances focus increasingly on calls for greater investigation of the various types of web-based utilities, suggesting that this will promote a finer-grained image of influence (Cronin, 2001). The rise of the Web 2.0 (social web) thus offers bibliometricians valuable opportunities to apply and adapt their techniques to new contexts and contents. Its significance from a bibliometric perspective goes well beyond enhanced opportunities for citation and link analysis. The web might challenge even some of the assumptions that have underpinned the established scholarly communication system. That is why some authors speak about a hybrid scholarly social network in the sense that it mirrors scholarly norms to some extent, and also general social networking norms so the use of it and similar sites should be seriously considered by the academic community (Thelwall, Kousha 2013). This has given the main incentive to the creation of altmetrics, which are social web metrics for academic presentations. It can, theoretically, be used in an evaluative role and as an information seeking aid, both tasks reserved until recently to traditional bibliometrics. If altmetrics are to be trusted then the claims made about both of these tasks must be reasonable and verifiable. Researchers in the field of scientific metrics have sensed an opportunity for new exploration, given the growing number of scientific publications dedicated to altmetrics and its methods. Altmetrics criteria calculated on the basis of activities in social media environment have recently emerged as an alternative way of measuring scientific impact (Priem et al, 2010), although ideas to measure the impact and visibility of research results and publications in the way that shifts from popular bibliometric tools, such as the analysis of citations, appeared before the rise of social media (Martin & Irvine, 1983). Altmetrics is the study and use of scholarly impact measures based on activity in online tools and environments. The term has also been used to describe the metrics themselves—one could propose in plural a ”set of new altmetrics”. Altmetrics is in most cases a subset of both scientometrics and webometrics; it is a subset of the latter in that it focuses more narrowly on scholarly influence as measured in online tools and environments, rather than on the Web more generally (Priem et al 2012).

One of the fundamental problems of citation analysis as the basis and the ground for evaluation of the impact of research results is that citations reflect only a limited
Recent review paper “Evaluating altmetrics” (Sud, Thelwall, 2014) discusses altmetric valuation strategies, including correlation tests, content analyses, interviews and pragmatic analyses. It recommends that the methods for altmetric evaluation should focus on identifying the relative strengths of altmetrics as new metrics. In addition to assess why some individuals post cites in the social web it is also important to understand who are the users of social web and respective citations. More generally, it would also be useful to know who uses the social web for scholarly purposes and which parts they use. The question is how much of this new metrics is acceptable for a scientific community? Decades were needed for the establishment of a reasonable trust in classical bibliometrical methods, such as citation analysis, so how long will altmetrics need to gain the comparable level of trust?

The other important question is the correlation between peer review and new metrics. Peer review is still at the heart of most academic evaluations, even when the key quantitative indicators have been based upon citations. Proven links between peer reviews and quantitative bibliometric indicators have been important in accepting the practice of bibliometric indicators (van Raan, 2006, Juznic et al 2010) and its use in support to the monitoring of the peer-review process from a scientometric perspective (Hörlesberger et al, 2013). The most common technique to help evaluate a research-related metric has been to calculate the correlation between them. If the new metrics and peer review both reflect the quality of publications then the rankings should be related, giving rise to a positive correlation coefficient. In a hypothetical case that the two metrics both measure the same parameters then their correlation would be somewhat positive. These metrics might be tentatively introduced into the system. The potential use must be based on feedback by different stakeholders on its utilization. This process needs time and might be the weakest link in introducing altmetrics methods and its indicators as a possible measure.

Although altmetric indicators and data sources used for evaluation purposes are increasingly discussed, little is known about the users of such social media platforms or how researchers integrate them into their research environment. Understanding how scientists use social media tools and for which purposes should also be important in evaluating practical applications of altmetrics. This research is surprisingly rare, even having in mind the established social science methods such as interviews and questionnaires. It is also extremely surprising that most of the research presenting their arguments about the extent of the use and importance of social web simply quotes user statistics obtained from administrators of different social networking websites. This is hardly an argument or an indicator of its real use. Such data provide only very general and superficial information.
The rare studies of the actual use of the social media tools presents results that require some caution. In reality, the uses and possibilities of altmetrics are perhaps more limited than the ’enthusiasts’ and promoters of altmetrics would like to admit. Web survey among scientific staff of the Heinrich-Heine-University Düsseldorf, Germany has found that the use of at least one social networking service was reported by barely one half of all respondents (53.7%). Only one third (30.1%) of respondents claimed to be active users. Others are only passive users. Web 2.0 achievements seem to play a minor role in academic work (Wikipedia excepting) (Weller et al. 2010). Similar study in Slovenia found the Slovenian researchers to be strong users of web search engines and websites, especially e-journals. Web 2.0 social networking and professional networking sites used for research purposes, however, are almost non-existing: social networks were never or almost never used by 85% of respondents. Age was not a factor, as this was a general characteristics of this population (Vilar et al 2012).

A rare study was conducted on a specific scientific community - bibliometricians (Haustein et al 2014). The results presented mixed opinions on altmetrics’ potential. Majority (72%) valued download counts, while only third saw potential in tracking articles’ influence in blogs, Wikipedia, reference managers, and social media. 70% were on LinkedIn, 23% had public Google Scholar profiles, and 16% were on Twitter, which they used both personally and professionally. Coverage of bibliometricians’ articles varied: 82% of articles published by sampled bibliometricians were included in Mendeley libraries, while only 28% were included in CiteULike.

The results, evaluation of altmetrics methods by bibliometricians, are reflected in many studies about correlation between journal papers downloads and citation received. The possibility of connecting journal paper downloads and social bookmarking services as it is presented on websites such as CiteUnLike is also proposed. Study of 168,109 scientific articles published in 45 physics journals between 2004 and 2008, has shown some interesting but limited possibilities (Haustein, Siebenlist, 2011). For example, those who read or scan new articles on the day of publication may subjectively select the most interesting parts to tweet or blog about, archive those in a reference manager site (for example Mendeley.com or CiteULike), mention details in a social networking site or discuss the articles in an online forum.

Some studies paint positive picture and offer promising outlooks. Study using semi-structured, 30- to 45-minute interviews on a sample of 28 academics examined researchers’ attitudes and practices relating to twitter citation. They used Twitter to cite articles, however, these citations differed from traditional citations (Priem and Costello 2010). On the basis of these results, authors proposed that Twitter citations could be automatically harvested and analyzed, although this study leaves open the question of the actual extent of the use of Twitter among researchers. Study using questionnaires and interviews with Ph.D. students and academics in the UK found that adoption of social web services was fragmented and not overwhelming at all (Procter et al. 2010). Another study on the small group of science bloggers focused on the fact that these bloggers achieved significant feats with limited resources. The conclusions were also very broad, stating that the impacts of science blogging community remain uncertain, although with the novel and potentially significant practices (Riesch, 2013).

To find out more about the possibility of altmetrics, we have to explore the applicability, use and acceptance of altmetrics sources and indicators in the scientific community. Since it is still unclear how and to what extent the social networking platforms are used, by whom and for what purpose, the objective of this study is to assess the representativeness and validity of altmetrics’ indicators with the help of scientific community. We see this as an important task for everyone who is involved professionally (research or otherwise) in the field of scientific research evaluation.

**Research**

The principal objective for this research is to investigate whether Slovenian researchers essentially use social networking sites and perceive them as an important part of their professional work as social networking is regarded as a part of possible new metrics. The objective was to answer the following research questions:

1. Do younger researchers use social networking tools more than older researchers?
2. Does the period of three years present an important difference in the acceptance of social networking tools among researchers?
3. Do the researchers regard altmetrics as alternative methods for evaluation of their research work?

We perceive the Slovenian researchers to be, on average, similar to other European researchers although comparative data (Peclin, Juznic 2012, Demsar, Juznic 2013, Gorraiz et al. 2011) show that their scientific output is above the average of the European Union, evaluated by the number of published papers in international scientific journals if contrasted to BDP, research funding or the number of inhabitants.

**Sample and methods of data collection**

The paper presents the continuation of the survey of information behaviour of Slovenian researchers in 2011 on a random sample obtained from the complete list of researchers in Slovenia. The study as a whole aimed to provide better insight into their patterns of information behaviour, thus facilitating the activities of research
organizations, information providers such as libraries, or providers of publicly funded information sources such as public research agencies. The results were presented at LIDA 2012 and contributed to better understanding of research processes, their evaluation, as well as support planning for the future (Vilar, 2012 et al). The aim of this new study is to explore opinion of researchers in Slovenia toward Web 2.0 tools in recent years as a part of their information behaviour and their attitudes toward bibliometrics and altmetrics indicators. As research was done on the same sample of respondents, it can be also seen as a longitudinal one, particularly in the issues which had already been explored in 2011.

We again prepared a web survey, this time with 16 questions (10 content questions (Likert-type) and 6 demographic questions). In this paper we present the analysis of the questions dealing with the availability of time for research-related activities, the use of web 2.0 tools for research-related activities, and awareness and attitudes regarding various altmetric methods.

Random sample of all currently active and officially registered researchers in Slovenia was used. Contact details were obtained from Slovenian Research Agency (ARRS), which governs all publicly funded research in Slovenia. Sample consisted of every eighth researcher, an email invitation was sent on April 7th, 2014 to a random sample of all active researchers in Slovenia (n=592). By May 2nd (the date of the analysis for this paper) we received 93 questionnaires (15.7%), of which 73 (12.3%) were sufficiently completed to be used in the analysis. Little more than half (58%) of the respondents were male, 40% were aged between 31-40, 30% between 41-50, 11% between 20-31, 10% between 51-60, and 9% were over 60 years. Majority, a quarter of respondents came from Natural Sciences, as can be seen from Table 1 which shows distribution between research areas.

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<tr>
<th>Research Area</th>
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<tr>
<td>Natural Sc.</td>
<td>25%</td>
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<td>Technical Sc.</td>
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<td>Humanities</td>
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<tr>
<td>Social Sc.</td>
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<td>Medicine</td>
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<td>Interdisciplinary</td>
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<td>Agriculture</td>
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<td>TOTAL</td>
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**Results and discussion**

We asked researchers to report their use of Web 2.0 tools, for example Facebook, Twitter, Web forums, blogs and also tools like Mendeley, CiteULike, ResearchGate and LinkedIn. Facebook and Twitter are used very rarely, with 10% and 5% respective users. Mendeley and CiteULike received similarly low preference. ResearchGate and LinkedIn, scored somewhat better - more researchers reported using them than researches not using them. The most frequent answer for ResearchGate was »occasionally« and »almost never« for LinkedIn.

There were some differences among disciplines: researchers from medicine have been frequent users of ResearchGate and occasional users of CiteULike. Also, social scientists, in relation to users representing other other sciences, are more frequent users of CiteULike, LinkedIn, web forums and blogs. In general, researchers in the humanities are less frequent users of Web 2.0 tools.

Age and gender were not an important factor. Because of a small sample, the differences can not be generalized, but can nevertheless be mentioned: the youngest researchers use Mendeley more than other researchers; LinkedIn seems to be the preferred tool of the researchers between 31 and 40. The two oldest groups of researchers more than other researchers seem to prefer the CiteULike, while researchers between 51 and 60 seem to favour the use of web forums. More women than expected and fewer men than expected use Mendeley occasionally, and never use ResearchGate or LinkedIn.

In another question we asked the respondents to provide their opinion on the uses of altmetrics in the evaluation of scientific research. Three possible answers were offered.

- I am familiar with
- I am not familiar with but I'm interested
- I am not familiar with and I'm not interested

Less then 20% of respondents (mostly male) reported on their familiarity with altmetrics. Surprisingly many (two thirds) said that they are not familiar with it but are interested. Age is not an influential factor. Gender, on the other hand, apparently has some more influence. Research discipline also has some influence. On average, fewer Natural scientists and more Medicine researchers are familiar with it; more technical scientists are not familiar with it and are not interested.

We also wished to investigate the possible acceptance of different altmetrics' indicators on the part of the researchers as a measure for evaluation. Number of downloads of articles from scientific journals/publications was the indicator agreed or partially agreed upon by the majority of respondents. Only 12% disagreed. Similar answers were obtained related to the possibility of using the number of downloads of publications from repositories, although these received somehow more answers related to “No
opinion”. References to research results in mass media also received same very positive acceptance. Two other indicators, references to research results in social networks and statistics from the programs such as ResearchGate and Mendeley are less popular, as expected. Namely, the researchers themselves are not very regular users of such applications even though they do not completely reject such a possibility. In fact, most researchers partially agreed with this option. Gender played no role. More researchers than average, in the age group of 41-50, oppose the idea of using the indicators from social networks and statistics from programs such as ResearchGate as an instrument for evaluation. Researcher form the Humanities are more in favour of using the data on downloads, as expected. Namely, they usually oppose the use of citation data. No other important differences were found.

There were also some correlations between the awareness of altmetrics tools and the use of Web 2.0 tools. Many of those who claim to be familiar with altmetrics often use ResearchGate and LinkedIn, and occasionally use Facebook and Twitter. Among those who would like to know more about altmetrics, there is an interesting division: they often use and never use ResearchGate more then average.

Although these are only some selected preliminary result, on a limited sample, they are nevertheless interesting. Before trying to answer the question whether Slovenian researchers act in a traditional way or are only just adapting to the new ways of communication we must look at the broader context. Slovenia has a very sophisticated system of tracking the publication patterns of scientists, and the respective citation impact, which is also very transparent as it is publicly available through two interconnected systems - COBISS and SICRIS. The motivation for the updates on publishing activities is very strong among the researchers. They regularly access COBISS and SICRIS, also in order to follow the publishing activity of their colleagues and associates. The system is connected and employs citation data both from WoS and Scopus (Bartol et al 2014). So the researchers are more familiar with 'classical' bibliometric indicators which are employed regularly and are also readily available. This is obviously not an obstacle to the acceptance of and interest in the more recent alternative methods as offered by altmetrics. Nevertheless, whilst it may seem plausible that articles which are downloaded or mentioned in the media and social web are important, more research into its applicability is needed if altmetrics are to be taken seriously and accepted as a tool for evaluation.

A weak use of social networking tools does not seem to prevent the researchers from being open to the possibilities of employing new methods of research evaluation. Such non-use is more related to the lack of time in a highly competitive world of science, and also to pragmatism. If the scientists do not perceive some concrete benefits, either in a better quality of information resources or improved prestige, they will not use such tools. At this point, it would be probably too early to look for other motives.

Conclusions

The expansion of the social web and its adoption by scholars has led to the creation of altmetrics, which are social web metrics for academic publications. These new metrics could, in theory, be used in an evaluative role, to give early estimates of the impact of publications or to give estimates of non-traditional types of impact. But there is one possible trap. We might agree that in the future more and more researchers are going to use Web 2.0 tools to mediate their interaction with the information sources. In doing so, they will be leaving behind valuable tracks, which will also be showing paths of influence. This influence might be of the same origin as the impact measured by classical bibliometric indicators. Thus, they should be perceived as good, or perhaps even better by the proponents of altmetrics. But can we predict what will happen if we start to use them as evaluation indicators. Numerous studies have documented that the scientists actually do base their actions on the criteria and indicators applied in evaluations (Bornmann, 2010; Erno-Kjolhede, Hansson 2011; Demsar, Juznic 2014). That should warn us not to rush too fast. Some authors argue that we should not limit ourselves only to those metrics that have been validated, as we will find that we are quickly outpaced by changes in technology (Stuart, 2014, p 172). That involves another danger for science – to go for popularity over quality.

Our results show that researchers are interested in the new evaluation tools, which can provide a foundation for an active approach towards altmetrics. We also believe that a very cautious approach should be applied towards using specific tools and indicators, not only across all disciplines, but also in different national environments. In the societal impact area it will be unlikely to find any indicators, such as publication and citation counts, which can be employed across most disciplines and institutions and which can be measured easily and on uniform principles. We can agree with the statement that more than a mere scientific impact measurements, the assessment of societal impact research is badly needed as the new set of indicators (Bornmann, 2013).

Our future research will follow two tracks. One is to increase the number of respondents which will permit a more confident generalization on why the usage of Web 2.0 tools among Slovenian researchers is still so weak and if there is a significant interest in altmetrics. The second is to focus on a selected research discipline with a strong applicative component and find out more about their understanding and acceptance of altmetrics indicators. This will also measure the societal impact of research rather than pure scientific aspects.
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Curriculum Vitae

**Primoz Juznic** is a full professor and the Head of the Department of Library and Information Science and Book Studies at Faculty of Arts in Ljubljana (Slovenia). His main areas of research are Bibliometrics, Library collections and Special Librarianship. He was the editor of Slovenian professional journal “Knjižnica” and is the peer reviewer and the member of Board of Journal of Librarianship and Information Science (Sage) and was a member of several congress program committees. Currently he is also a member of Training and Education Section of IFLA. In last five years, he was the author or co-author of over 30 articles in professional journals. Before starting his university career, he was a heading different special and academic libraries and was a director of University Computer Centre.

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