European Commission

Comparative scientometric assessment of the results of ERC funded projects

Alternative metrics report (D7)

European Research Council
Established by the European Commission

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Research and Innovation

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Alternative metrics report (D7)

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Preface

This document, prepared by Observatoire des sciences et des technologies (OST) and RAND Europe serves as the Final Alternative Metrics Report (deliverable: D7) for the study "Comparative scientometric assessment of the results of ERC funded projects" for the European Research Council Executive Agency (ERCEA).

In addition to this report, other analysis and findings from this study are reported in:

- D3: Filed classification report
- D4: Data coverage report
- D5: Bibliometric assessment report
- D6: Patent analysis report
- D8: Peer-review evaluation of highly ranked publications from scientometric assessment
- D11: Final synthesis report

The authors would like to acknowledge the support of ERCEA, in particular Boris Kragelj, members of the ERC Scientific Council and other ERC staff members who have provided useful feedback, data and advice throughout the study. We would also like to thank our quality assurance reviewers, Yves Gingras, Susan Guthrie and David Kryl, for their constructive comments and timely review.

This document has been peer reviewed in accordance with RAND Europe's quality assurance standards.

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1. Introduction and aims

This report is part of a wider study that aims to provide a comprehensive scientometric assessment of European Research Council (ERC) funded research from a comparative perspective. Performed from the point of view of altmetrics—which can be considered indicators of the online visibility of scientific documents—this reports aims at answering the following evaluation questions:

1. Does the funding provided by ERC help the grantees improve their *altmetric* visibility?
2. Do ERC grantees perform better than researchers sponsored by other European and American funding agencies?

Given that the online tools which serve as a basis for these altmetric indicators are relatively recent, this report can only answer—*indirectly*—the first research question by comparing altmetric scores of successful and unsuccessful ERC applicants after the competition, without providing a *before* analysis. The data, however, allows us to fully answer the second research question related to the international comparison of ERC-funded researchers.

Within the course of this project, we have compiled data on papers' numbers of tweets, Facebook and Google+ posts, blogs and media mentions, as well as Mendeley reader counts. However, the analysis found in this report does not cover Facebook and Google+, as the available data is of poor quality (see Chapter 2). Results for these two platforms are nonetheless presented in the appendices.

The next chapter describes what altmetric indicators are and what we know about their meaning and properties. It also presents the population under study, and the data sources and methods used. It is followed by the presentation of the results in Chapter 3, which is organised according to the two research questions tackled by this report. The report concludes with a few observations on the online visibility of EU and US research, as well as differences across fields of knowledge.

2. Background and Methods

2.1. What are altmetrics?

The set of metrics referred to as altmetrics are mainly based on activity on social media and web 2.0 platforms focused on scholarly contents and scholars. They were introduced as new filters alternative to peer review and new measures of research output and impact alternative to citations (Priem, Taraborelli, Groth, & Neylon, 2010). They were also motivated by the aim of considering a wider range of research outputs and metrics to steer against the oversimplification of equating research productivity and impact with the number of publications and citations (Piwowar, 2013). Alternative to the number of peer-reviewed journal articles, research products could, for example, include blog posts, software code and datasets, and impact measurements would not be limited to citations but consider the number of times a scientific document (or any other research product) is mentioned, discussed, saved or used on a social media or networking platform such as Twitter, Facebook, Mendeley, figShare or Github. The exclusion of 'traditional' bibliometric indicators is usually the common denominator of altmetrics (Priem et al., 2010).

Altmetrics are, however, largely determined by technical possibilities and functions of social media platforms as well as easy access through application programming interfaces (APIs). Therefore the set of metrics referred to as altmetrics are constantly changing. For example, Plum Analytics includes library holdings (Parkhill, 2013), PLOS captures downloads and views, and Altmetric.com monitors newspapers and mentions in policy documents (Liu, 2014)—types of usage statistics of scientific documents that existed long before web 2.0 and social media. Moreover, altmetrics have been referred to as "a good idea but a bad name" (Rousseau & Ye, 2013, p. 2), as research has shown that most of them do not represent an alternative to citations, as they cannot replace them as indicators of scientific impact and are, rather, indicators of a different phenomenon. This study focuses on Mendeley reader counts as well as the number of Twitter mentions, public Facebook and Google+ posts, mentions in research blogs and mainstream media of scientific journal articles with a DOI, as collected by Altmetric.com. Below is a description of the various altmetric data sources covered in this report.

Mendeley was launched in 2008 and is a social reference manager which helps to save, manage and annotate scholarly documents. The readership count of a particular paper reflects the number of Mendeley users who have stored this document in their library. Users are assumed to have an interest in organising scientific literature for citing or using it in a professional or educational context, although not all documents are read (Mohammadi, 2014). Although it has been shown that most users are students, postdoctoral fellows and researchers, it is not yet entirely known whether Mendeley users are representative of the entire readership of scientific papers and what specific biases exist (Mohammadi, 2014; Mohammadi, Thelwall, Haustein, & Larivière, 2015).

Mainstream media captured by Altmetric.com include mentions in more than 1,000 English and non-English online newspapers and news websites such as the *New York Times* or *Die Zeit*.

Mentions in blogs are based on a manually curated list of more than 8,000 blogs with authors and readers inside as well as outside of academia. Research blogs have been described as a new genre of academic publications and citing a scientific paper in a blog post is believed to be similar to

citing it in a peer-reviewed paper, as they discuss and analyse scientific content (Shema, Bar-Ilan, & Thelwall, 2014).

Tweets captured by Altmetric.com include those mentioning a unique identifier of the paper, such as the DOI, publisher URL, arXiv or PubMed ID. 500 million tweets are sent per day and Twitter currently has 302 million monthly active users, which in 2014 represented 23% of online adults. The platform is particularly popular among college-educated internet users and those below the age of 50. Among academics, the platform is less popular; studies found that around 10% use Twitter for work (Grande et al., 2014; Procter et al., 2010; Pscheida, Albrecht, Herbst, Minet, & Köhler, 2013; Rowlands, Nicholas, Russell, Canty, & Watkinson, 2011).

Facebook (founded in 2004) and Google+ (launched in 2011) are social networking platforms that allow users to connect with friends, and create and share content. Facebook had 845 million monthly active users in 2012, who spent an average of 405 minutes per month (September 2011 to January 2012) on the platform. In comparison, Google+ has been referred to as a "virtual ghost town" (Efrati, 2012, para. 3) with 90 million users spending an average of 3 minutes per month. It should be noted that Altmetric.com only captures, for these two platforms, mentions of scientific documents in public posts and not those shared with friends only. Given that the vast majority of Facebook and Google+ accounts are private, the mentions covered by Altmetric.com only represent a tiny fraction of all the posts made by users. Given these limitations, this report does not describe the results obtained using these two platforms. It does, however, provide results based on these social media in the appendices, as well as in the Excel file that accompanies this report.

2.2. Properties of altmetric indicators

The majority of empirical altmetrics research analyses social media activity concerning peer-reviewed journal articles and compares it to citation metrics to understand whether they measure a similar (but earlier) or different kind of research impact. Studies focus on the coverage of papers (i.e. the extent to which they are visible on various platforms), the average number of counts of online events and whether they correlate with citations. In terms of signal, the social reference management software Mendeley has been shown to be the dominant tool, with levels of coverage—i.e. documents having at least one reader on the platform—as high as 50-70% in some disciplines (Haustein, Peters, Sugimoto, Thelwall, & Larivière, 2014; Haustein & Siebenlist, 2011; Mohammadi & Thelwall, 2014; Mohammadi et al., 2015; Priem, Piwowar, & Hemminger, 2012). Varying between 10% and 21%, signals on Twitter have been shown to be significantly lower than Mendeley, and Facebook has even less coverage (between 2.5% and 10% depending on the dataset and study), while mentions in blog posts, Google+ or mainstream news media are even more selective (Costas, Zahedi, & Wouters, 2014; Haustein, Costas, & Larivière, 2015; Haustein, Peters, et al., 2014; Priem et al., 2012). Correlating citations with various altmetrics show that Mendeley shows moderate to high positive correlations, which can be explained by its academic users and its use in a pre-citation context (Haustein, Larivière, Thelwall, Amyot, & Peters, 2014; Mohammadi et al., 2015; Thelwall & Wilson, 2015). Mendeley reader counts are thus considered an altmetric indicator with a high potential to measure academic use broader than that by citing authors, as well as a possible early indicator of citation impact (Costas, Zahedi, & Wouters, 2015). Although initial evidence based on one journal had suggested that tweets could be used as an early indicator for citations (Eysenbach, 2011), large-scale studies have shown that correlations between the number of tweets and citations for scientific papers are weak (Costas et al., 2014, 2015; Haustein, Costas, et al., 2015; Haustein, Peters, et al., 2014; Thelwall, Haustein, Larivière, & Sugimoto, 2013) and that the most tweeted papers often report curious studies, have funny titles (Haustein, Peters, et al., 2014) and reflect “the usual trilogy of sex, drugs, and rock and roll” (Neylon, 2014). Correlations between citations and Facebook and Google+ posts, blog and mainstream media mentions are also very low (Haustein, Costas, et al., 2015).

Altmetrics are also often presented as indicators that reflect the general public's interest in science. However, their validity as such has not been proven yet and the lack of reliability and presence of various biases have been heavily debated (Dinsmore, Allen, & Dolby, 2014; Nature Materials Editors, 2012; Wouters & Costas, 2012). For instance, in addition to over representing research that contains an *entertaining* aspect—as exemplified by the topics of papers most visible on social media (Haustein, Peters, et al., 2014)—a certain share of tweets to scientific articles are created by automated Twitter bots (Haustein, Bowman, et al., 2015). In the context of research evaluation, various altmetrics, particularly tweets, Facebook and Google+ posts, should thus be handled with utmost care, as their meaning (i.e. what concept are they an indicator of) is still subject to debate.

2.3. Studied Population of ERC Researchers and Benchmark Samples

The basis for retrieving the various altmetric indicators is the scientific papers authored by researchers. Hence, the samples of ERC applicants and comparable groups described in the bibliometric report for this study (D5) are also analysed in this report. This includes the 2,556 researchers funded by ERC between 2007 and 2011, who are distributed across three large domains (Life Sciences, Physical Science and Engineering and Social Sciences and Humanities) divided into 25 disciplinary panels and two categories of grants: starting grants (StG) awarded to young scientists and advanced grants (AdG) intended for senior researchers. These funded researchers' altmetric scores are compared with those obtained for the following comparable groups:

- 2,556 ERC non-funded applicants;
- 1,000 EU FP7 collaborative projects/cooperation funded researchers;
- 1,000 US National Science Foundation (NSF) funded researchers;
- 400 US National Institutes of Health (NIH) funded researchers;
- 237 researchers funded by the National Endowment for the Humanities (NEH)
- 100 Howard Hughes Medical Institutes (HHMI) funded researchers.

As requested by the study's Steering Committee, the ERC non-funded applicants sample has the same structure as the group of funded applicants (distribution across the panels and call schemas) but it also includes:

- 1,304 applicants rejected at step 1;
- 1,252 applicants rejected at step 2, of whom 175 were rejected just below the threshold for funding.

All papers covered in this report have been disambiguated following the method presented in the bibliometric report (D5).

2.4. Data Sources

This report draws on three data sources

- *The Web of Science*
- The social reference manager *Mendeley*
- *Altmetric.com* (for Tweets, Facebook posts, Google+, Blogs and media)

Web of Science (WoS) 1980-2013: The *Observatoire des sciences et technologies* (OST) maintains a bibliometric database of all WoS records since 1980. Along with the Science Citation Index Expanded, Social Science Citation Index and Arts and Humanities Citation Index, the database includes the Conference Proceedings Citation Index (from 1990) and the Book Citation Index (from 2005). For each of the documents covered in these databases, a search was performed in the two

altmetric data sources using the documents' Digital Object Identifier. Hence, altmetrics for documents without DOIs could not be obtained.

Altmetric.com and *Mendeley* provide information on the visibility of ERC-funded research projects beyond that which traditional indicators based on publications and patents can provide. They allow the assessment of the visibility of scientific papers on various social media platforms. The analysis of these alternative metrics served as a complementary task to the bibliometric and patent analyses in this study. Specifically, it involved querying application programme interfaces (APIs) of online sources of the two alternative metrics providers. These data sources are "paper related" and allow us to see how many times ERC funded researchers' and comparable groups' papers are mentioned on Twitter and Facebook, as well as on blogs and in news items, and added to Mendeley libraries. Given that these are relatively new data sources, new methods and indicators have to be developed and tested.

2.4.1. Mendeley API

The records retrieved from Mendeley were based on 194,130 Document Object Identifiers (DOIs) retrieved from the Web of Science. Each DOI was queried against the Mendeley API[1] using a script written in PHP[2]. The data retrieval script was run at four different times to retrieve data from the Mendeley API: 76,269 records were queried from 4 March to 5 March 2015; 78,930 records were queried from 11 April to 12 April 2015; 38,915 records were queried from 22 April to 23 April 2015; and 218 records were queried on 24 April 2015. The Mendeley API returns results as JSON (JavaScript Object Notation) files (ECMA International, 2013). The Mendeley API is robust and allows a programmer to establish a secure connection with the Mendeley application using the oAuth standard (Hardt, 2012) in order to request specific data.

The Mendeley API method[3] was used to retrieve the appropriate Mendeley content. The data returned for each Mendeley record contained a large amount of information about both the journal article and the number of counts in Mendeley, the keywords associated with the article, the various identifiers (DOI, ISSN, PMID, etc.) associated with the article, countries of users adding the article, types of users adding the article, and links to the article. The JSON files were parsed for analysis using a second PHP script and the data was added to multiple MySQL database tables following a relational database model (Garcia-Molina, Ullman, & Widom, 2008). The database schema included tables for the article information, authors, countries, identifiers, keywords, readers, sub disciplines, and websites.

Of the original 194,130 DOIs retrieved from the Web of Science, a total of 187,092 articles were found to exist in Mendeley. The uptake takes longer in Mendeley, which is why a larger window—2009 to 2013—of capture is used. Missing papers could be due to articles without DOIs (Zahedi, Haustein, & Bowman, 2014) or to papers that simply did not have any Mendeley readers.

2.4.2. Altmetric API

The API at Altmetric.com provides data from events in social media, blogs, news outlets, policy documents, and other sources related to the sharing of a URL of academic works containing a valid DOI. Altmetric.com tracks "approximately 5000 papers a day, with one mention seen on average every seven seconds" ("What does Altmetric do?", n.d.). It is considered to be the most complete social media data associated with scientific papers, outside of Mendeley (Costas, Zahedi, & Wouters, 2014).

Based on the methods used by Haustein, Costas, and Larivière (2015), the DOIs were matched to information from Altmetric.com downloaded in May 2014. The Altmetric.com file results in the

[1] http://dev.mendeley.com/

[2] http://php.net/

[3] https://api.mendeley.com/catalog?view=all&doi=****

JSON format. The data returned for each Altmetric.com record contained a large amount of information about both the DOI source and the number of counts in a variety of contexts including blogs, F1000, Facebook, Google+, LinkedIn, news sites (e.g. Yahoo, The Guardian, etc.), peer review sites (e.g. PubPeer, Publons, etc.), question and answer sites, Reddit, Twitter, video sites (e.g. YouTube) and Weibo. The information retrieved from Altmetric.com was parsed for analysis using a second PHP script and the data was added to a MySQL database for analysis.

Of the original 194,130 DOIs retrieved from the Web of Science, a total of 66,959 documents from 2012 and 2013 were analysed. Because Altmeric.com started collecting this activity in June 2011, results from an examination of publications before 2012 would be inconclusive. However, social media events happen quickly for publications (Thelwall, Haustein, Larivière, & Sugimoto, 2013). Focusing on documents published between 2012 and 2013 allowed for a window of social media activity between five and 29 months, which is ample time for data to accumulate in these social media contexts.

Table 2-1. Number of papers covered by the altmetric analysis, by group of researchers and data source

Indicator/Group	ERC-Funded		ERC Non-Funded		EU	HHMI		NEH	NIH		NSF	
	Junior	Senior	Junior	Senior		Junior	Senior		Junior	Senior	Junior	Senior
Altmetric.com												
LS	4,686	7,183	3,543	6,461	1,682	433	492		1,963	2,026	336	211
PE	9,141	10,950	5,919	7,390	5,648						3,993	3,143
SH	1,065	1,211	764	683	300			98			192	118
Mendeley												
LS	7,836	12,434	5,493	10,976	3,336	813	1,115		3,757	4,547	770	470
PE	16,738	20,244	9,298	13,373	11,098						8,762	7,444
SH	1,699	2,177	1,222	1,379	591			253			460	247

2.5. Indicators

In this report, mean numbers of events associated with scientific papers are used as indicators of ERC applicants' and comparable groups' papers' visibility on the social Web. As mentioned above, four platforms are analysed in details: Twitter, Blogs, Media and Mendeley. Given the recent uptake of the use of social media tools, altmetric indicators could not be obtained for older documents. Hence, indicators based on platforms covered by altmetric.com (Twitter, Blogs and Media) are compiled for papers published in 2012-2013, while results for Mendeley could be obtained for a longer period (2009-2013). Given that many documents are not covered by altmetric sources—i.e. do not receive any social media attention—only documents with at least one tweet, blog mention, etc. are included in the calculation of the means.

Several factors can affect altmetrics scores. In addition to being based on highly skewed distributions—as only a relatively small proportion of papers are mentioned on Twitter and on blogs for instance—the likelihood that a paper receives high online visibility varies according to many factors, such as document type, field, topic, or day of publication—as well as potentially by other factors which are not easily identifiable, such as humour (Costas, Zahedi, & Wouters, 2015; Haustein, Costas, & Larivière, 2015). Current research on altmetrics has not yet established a proper normalisation scheme for such indicators. Hence, results provided in this report are based on simple averages of counts. However, in order to mitigate the differences by field, data are provided by ERC panel and by ESI field, and should not be compared across disciplines.

3. Results

3.1. Effect of Funding

This section compares, for funded and unfunded ERC applicants, the mean number of altmetric events obtained after the funding was allocated to the subset of funded researchers. Figures 3-1 to 3-3 present the results of such analysis for Life Sciences, Physical Sciences and Engineering and Social Sciences and Humanities, respectively. A first finding which can be observed in all three figures is the difference in the number of events across the four platforms. While the number of mean Mendeley readers per paper can be counted in dozens and mean Twitter counts span from one to six, mean numbers of blog and media mentions are always below one.

More specifically, for Life Sciences, successful applicants' papers—both junior and senior—have a higher social media activity than those of unsuccessful ones (Figure 3-1). Senior researchers' papers are also more likely to have a higher social media activity than those of junior researchers. These findings are observed for each indicator. Worth mentioning is the huge gap in Mendeley readership, which is almost four times higher for funded researchers than for unfunded ones.

Figure 3-1. Mean number of altmetric events of ERC researchers, by status, for 2009-2013 (Mendeley) and 2012-2013 (altmetric.com) papers, Life Sciences

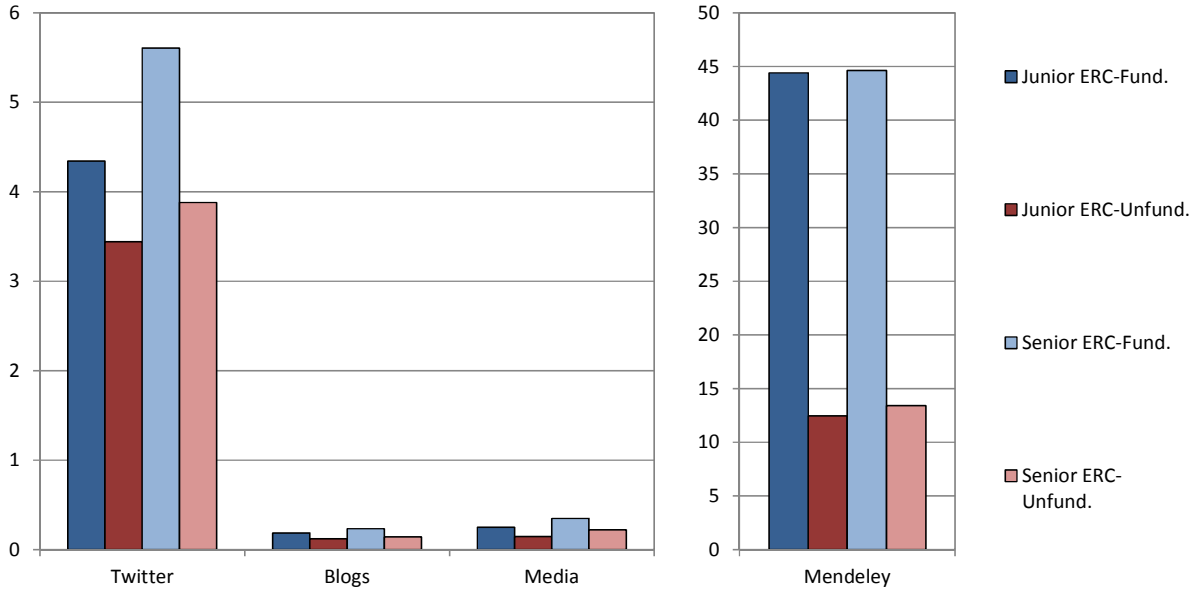
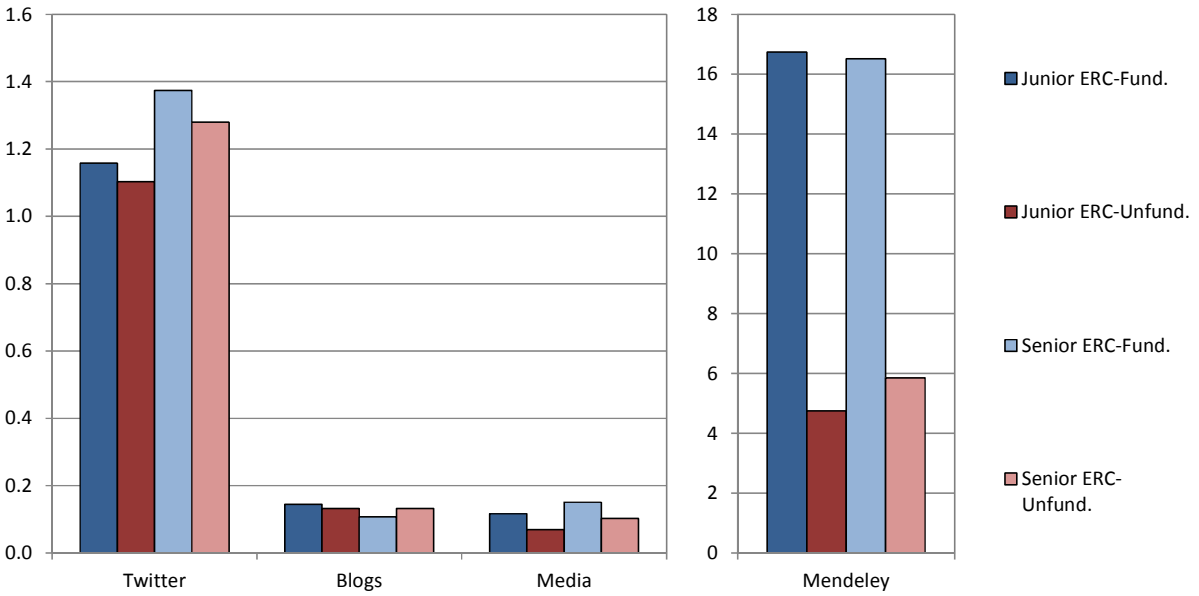


Figure 3-2 provides the same indicators, but for the subset of Physical Sciences and Engineering, and shows similar trends. One can see that the mean number of tweets in this domain is much lower than that obtained for Life Sciences, which is consistent with previous research on the diffusion of research on social media across the various subfields (Haustein, Costas, et al., 2015). Still, it shows that funded researchers' altmetric scores are greater than those of unfunded

researchers—except for blog mentions of senior researchers, which are greater for the unfunded group— and that the gap between the two groups is much higher for Mendeley readership than for other altmetrics.

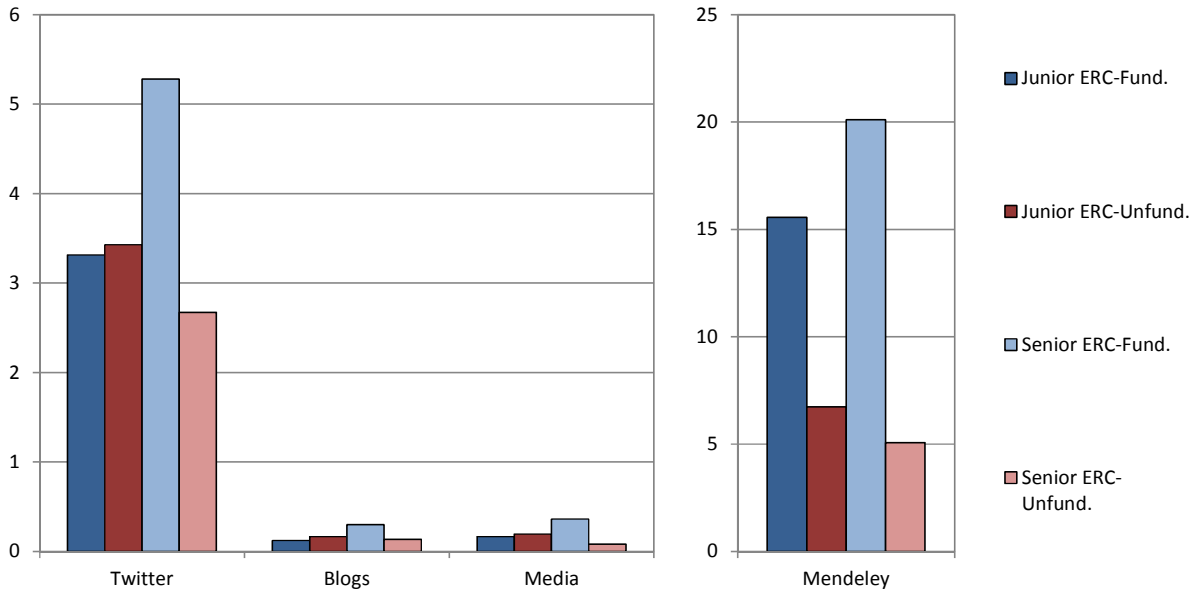
Figure 3-2. Mean number of altmetric events of ERC researchers, by status, for 2009-2013 (Mendeley) and 2012-2013 (altmetric.com) papers, Physical Sciences and Engineering



Social Sciences and Humanities behave slightly differently (Figure 3-3), especially for junior researchers. While Mendeley reader trends follow the same trends as those observed in the two other fields—with funded researchers' papers having higher numbers of readers than unfunded ones—social media activity of unfunded junior researchers is greater than that of funded ones. For senior researchers, funded applicants obtained greater social media visibility than unfunded ones.

Appendices A-C present these findings across application year (Appendix A), panel (Appendix B) and Essential Science Indicator (ESI) field categories (Appendix C). These additional and more disaggregated results provide evidence of the strength of the trends observed above, and show that irrespective of the application year, panel and ESI field, ERC-Funded applicants obtain higher altmetric scores than unsuccessful ones, and that the trend observed at the aggregate level is not due to the different *social media practices* across subfields. It also emphasises the fact that this gap is much wider for Mendeley than for other altmetrics, and that the gap is consistently observed across fields.

Figure 3-3. Mean number of altmetric events of ERC researchers, by status, for 2009-2013 (Mendeley) and 2012-2013 (altmetric.com) papers, Social Sciences and Humanities



Breaking down the various altmetric scores by rankings of applicants during the peer-review process also show interesting differences (Table 3-1). As one might expect, higher scores are, on average, obtained by non-borderline funded applicants—except for Social Sciences and Humanities, where tweets, blogs and media counts are greater for borderline-funded researchers. Along these lines, unsuccessful applicants failed at step 2 obtain higher scores than those who failed at step 1, although step 2 borderline cases do not seem to have greater visibility than non-borderline ones, except in Physical Sciences and Engineering. In the case of Mendeley, the hierarchy of the peer-review evaluation is, in all three domains, perfectly replicated.

Table 3-1. Mean number of altmetric events of ERC researchers by their rank in the evaluation, for 2009-2013 (Mendeley) and 2012-2013 (altmetric.com) papers

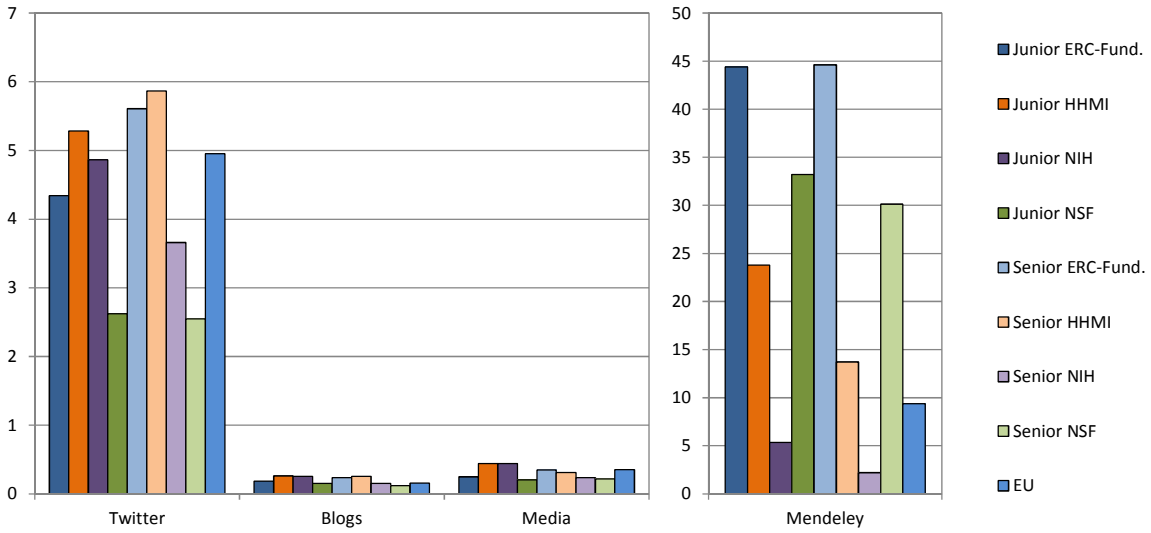
Groups	Twitter			Blogs			Media			Mendeley		
	LS	PE	SH	LS	PE	SH	LS	PE	SH	LS	PE	SH
Funded	5.11	1.28	4.36	0.22	0.12	0.22	0.31	0.13	0.27	44.53	16.62	18.11
Non-Borderline	5.17	1.30	4.22	0.21	0.13	0.21	0.31	0.14	0.26	44.74	16.45	18.56
Borderline	4.17	0.88	6.66	0.27	0.08	0.27	0.34	0.11	0.35	41.28	19.49	10.52
ERCunfunded	3.72	1.20	3.07	0.13	0.13	0.15	0.19	0.09	0.14	13.07	5.40	5.84
NON-FUNDED Failed at STEP2 - Borderline	3.72	1.89	2.21	0.13	0.18	0.08	0.21	0.23	0.06	25.02	8.64	6.07
NON-FUNDED Failed at STEP2	4.45	1.24	3.86	0.17	0.13	0.19	0.25	0.09	0.16	15.38	6.21	6.01
NON-FUNDED Failed at STEP1	2.63	0.97	2.64	0.08	0.12	0.14	0.11	0.05	0.15	6.28	3.41	5.62
All groups	4.47	1.25	3.86	0.18	0.13	0.19	0.26	0.12	0.22	30.43	12.35	13.19

3.2. International Benchmarking

This section compares the online visibility of ERC-funded researchers' papers with that of the comparable groups. Figures 3-4 to 3-6 present the results for Life Sciences, Physical Sciences and Engineering and Social Sciences and Humanities, respectively. In Life Sciences, junior researchers' papers obtain lower Twitter, blog and media activity than junior HHMI or NIH researchers, but

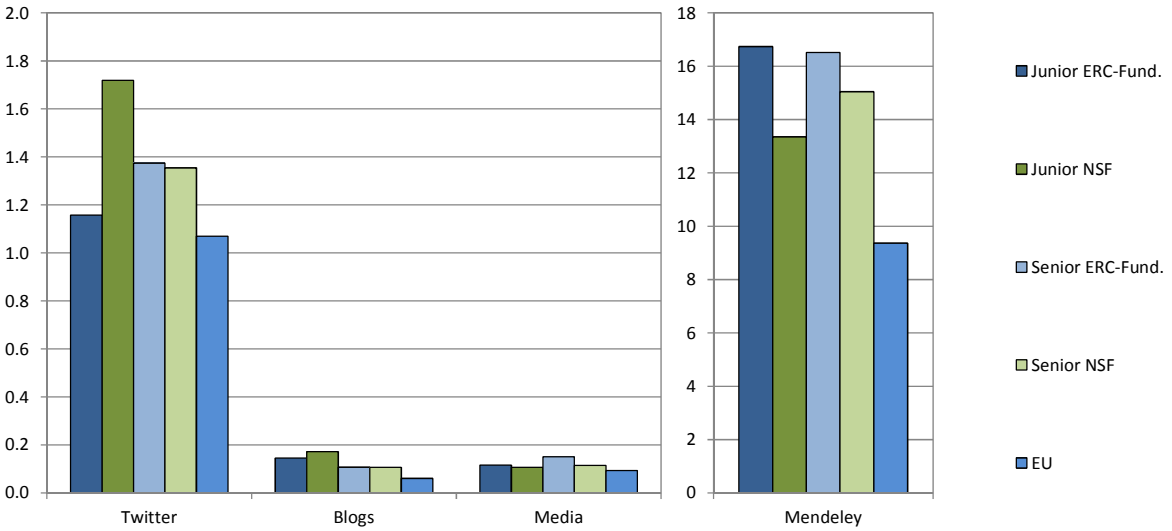
greater activity than NSF researchers. ERC-funded senior researchers are almost on par with HHMI senior researchers for these three indicators, and are above NIH and NSF senior researchers. The group of EU researchers is above junior ERC researchers, but below the group of senior ERC researchers. Mendeley readership counts provide a different pattern: both groups of ERC-funded researchers' papers obtain a much greater number of readers than their US and EU comparable groups.

Figure 3-4. Mean number of altmetric events of ERC-funded researchers and comparable groups, by status, for 2009-2013 (Mendeley) and 2012-2013 (altmetric.com) papers, Life Sciences



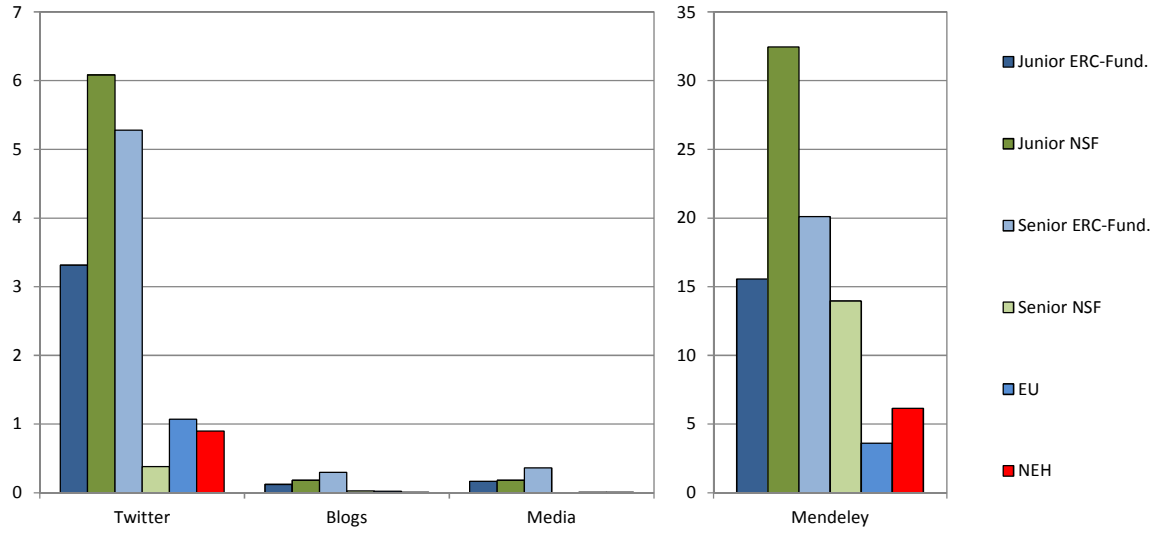
As shown previously, papers from Physical Sciences and Engineering researchers obtain much lower visibility on social media than those of researchers from the two other fields, and this is not specific to ERC papers (Figure 3-5). However, Figure 3-5 shows lower tweet counts for junior ERC researchers compared to their NSF peers, and similar rates for the two groups of senior researchers. The group of EU FP7 researchers obtains a lower mean number of tweets than the two groups of ERC-funded researchers. The very low mean numbers of blog and media counts make it difficult to assess any trend. On the other hand, the Mendeley reader count of ERC-funded researchers remains greater than that of the comparable groups.

Figure 3-5. Mean number of altmetric events of ERC-funded researchers and comparable groups, by status, for 2009-2013 (Mendeley) and 2012-2013 (altmetric.com) papers, Physical Sciences and Engineering



In the Social Sciences and Humanities (Figure 3-6), we observe a striking difference between junior and senior NSF researchers: while juniors top the rankings and obtain much more visibility on Twitter than their ERC counterparts (both junior and senior), NSF senior researchers' papers are almost invisible on this platform. The two groups of ERC researchers are also more visible on Twitter than the two other comparable groups (EU FP7 and NEH researchers). Similar trends are observed for blogs and media. In terms of Mendeley reader counts, junior NSF researchers obtain higher scores than their ERC peers, but the opposite is observed for senior researchers. Both EU FP7 and NEH researchers obtain lower Mendeley readership counts than other groups under study.

Figure 3-6. Mean number of altmetric events of ERC-funded researchers and comparable groups, by status, for 2009-2013 (Mendeley) and 2012-2013 (altmetric.com) papers, Social Sciences and Humanities



3.2.1. International benchmarking by ESI field

As previous figures have shown, various altmetric indicators are—just like bibliometric indicators—sensitive to various domains of study, and scores are higher in Life Sciences and Social Sciences and Humanities than in Physical Sciences and Engineering. In order to provide a more fine-grained analysis of the differences in altmetric scores of ERC researchers and comparable groups, the Twitter and Mendeley scores—the altmetrics with the highest signal—are analysed at the level of ESI subfields. The results for blogs, media mentions, Facebook posts and Google+ mentions are provided in Appendices D-G.

Table 3-2 provides the mean number of tweets of ERC researchers and comparable groups by ESI field. As not all groups of researchers have papers in each of the ESI fields, only comparable group and ESI field combinations with at least ten papers are shown. The table shows that ERC-funded researchers obtain higher numbers of tweets in the majority of the ESI fields than comparable groups, except for NIH, where researchers funded by this programme obtain higher scores in a majority of fields. More specifically, ERC-funded researchers' scores are above those of EU FP7 researchers in 69.2% of fields, above HHMI in 88.8% of fields, above NEH in 66.7% of fields, and above NSF researchers in 71.4% of the fields. Compared to NIH researchers, the group of ERC-funded researchers achieved higher scores in half of the ESI fields.

Table 3-2. Mean number of Twitter mentions of ERC researchers and comparable groups, for 2012-2013 papers

ESI Field	ERC-Funded	ERC Non-Funded	EU	HHMI	NEH	NIH	NSF
AGRICULTURAL SCIENCES	2.68	0.54	1.60				0.14
ARTS & HUMANITIES	0.04	0.06			0.13		
BIOLOGY & BIOCHEMISTRY	3.27	2.03	1.70	4.15		4.27	2.25
CHEMISTRY	0.73	0.64	0.35	0.70		1.34	0.57
CLINICAL MEDICINE	3.29	2.84	5.01	2.04	2.85	3.89	1.36
COMPUTER SCIENCE	0.74	0.62	0.72				0.24
ECONOMICS & BUSINESS	1.19	0.91	0.72				0.47
ENGINEERING	0.08	0.07	0.08			0.26	0.09
ENVIRONMENT/ECOLOGY	2.47	2.51	1.11			2.33	1.31
GEOSCIENCES	1.44	2.10	0.76				0.83
IMMUNOLOGY	2.59	1.75	2.02	1.12		2.86	
MATERIALS SCIENCE	0.65	0.29	0.19			0.73	0.38
MATHEMATICS	0.07	0.19	0.37				0.09
MICROBIOLOGY	3.17	2.64	2.24	1.98		1.35	3.00
MOLECULAR BIOLOGY & GENETICS	5.25	5.65	6.22	5.09		6.35	2.63
MULTIDISCIPLINARY	14.88	10.35	8.54	13.77		10.65	14.30
NEUROSCIENCE & BEHAVIOR	3.40	3.54	2.04	4.28		3.33	1.59
PHARMACOLOGY & TOXICOLOGY	0.67	0.91	0.92	0.25		0.56	1.00
PHYSICS	1.10	1.51	0.89			1.23	2.56
PLANT & ANIMAL SCIENCE	2.89	1.56	0.90	0.58		1.14	1.29
PSYCHIATRY/PSYCHOLOGY	3.38	3.65	1.23	2.14		1.79	2.29
SOCIAL SCIENCES, GENERAL	1.65	1.76	2.25		0.27	1.53	3.23
SPACE SCIENCE	0.71	0.72	0.73				1.05
All Fields	2.81	2.33	1.93	5.59	0.90	4.25	1.72

In terms of Mendeley readership (Table 3-3), results are unequivocal: compared to EU FP7, HHMI and NIH researchers, ERC-funded researchers obtain higher Mendeley scores in every ESI field in

which both groups are active. For NEH, it is the case in 66.7% of the ESI fields and, for NSF researchers, for 76.2% of the fields. These results strongly confirm the positive difference in favour of ERC-funded researchers with regard to Mendeley readership, and that this difference is not due to different Mendeley usage across domains.

Table 3-3. Mean number of Mendeley readers of ERC researchers and comparable groups, for 2012-2013 papers

ESI Field	ERC-Funded	ERC Non-Funded	EU	HHMI	NEH	NIH	NSF
AGRICULTURAL SCIENCES	25.32	3.82	3.36				6.57
ARTS & HUMANITIES	1.05	0.97			1.16		
BIOLOGY & BIOCHEMISTRY	38.04	12.50	6.51	11.17		3.97	20.95
CHEMISTRY	17.53	4.43	7.62	0.68		0.53	14.84
CLINICAL MEDICINE	17.52	5.06	4.12	3.23	8.41	0.39	9.48
COMPUTER SCIENCE	9.47	3.42	1.69				8.07
ECONOMICS & BUSINESS	12.12	5.04	3.96				16.23
ENGINEERING	8.92	2.55	2.37			0.09	7.42
ENVIRONMENT/ECOLOGY	46.58	13.26	8.07			2.64	29.00
GEOSCIENCES	18.81	7.26	7.44				13.56
IMMUNOLOGY	33.17	8.32	7.08	8.02		1.67	
MATERIALS SCIENCE	24.93	4.92	7.85			1.85	19.88
MATHEMATICS	3.40	1.27	0.71				4.61
MICROBIOLOGY	32.78	7.34	3.66	1.33		0.71	26.95
MOLECULAR BIOLOGY & GENETICS	56.52	24.56	16.25	22.01		10.09	39.68
MULTIDISCIPLINARY	76.69	36.27	37.66	40.47		13.58	68.70
NEUROSCIENCE & BEHAVIOR	45.74	9.05	3.74	10.59		0.17	34.54
PHARMACOLOGY & TOXICOLOGY	17.61	2.16	3.36	0.09		0.02	19.72
PHYSICS	15.07	4.50	7.18			0.11	13.65
PLANT & ANIMAL SCIENCE	33.80	9.54	4.43	9.46		0.46	21.79
PSYCHIATRY/PSYCHOLOGY	21.27	5.91	5.45	4.00		0.23	30.18
SOCIAL SCIENCES, GENERAL	9.98	3.85	3.72		3.57	0.06	16.68
SPACE SCIENCE	9.74	5.40	3.45				5.99
All Fields	25.97	8.46	6.97	17.97	6.15	3.63	15.81

4. Conclusions

Based on the analysis of social media visibility of scientific papers, as compiled by various altmetric sources, this report aimed to answer the following questions:

1. Does the funding provided by ERC help the grantees improve their *altmetric* visibility?
2. Do ERC grantees perform better than researchers sponsored by other European and American funding agencies?

With respect to the first question, results found in this report have shown that ERC-funded applicants, both junior and senior, systematically obtained higher altmetric scores than unsuccessful ones, and that these results are observed in each of the panels, application years and ESI disciplines. In all of these cases, the gap between the two groups was wider for Mendeley than for other altmetrics. In most fields and indicators, the ranks of applicants in the peer-review process was replicated, with non-borderline funded applicants obtaining scores higher than borderline ones, and unsuccessful applicants failing at step 2 obtaining higher scores than those failing at step 1. Results also showed that strong differences exist between fields, with papers in natural and physical sciences being picked up by social media at a much lower rate than those in medical disciplines or social sciences and humanities. However, we cannot assess whether this is an improvement on their scores *before* they applied to the ERC, as altmetric scores—because of their recency—could not be compiled for the older time periods.

Regarding the second question, results were more mixed and depended on the field and indicator. In all three domains, ERC-funded researchers obtained higher Mendeley scores than their international comparison groups—except for the group of junior researchers in the Social Sciences and Humanities, who scored below their NSF peers. For other indicators—and especially Twitter—NSF and NIH groups typically score higher than ERC researchers, which might be a consequence of US researchers' favourable attitude towards social media and the fact that they are likely to use it to publicise their work (Nicholas, et al., 2014). Another factor which might play a role is the fact that the NSF decided to recognise all scholars' research *products,* rather than just publications, as indicators of research activity (Piwowar, 2013).

To our knowledge, this report is the first of its kind analysing the altmetric activity of groups of researchers in a policy context. As such, it is exploratory in nature and needs to be interpreted with caution. As mentioned in the review of altmetrics provided in Chapter 2, the interpretation of altmetric scores is still being debated. While Mendeley scores can be interpreted as indicators of the usage of scientific literature, especially by graduate students and postdocs, tweets point to a different type of impact, which is much less clearly understood. Current evidence on the characteristics of papers which are highly tweeted does not suggest that these papers have a "social" impact but, rather, that they echo on social media because they are funny, curious, or contain mistakes. Thus, any policy or incentives based on Twitter could lead to adverse effects. More research is thus necessary to better understand the properties and meaning of these indicators before using them in a policy context.

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Appendices

Appendix A: Mean number of altmetric events of ERC-funded and unfunded researchers, by application year, for 2012-2013 papers

Groups	Twitter		Facebook		Google+		Blogs		Media		Mendeley	
	Funded	Unfunded	Funded	Unfunded	Funded	Unfunded	Funded	Unfunded	Funded	Unfunded	Funded	Unfunded
LS	5.11	3.72	0.46	0.35	0.11	0.09	0.22	0.13	0.31	0.19	44.53	13.07
2007	4.36	2.00	0.37	0.19	0.06	0.03	0.17	0.06	0.23	0.03	53.77	11.03
2008	5.05	3.54	0.48	0.32	0.12	0.07	0.23	0.12	0.33	0.18	51.07	16.83
2009	5.73	4.50	0.59	0.39	0.15	0.09	0.24	0.15	0.38	0.23	43.39	15.80
2010	5.34	3.85	0.47	0.32	0.12	0.10	0.22	0.16	0.27	0.21	41.06	13.20
2011	4.70	3.54	0.38	0.39	0.10	0.09	0.20	0.12	0.31	0.20	36.95	5.91
PE	1.28	1.20	0.11	0.10	0.05	0.04	0.12	0.13	0.13	0.09	16.62	5.40
2007	0.92	0.35	0.10	0.04	0.05	0.01	0.11	0.05	0.11	0.02	19.42	3.99
2008	1.13	1.45	0.12	0.12	0.06	0.05	0.11	0.11	0.16	0.11	16.43	7.70
2009	1.27	1.13	0.11	0.10	0.06	0.03	0.10	0.13	0.13	0.08	17.22	5.23
2010	1.50	1.21	0.13	0.10	0.04	0.04	0.12	0.13	0.14	0.09	15.89	5.54
2011	1.24	1.31	0.11	0.11	0.05	0.05	0.16	0.16	0.13	0.10	15.09	3.81
SH	4.36	3.07	0.32	0.19	0.14	0.04	0.22	0.15	0.27	0.14	18.11	5.84
2007	3.85	2.70	0.42	0.19	0.09	0.08	0.08	0.07	0.09	0.16	16.27	6.60
2008	4.77	2.74	0.34	0.13	0.27	0.03	0.33	0.14	0.33	0.11	19.20	6.37
2009	3.73	3.37	0.35	0.24	0.16	0.04	0.14	0.21	0.21	0.20	12.60	5.97
2010	3.08	2.67	0.19	0.16	0.05	0.03	0.12	0.12	0.07	0.20	25.39	6.64
2011	5.34	3.48	0.33	0.20	0.14	0.05	0.29	0.16	0.44	0.06	16.17	3.19
All groups	2.81	2.33	0.25	0.21	0.08	0.06	0.16	0.13	0.20	0.13	25.97	8.46

Appendix B: Mean number of altmetric events of ERC-funded and unfunded researchers, by panel, for 2009-2013 (Mendeley) and 2012-2013 (altmetric.com) papers

Groups	Twitter		Facebook		Google+		Blogs		Media		Mendeley	
	Funded	Unfunded	Funded	Unfunded	Funded	Unfunded	Funded	Unfunded	Funded	Unfunded	Funded	Unfunded
LS	5.11	3.72	0.46	0.35	0.11	0.09	0.22	0.13	0.31	0.19	44.53	13.07
LS01	3.11	1.65	0.24	0.13	0.06	0.02	0.11	0.07	0.23	0.11	43.57	12.37
LS02	9.87	8.59	0.67	0.64	0.28	0.22	0.50	0.38	0.53	0.40	78.67	40.51
LS03	4.44	1.83	0.41	0.19	0.10	0.08	0.16	0.05	0.25	0.11	54.53	16.59
LS04	5.03	3.25	0.51	0.48	0.09	0.09	0.17	0.07	0.33	0.17	32.67	11.08
LS05	5.49	4.25	0.39	0.37	0.14	0.14	0.20	0.12	0.34	0.23	60.21	9.79
LS06	2.78	2.56	0.31	0.23	0.04	0.04	0.08	0.06	0.19	0.16	38.46	9.52
LS07	3.06	3.62	0.46	0.36	0.04	0.04	0.10	0.10	0.21	0.17	18.40	4.90
LS08	6.32	3.83	0.51	0.27	0.16	0.09	0.37	0.21	0.38	0.24	57.26	11.29
LS09	6.23	1.40	0.54	0.22	0.13	0.03	0.25	0.06	0.34	0.04	32.94	4.83
PE	1.28	1.20	0.11	0.10	0.05	0.04	0.12	0.13	0.13	0.09	16.62	5.40
PE01	0.25	0.39	0.02	0.03	0.01	0.02	0.01	0.02	0.00	0.01	5.48	1.87
PE02	1.85	1.94	0.15	0.14	0.11	0.09	0.23	0.25	0.14	0.06	13.76	4.96
PE03	1.32	0.64	0.09	0.05	0.06	0.02	0.17	0.07	0.19	0.10	29.42	6.36
PE04	1.71	1.65	0.09	0.10	0.04	0.04	0.07	0.22	0.13	0.07	20.36	4.78
PE05	0.86	0.62	0.09	0.07	0.02	0.01	0.07	0.03	0.10	0.04	18.70	4.64
PE06	0.72	1.50	0.08	0.03	0.02	0.06	0.03	0.03	0.04	0.03	13.62	4.16
PE07	0.76	0.28	0.10	0.04	0.02	0.02	0.05	0.05	0.05	0.06	12.52	1.64
PE08	0.74	0.37	0.09	0.07	0.03	0.01	0.05	0.02	0.05	0.04	12.18	3.04
PE09	1.34	1.14	0.14	0.11	0.10	0.07	0.19	0.19	0.26	0.21	10.41	5.67
PE10	2.67	2.97	0.30	0.30	0.08	0.08	0.25	0.24	0.34	0.26	23.48	16.54
SH	4.36	3.07	0.32	0.19	0.14	0.04	0.22	0.15	0.27	0.14	18.11	5.84
SH01	4.93	1.72	0.28	0.08	0.04	0.01	0.12	0.07	0.09	0.01	14.55	5.31
SH02	1.47	2.28	0.17	0.21	0.00	0.01	0.05	0.09	0.06	0.20	8.88	3.78
SH03	1.93	1.13	0.12	0.07	0.04	0.00	0.08	0.05	0.06	0.00	11.57	2.45
SH04	5.76	4.66	0.41	0.25	0.16	0.08	0.29	0.22	0.40	0.15	24.50	7.62
SH05	0.15	2.09	0.00	0.12	0.00	0.03	0.00	0.00	0.00	0.00	5.61	3.71
SH06	2.29	2.10	0.28	0.18	0.45	0.05	0.28	0.19	0.25	0.37	11.24	6.55
All groups	2.81	2.33	0.25	0.21	0.08	0.06	0.16	0.13	0.20	0.13	25.97	8.46

Appendix C: Mean number of altmetric events of ERC-funded and unfunded researchers, by ESI Field, for 2009-2013 (Mendeley) and 2012-2013 (altmetric.com) papers

ESI Field	Twitter		Facebook		Google+		Blogs		Media		Mendeley	
	Funded	Unfunded	Funded	Unfunded	Funded	Unfunded	Funded	Unfunded	Funded	Unfunded	Funded	Unfunded
AGRICULTURAL SCIENCES	2.68	0.54	0.48	0.13	0.06	0.00	0.05	0.01	0.02	0.00	9.74	5.40
ARTS & HUMANITIES	0.04	0.06	0.02	0.04	0.00	0.00	0.00	0.02	0.00	0.00	9.98	3.85
BIOLOGY & BIOCHEMISTRY	3.27	2.03	0.25	0.22	0.10	0.05	0.16	0.08	0.24	0.12	21.27	5.91
CHEMISTRY	0.73	0.64	0.07	0.06	0.01	0.01	0.05	0.04	0.06	0.04	33.80	9.54
CLINICAL MEDICINE	3.29	2.84	0.42	0.32	0.04	0.03	0.08	0.05	0.17	0.13	15.07	4.50
COMPUTER SCIENCE	0.74	0.62	0.01	0.01	0.01	0.01	0.02	0.01	0.00	0.00	17.61	2.16
ECONOMICS & BUSINESS	1.19	0.91	0.05	0.05	0.00	0.00	0.05	0.04	0.01	0.01	45.74	9.05
ENGINEERING	0.08	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	76.69	36.27
ENVIRONMENT/ECOLOGY	2.47	2.51	0.19	0.17	0.03	0.02	0.14	0.12	0.05	0.07	56.52	24.56
GEOSCIENCES	1.44	2.10	0.15	0.22	0.05	0.05	0.15	0.17	0.15	0.16	32.78	7.34
IMMUNOLOGY	2.59	1.75	0.66	0.22	0.04	0.02	0.06	0.05	0.18	0.05	3.40	1.27
MATERIALS SCIENCE	0.65	0.29	0.08	0.05	0.04	0.01	0.09	0.03	0.13	0.05	24.93	4.92
MATHEMATICS	0.07	0.19	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	33.17	8.32
MICROBIOLOGY	3.17	2.64	0.30	0.28	0.03	0.06	0.13	0.09	0.07	0.11	18.81	7.26
MOLECULAR BIOLOGY & GENETICS	5.25	5.65	0.48	0.51	0.10	0.16	0.23	0.23	0.32	0.37	46.58	13.26
MULTIDISCIPLINARY	14.88	10.35	1.22	0.87	0.49	0.27	0.81	0.58	1.37	0.91	8.92	2.55
NEUROSCIENCE & BEHAVIOR	3.40	3.54	0.21	0.30	0.07	0.11	0.10	0.09	0.11	0.07	12.12	5.04
PHARMACOLOGY & TOXICOLOGY	0.67	0.91	0.04	0.03	0.00	0.02	0.01	0.01	0.02	0.00	9.47	3.42
PHYSICS	1.10	1.51	0.08	0.10	0.05	0.06	0.14	0.21	0.08	0.04	17.52	5.06
PLANT & ANIMAL SCIENCE	2.89	1.56	0.27	0.14	0.06	0.03	0.17	0.07	0.10	0.07	17.53	4.43
PSYCHIATRY/PSYCHOLOGY	3.38	3.65	0.18	0.19	0.13	0.08	0.15	0.11	0.13	0.09	38.04	12.50
SOCIAL SCIENCES, GENERAL	1.65	1.76	0.18	0.21	0.01	0.02	0.07	0.06	0.15	0.07	1.05	0.97
SPACE SCIENCE	0.71	0.72	0.06	0.06	0.06	0.04	0.11	0.11	0.05	0.05	25.32	3.82
All Domains	2.81	2.33	0.25	0.21	0.08	0.06	0.16	0.13	0.20	0.13	25.97	8.46

Appendix D: Mean number of blog mentions of ERC researchers and comparable groups, by ESI field, for 2012-2013 papers

ESI Field	ERC-Funded	ERC Non-Funded	EU	HHMI	NEH	NIH	NSF
AGRICULTURAL SCIENCES	0.05	0.01	0.02	1.00	0.00	0.00	0.09
ARTS & HUMANITIES	0.00	0.02	0.00		0.00		0.00
BIOLOGY & BIOCHEMISTRY	0.16	0.08	0.05	0.16	0.50	0.22	0.10
CHEMISTRY	0.05	0.04	0.02	0.14	0.00	0.09	0.04
CLINICAL MEDICINE	0.08	0.05	0.10	0.04	0.00	0.10	0.06
COMPUTER SCIENCE	0.02	0.01	0.02	0.00	0.00	0.00	0.01
ECONOMICS & BUSINESS	0.05	0.04	0.02	0.00	0.00	0.00	0.05
ENGINEERING	0.00	0.00	0.00	0.00	0.00	0.03	0.02
ENVIRONMENT/ECOLOGY	0.14	0.12	0.09	0.11	0.00	0.13	0.10
GEOSCIENCES	0.15	0.17	0.08	0.00			0.11
IMMUNOLOGY	0.06	0.05	0.05	0.04	0.00	0.09	0.00
MATERIALS SCIENCE	0.09	0.03	0.02	0.00	0.00	0.18	0.07
MATHEMATICS	0.01	0.01	0.05	0.00	0.00	0.00	0.00
MICROBIOLOGY	0.13	0.09	0.07	0.13	0.00	0.08	0.13
MOLECULAR BIOLOGY & GENETICS	0.23	0.23	0.32	0.15	0.00	0.32	0.17
MULTIDISCIPLINARY	0.81	0.58	0.51	0.76	0.00	0.55	0.80
NEUROSCIENCE & BEHAVIOR	0.10	0.09	0.02	0.24		0.18	0.03
PHARMACOLOGY & TOXICOLOGY	0.01	0.01	0.03	0.00		0.02	0.03
PHYSICS	0.14	0.21	0.05	0.00	0.00	0.16	0.31
PLANT & ANIMAL SCIENCE	0.17	0.07	0.02	0.08		0.00	0.05
PSYCHIATRY/PSYCHOLOGY	0.15	0.11	0.05	0.14	0.00	0.05	0.12
SOCIAL SCIENCES, GENERAL	0.07	0.06	0.07	0.00	0.00	0.03	0.14
SPACE SCIENCE	0.11	0.11	0.05	0.00			0.06
All Fields	0.16	0.13	0.08	0.26	0.01	0.20	0.14

Appendix E: Mean number of media mentions of ERC researchers and comparable groups, by ESI field, for 2012-2013 papers

ESI Field	ERC-Funded	ERC Non-Funded	EU	HHMI	NEH	NIH	NSF
AGRICULTURAL SCIENCES	0.02	0.00	0.01	0.00	0.00	0.00	0.00
ARTS & HUMANITIES	0.00	0.00	0.00		0.00		0.00
BIOLOGY & BIOCHEMISTRY	0.24	0.12	0.02	0.37	0.00	0.25	0.10
CHEMISTRY	0.06	0.04	0.02	0.16	0.00	0.17	0.03
CLINICAL MEDICINE	0.17	0.13	0.24	0.15	0.00	0.25	0.14
COMPUTER SCIENCE	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ECONOMICS & BUSINESS	0.01	0.01	0.00	0.00	0.00	0.00	0.07
ENGINEERING	0.00	0.00	0.00	0.00	0.33	0.00	0.04
ENVIRONMENT/ECOLOGY	0.05	0.07	0.05	0.11	0.00	0.07	0.07
GEOSCIENCES	0.15	0.16	0.05	0.00			0.14
IMMUNOLOGY	0.18	0.05	0.11	0.06	0.00	0.16	0.17
MATERIALS SCIENCE	0.13	0.05	0.04	0.00	0.00	0.26	0.11
MATHEMATICS	0.00	0.01	0.00	0.00	0.00	0.00	0.00
MICROBIOLOGY	0.07	0.11	0.07	0.05	0.00	0.01	0.44
MOLECULAR BIOLOGY & GENETICS	0.32	0.37	0.94	0.42	0.00	0.62	0.19
MULTIDISCIPLINARY	1.37	0.91	1.06	0.81	0.00	0.73	1.47
NEUROSCIENCE & BEHAVIOR	0.11	0.07	0.13	0.19		0.41	0.00
PHARMACOLOGY & TOXICOLOGY	0.02	0.00	0.01	0.00		0.08	0.03
PHYSICS	0.08	0.04	0.07	0.00	0.00	0.34	0.08
PLANT & ANIMAL SCIENCE	0.10	0.07	0.02	0.00		0.00	0.04
PSYCHIATRY/PSYCHOLOGY	0.13	0.09	0.01	0.00	0.00	0.02	0.10
SOCIAL SCIENCES, GENERAL	0.15	0.07	0.04	0.00	0.00	0.03	0.10
SPACE SCIENCE	0.05	0.05	0.02	0.00			0.05
All Fields	0.20	0.13	0.15	0.37	0.01	0.34	0.12

Appendix F: Mean number of Facebook posts of ERC researchers and comparable groups, by ESI field, for 2012-2013 papers

ESI Field	ERC-Funded	ERC Non-Funded	EU	HHMI	NEH	NIH	NSF
AGRICULTURAL SCIENCES	0.48	0.13	0.16	0.00	0.00	1.00	0.05
ARTS & HUMANITIES	0.02	0.04	0.00		0.00		0.00
BIOLOGY & BIOCHEMISTRY	0.25	0.22	0.07	0.38	0.00	0.37	0.15
CHEMISTRY	0.07	0.06	0.04	0.11	0.00	0.13	0.05
CLINICAL MEDICINE	0.42	0.32	0.48	0.27	0.40	0.62	0.10
COMPUTER SCIENCE	0.01	0.01	0.01	0.00	0.00	0.00	0.00
ECONOMICS & BUSINESS	0.05	0.05	0.05	0.00	0.00	0.00	0.02
ENGINEERING	0.00	0.00	0.00	0.00	0.33	0.03	0.01
ENVIRONMENT/ECOLOGY	0.19	0.17	0.11	0.33	0.00	0.93	0.12
GEOSCIENCES	0.15	0.22	0.07	0.00			0.12
IMMUNOLOGY	0.66	0.22	0.13	0.16	0.00	0.54	0.00
MATERIALS SCIENCE	0.08	0.05	0.04	0.00	0.00	0.16	0.06
MATHEMATICS	0.01	0.01	0.00	0.00	0.00	0.00	0.01
MICROBIOLOGY	0.30	0.28	0.15	0.35	0.00	0.06	0.26
MOLECULAR BIOLOGY & GENETICS	0.48	0.51	0.46	0.63	0.00	0.64	0.19
MULTIDISCIPLINARY	1.22	0.87	0.70	0.87	0.00	0.99	1.05
NEUROSCIENCE & BEHAVIOR	0.21	0.30	0.20	0.40		0.32	0.14
PHARMACOLOGY & TOXICOLOGY	0.04	0.03	0.06	0.19		0.03	0.11
PHYSICS	0.08	0.10	0.07	0.00	0.00	0.21	0.25
PLANT & ANIMAL SCIENCE	0.27	0.14	0.06	0.17		0.18	0.14
PSYCHIATRY/PSYCHOLOGY	0.18	0.19	0.14	0.36	0.00	0.08	0.06
SOCIAL SCIENCES, GENERAL	0.18	0.21	0.14	0.00	0.00	0.07	0.15
SPACE SCIENCE	0.06	0.06	0.06	0.00			0.12
All Fields	0.25	0.21	0.16	0.51	0.09	0.47	0.14

Appendix G: Mean number of Google+ mentions of ERC researchers and comparable groups, by ESI field, for 2012-2013 papers

ESI Field	ERC-Funded	ERC Non-Funded	EU	HHMI	NEH	NIH	NSF
AGRICULTURAL SCIENCES	0.06	0.00	0.01	0.00	0.00	0.00	0.00
ARTS & HUMANITIES	0.00	0.00	0.00		0.00		0.00
BIOLOGY & BIOCHEMISTRY	0.10	0.05	0.02	0.08	1.00	0.27	0.03
CHEMISTRY	0.01	0.01	0.00	0.00	0.00	0.04	0.01
CLINICAL MEDICINE	0.04	0.03	0.04	0.00	0.00	0.04	0.01
COMPUTER SCIENCE	0.01	0.01	0.02	0.00	0.00	0.00	0.01
ECONOMICS & BUSINESS	0.00	0.00	0.02	0.00	0.00	0.00	0.07
ENGINEERING	0.00	0.00	0.00	0.00	0.00	0.03	0.01
ENVIRONMENT/ECOLOGY	0.03	0.02	0.01	0.11	0.00	0.07	0.03
GEOSCIENCES	0.05	0.05	0.02	0.00			0.06
IMMUNOLOGY	0.04	0.02	0.01	0.02	0.00	0.10	0.00
MATERIALS SCIENCE	0.04	0.01	0.02	0.00	0.00	0.03	0.01
MATHEMATICS	0.01	0.01	0.00	0.00	0.00	0.00	0.01
MICROBIOLOGY	0.03	0.06	0.04	0.06	0.00	0.01	0.10
MOLECULAR BIOLOGY & GENETICS	0.10	0.16	0.07	0.15	0.00	0.19	0.07
MULTIDISCIPLINARY	0.49	0.27	0.18	0.35	0.00	0.50	0.90
NEUROSCIENCE & BEHAVIOR	0.07	0.11	0.03	0.11		0.07	0.09
PHARMACOLOGY & TOXICOLOGY	0.00	0.02	0.00	0.00		0.00	0.03
PHYSICS	0.05	0.06	0.02	0.00	0.00	0.03	0.10
PLANT & ANIMAL SCIENCE	0.06	0.03	0.01	0.00		0.00	0.02
PSYCHIATRY/PSYCHOLOGY	0.13	0.08	0.00	0.07	0.00	0.01	0.02
SOCIAL SCIENCES, GENERAL	0.01	0.02	0.02	0.00	0.00	0.00	0.06
SPACE SCIENCE	0.06	0.04	0.03	0.00			0.05
All Fields	0.08	0.06	0.03	0.14	0.02	0.15	0.07

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The European Research Council Executive Agency (ERCEA) asked RAND Europe and the Observatoire des sciences et des technologies (OST) to use innovative scientometric techniques, including bibliometrics, patent analysis and alternative metric analysis, in carrying out a comparative assessment of European Research Council funded projects. The four interrelated objectives of the study were: (i) to provide a systematic overview and assessment of results stemming from ERC-funded projects; (ii) benchmark results of ERC-funded research and researchers against European and US control groups; (iii) conduct a qualitative peer-review assessment to explore the kinds of contributions made by ERC-funded research; and (iv) provide a scientometric framework and consolidated database for future assessment of ERC funded research.

This document is the alternative metrics report for the study.

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