TRUST AND AUTHORITY IN SCHOLARLY COMMUNICATIONS IN THE LIGHT OF THE DIGITAL TRANSITION

FINAL REPORT

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Trust and Authority in Scholarly Communications in the Light of the Digital Transition

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Contents

1 Introduction

This report provides an overview of an investigation into trust and authority in scholarly communications in the digital era. It flags the key findings and documents progress against project goals and key research questions. The main outputs of the research, and the places where the detailed findings can be found, are the working papers, which have been issued separately. These papers are in effect all draft articles, which either have already been submitted to various scholarly journals or will be submitted in the near future. These papers are where more detailed research findings can be found. A list of the papers can be found in Appendix 1.

2 Rationale

The origins of this research investigation partly lie in CIBER's exploratory research on the Google Generation conducted in 2007 for JISC and the British Library, who were concerned that the future researcher, those born digital, might bring with them new values, perceptions and behaviours which would challenge the establishment and its existing practices, especially in regard to trustworthiness (Rowlands et al., 2008). The study showed that the young scholars had been conditioned by the digital environment and behaved quite surprisingly as a result; they bounced a lot and tended not to return, a horizontal form of fast information behaviour best described as 'bouncing'. They also appeared to do very little evaluation. What was not clear was whether they would change their behaviour when they entered academe and the workplace and started researching. Or, would academe and employers have to adapt to them? In fact it was not quite as simple as that because extensive follow-up research based upon the usage log of scholarly websites showed that the behaviour of older generations was also being similarly changed by the digital transition (Nicholas et al., 2009). So five years on since the original research, what better place to look for the winds or seeds of change than in the scholarly communications field, with its long established and treasured quality control practices and mandates.

The evolution of the system of communications between researchers, as well as between researchers and those interested in the results of research, has been built upon quality assurance and trust: establishing trusted sources, channels and metrics for the exchange of scientific and other scholarly information. But rapid changes in technologies, services and behaviours mean that it is increasingly important for everyone involved in the scholarly communications process to understand how established channels of communication, such as peer reviewed journals, are viewed and used alongside the many emerging information sources and services available on the Web. In a nutshell, what happens if the very pillars of trust are buffeted and challenged by the move to the virtual space, consequent disintermediation, the emergence of the Google Generation - the born digital, social media and new publishing models, such as open access?

3 Aims and objectives

The broad aim of the research was to examine how emerging digital behaviours are challenging and, perhaps, changing long-held concepts of trust and authority in the world of scholarly research. The study examined how researchers assign and calibrate authority and trustworthiness to the sources and channels they choose to use, cite and publish in. That is it is about academic researchers as both producers and consumers and how they deal with the trust and authority consequences of the digital transition, especially in regard to changing digital behaviours, social media and open access publishing.

Given the 'shifting-sands' nature of the topic, the project trod very carefully, avoiding, where possible, previous assumptions and preconceptions regarding trust, and investigated instead current reading, discovery, citation and publication behaviours afresh in order to build a fresh understanding of what constitutes trustworthiness in the minds of researchers operating in today's virtual scholarly environment. To do this, we needed to obtain an understanding of the context of their decision making. This meant that not only was it important for us to understand the research process but also how the researchers themselves understood it.

4 Scope

The research was largely user-led, with the scope of the study dictated as much by the researchers being studied as the project team. Topics covered included:

- Changes in scholarly communication activities, their nature and impact.
- Methods of establishing trustworthiness.
- Role of personal social networks.
- Metrics, trust proxies (impact factors).
- Alternative metrics and usage factors.
- Peer review practices.
- Institutional and policy driven peer evaluation (Research Excellence. Framework; tenure).
- Influence of social media and open access.

- Types of publications/sources and their relative trustworthiness.
- Data
- Usage strategies
- Reading behaviour
- Citation tactics
- Pressures to publish
- Overload and noise
- Unethical practices
- Diversity in regard to age, seniority, nationality, gender and discipline

Academic scientific and social science researchers in the UK and USA were the main focus of the investigation, partly because these disciplines/countries are dominant in scholarly communications and partly because these are of particular interest to the funding body, the Alfred P. Sloan Foundation. Nevertheless it was recognised that trustworthiness has a cultural and national aspect and data were collected globally to provide context and comparison. Some respondents teaching in social sciences departments were in fact trained in the humanities and researching on topics within the humanities, but we cannot claim to have covered comprehensively the trust attitudes of researchers in the humanities.

5 Key research questions

- How and where do researchers place their trust when using and reading scholarly information?
- How and where do researchers place their trust when citing sources?
- How and where do researchers place their trust when publishing their work?
- Are usage and citing behaviour influenced by ease of access?
- Do researchers looking for authority and trustworthiness in their reading, citing and disseminating activities use the social media?
- Do researchers looking for authority and trustworthiness in their reading, citing and disseminating activities use open access publications?
- Do researchers looking for authority and trustworthiness in their reading, citing and disseminating activities use data?
- Do researchers looking for authority and trustworthiness in their reading, citing and disseminating activities use preprints and rapid publications?
- Are unethical practices an issue?
- Are new measures of research impact (altmetrics and usage factors) being adopted by researchers?
- Are there differences in attitudes and actions in terms of age, discipline, country and other factors?
- Have behaviours and attitudes changed over the past decade?

6 Research methods

A mixed method, staged approach was used, each method informing the following method.

6.1 Literature review

An extensive literature review was conducted as part of the research proposal documentation and throughout the 15 month life of the project. Continuously updated, it forms what is arguably the most extensive review of trustworthiness in the digital scholarly

environment, featuring more than 200 references. The review was particularly important because it provided us with a source of possible questions to ask and acted as a benchmark to enable us to establish the extent and direction of any changes. This review is available as a self-standing paper and also has been submitted for publication.

6.2 Log analysis

As mentioned at the beginning of this report the study and its research questions were informed by CIBER's extensive deep log research into the usage behaviour of scholars in the digital environment (Nicholas et al., 2010). This knowledge was topped up for this investigation by a small-scale study of the usage logs of an international scholarly publisher. The purpose of which was to identify data on digital usage behaviours that raise trustworthiness and quality questions, to be pursued through focus groups, interviews and a questionnaire. A raw http log recording traffic was parsed to remove redundant fields and requests generated by web-crawlers and other robots. Some analysis was performed as a by-product of this text parsing process. The consolidated log was then normalised as an SQL database. Subsequent analysis was performed by a combination of SQL queries, Python programs, and various spreadsheet and statistical applications.

6.3 Field research

A three-pronged, stepped approach was taken to data gathering. First, focus groups were used to explore and scope the study and determine what the big issues were. The findings of the focus groups informed the critical incident interviews which followed. These took the research to a much more personal and detailed level, as they focussed on the citation decisions of an individual researcher in respect to one of their publications. Both focus groups and interviews informed the third research instrument, a global questionnaire survey, which sought to canvass the opinions of a much bigger and international research population.

6.4 Focus groups

In order to recruit researchers for the focus groups, interviews and the survey, publishers agreed to send out invitations to their authors, editors, editorial board members and referees, and in most cases the publishers also hosted the focus groups on their premises. The fact that group participants had a common loyalty, to the publisher, provided the group with a cohesion, which helped in the discussions, but which may have narrowed the perspective. Publishers were asked to pass invitations to academic researchers in the social sciences and sciences and to try and ensure a balance in terms of age, subject and gender. Early career researchers and physical scientists, however, were more difficult to recruit.

Fourteen groups were held during the period November 2012 to April 2013 in the UK (8) and USA (6). In all a total of 66 researchers, 36 from the UK and 30 from the US, attended the focus groups. Typically groups lasted 90 minutes and 5 to 8 researchers attended. See below for details:

- Three groups at Taylor & Francis (Abingdon) covering mainly social scientists.
- Three groups at Sage (London) covering: a) clinical scientists, b) social scientists, c) early career researchers.
- One group at BioMed Central (London) covering biological scientists.
- One group at Wiley (Oxford) covering physical scientists.
- Three groups at Sage (Washington DC) covering mainly social scientists.
- Three groups at Thomson-Reuters (Philadelphia) covering mainly medical scientists, with some social scientists.

The demographic breakdown of participants:
a) Discipline: life sciences (29); physical sciences (4); social sciences (33).
b) Age: under 30 (4); 30–39 (13); 40–49 (14); 50–59 (20); 60+ (15).
c) Gender: males (32); females (34).

6.5 Critical incident interviews

Interviews were conducted between December 2012 and April 2013. Interviewees could choose to have the interviews conducted face-to-face at a mutually convenient location or remotely via phone or Skype. They were contacted ahead of the interview, provided with a list of questions if requested. A publication published or submitted by them was agreed on for the critical incident element of the interview. The critical incident element concerned references in a recent publication authored by the interviewee. Five citations were identified and interviewees were asked a number of related questions, namely:

- What made them include the citation?
- How they decided whether it was a reliable source?
- How they found the source?

The reason for homing-in on citation behaviour is because: a) it provided a fix on a specific and documented part of researchers' scholarly communication activities about which people could be directly questioned; b) citing behaviour requires the author to choose and select and we could learn a lot about the role trustworthiness played in this; c) it has an immense importance in the scholarly communication research literature. In addition interviewees were asked more broadly about trust in respect to scholarly communications, in particular about changes in information use and publishing and their impact on trustworthiness and reliability of scholarly communications and the use of social media.

Interviews were conducted with university academics across the USA and all four countries of the United Kingdom (42 in the US and 45 in the UK). Eighty-seven researchers were interviewed; 35 face-to-face and the remainder by phone. There were 60 male and 27 female with the majority (51) "mature" (aged 30 - 50), 37 older including some "emeritus" and 9 under 30. In this report, we have used the term "established researchers" to describe those interviewed who had established careers in academic life. We managed to recruit some early career academics through asking other participants to recommend recent PhDs and post-docs. There were 51 social scientists and 36 scientists; the latter divided between 20 life scientists and 16 physical scientists. It proved easier recruiting social scientists, especially in the USA. Some, although regarding themselves as social scientists, had an academic background in the humanities that influenced their practices; there were significant differences in what sources they used and what they cited. There were some outliers from particular disciplines, for example computer science and mathematical physics.

6.6 Questionnaire survey

Since the research design was a sequential mixed-methods study with a qualitative phase in the beginning and then a quantitative phase, the findings of the interviews and focus groups were used as the basis for developing the questionnaire. The other important source for the content of the questionnaire was the exhaustive review of the literature that was done as part of the study. Using literature review and qualitative findings, a questionnaire was designed by the research team and it went through about 15 revisions. A pilot study was conducted during the first week of May and further revisions made.

SurveyMonkey, which is a well-established commercial service for creating online questionnaire surveys, was used for the survey. The questionnaire went online on the 28th of May. Invitation emails were sent to authors by Elsevier, Sage, Wiley and Taylor & Francis. BioMed Central included a link to the questionnaire in its newsletter and PLOS put a link to the questionnaire on its journal websites. Sage and Elsevier sent reminder emails to their authors after about 10 days. The survey closed on 30th of July. In total, 3650 respondents completed the questionnaire. The distribution of the source of respondents is as Table 1.

Table 1. Number of responses by publisher

Publisher	Frequency	Percent
BioMed Central (BMC)	38	1.0
Elsevier	1318	36.1
PLOS	12	0.3
Sage	1073	29.4
Taylor & Francis	658	18.0
Wiley	283	7.8
Total	3650	100.0

To increase the response rate, we offered respondents the chance to take part in a prize draw. This was mentioned in the invitation emails and also in the introduction of the questionnaire on the first page. In total 2570 respondents entered their emails for the draw.

Participants were asked a total of 24 questions regarding their using and reading habits, dissemination practices, citation practices, and personal demographics. The full questionnaire is presented in Appendix 2. Much of the questionnaire relied on Likert scales ranking the importance or agreement with factors or statements related to the trustworthiness of a source. We looked at the three key areas where trust is an issue: using/reading, citation, and dissemination/publication.

SPSS 19.0 was used for the data analysis. The Human Development Index (HDI[1]) was used for categorizing the countries and comparing the differences among them. HDI is a composite statistic of life expectancy, education, and income indices used to rank countries into four tiers of human development: very high, high, medium, and low (Wikipedia, 2013).

Although the number of respondents was very acceptable, numbers could, probably, have been boosted by:

a) Improving the way that different publishers distributed the survey. PLOS and BMC's method for distributing the questionnaire by adding the questionnaire's link to their newsletter (BMC) or to their site proved was not very effective. On the other hand, T&F sent invitation emails mid-week around 11 am local time based, on the time zone of the countries of its authors. This method appeared to work well in increasing the response rate. Reminders by Sage also had a positive impact on the number of respondents.

b) Shortening the questionnaire. It was a long questionnaire and the data showed that quite a number of respondents did not fill in the questionnaire fully and left in the middle. For example, while the number of respondents for the first item of the questionnaire was 3589 (with 69 missing answers), the number for the last item dropped to 3037 (with 617 missing answers). The length of the questionnaire might have also been an explanation for a large number of missing answers. There were many missing answers in the data and the number of responses for each question varied. The regulations of the Ethics Committee of University of Tennessee required that respondents should not be forced to answer questions and they should be able to leave any question blank. Therefore we did not make any of the questions compulsory. As a result, there was missing data in our survey.

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[1] http://hdr.undp.org/en/statistics/hdi/

7 Literature review (research context)

This section summarises the evidence that fellow researchers have produced on trustworthiness in scholarly communications and related matters in the last decade. It is arranged by the type of research activity involved: usage/reading, citing and dissemination. The full paper on which this section is based is available as a project working paper.

7.1 Usage/reading

For the purpose of assessing scholarly content, traditional criteria are held to be important (Ponte and Simon, 2011), with the decision to accept/reject web-based information made on a multidimensional basis, where information quality and authority as well as topical interest are taken into account (Rieh, 2002). The quality of scientific content is assessed on the basis of traditional criteria, such as presence in citation indexes and reputation of the publishing venue, which are considered most important, with publications in open access journals or archives and the number of occurrences in search engines and personal blogs or web sites considered less relevant, and the presence in social bookmarking systems considered not very relevant at all (Ponte and Simon, 2011).

Among the different characteristics of a research article, which are considered when taking the decision what to read, the source of the article (ranging from top refereed journals to non-refereed/unpublished articles not in a journal) and the title of the journal figure highly, as high as its online accessibility, though not as high as its topic. In fact, the highest rated articles are those written: (i) by a top-tier author, in a peer reviewed journal, available on-line at no personal cost to the reader; (ii) by a top-tier author, in a peer-reviewed journal not in the top tier, available online at no personal cost to the reader (Tenopir et al., 2010; 2011)

The evaluation of authors is similarly based on the traditional criteria of the number of citations to their work and the quality of their publications. Personal web-pages, personal blogs, membership in professional social networks and presence in user-generated tagging services are seen as the least relevant for the purpose (Ponte and Simon, 2011).

There is universal agreement that peer review is essential for maintaining the quality and reliability of research articles (Mulligan and Mabe, 2011; Rowlands et al., 2004). As Harley et al. (2010) put it, "the degree to which peer review, despite its perceived shortcomings, is considered to be an important filter of academic quality, cannot be overstated". Indeed, peer review is considered quite effective as a filter for selecting the best manuscripts for a journal, to improve the readability of the published papers, and for detecting error, although less so for detecting plagiarism and fraud (Ponte and Simon, 2011). No wonder a repeatedly cited reason for researchers' slow uptake of social media is that the information

there is un-refereed (RIN, 2009; Procter et al., 2010; RIN, 2010; Schonfeld and Housewright, 2010).

Social media are not replacing traditional scholarly material, but they are certainly used to supplement and enhance it, and the evidence is overwhelming (Nicholas and Rowlands, 2011; Procter et al., 2010; RIN, 2010; Rowlands et al., 2011; Tenopir et al., 2012). However, some things are changing because, while the RIN (2010) study researchers did not trust social media and had concerns regarding the quality of the information communicated in this way, just a year later a CIBER study finds differently: the issue of quality was not high on the agenda (Nicholas and Rowlands, 2011; Rowlands et al., 2011). This, for three reasons: first, participants believed they had sufficient evaluative skills to establish the trust and authority of sources; secondly, one of the main benefits of social media is that the community filters out rubbish, and rubbish as self-defined by the community; thirdly, there were different types and models of authority – not just the traditional peer-review model (Rowlands et al., 2011).

7.2 Citing

The prime motivations for citing other people's work, across all disciplines, are the perceived authority of the cited material or of its author or of its dissemination channel (RIN, 2009; Van Dalen, 2005). So much so, that, as Lindgren (2011) finds, in the field of performance measurement it is the author's professional status, rather than the research design, its methods or the author's gender and nationality, which plays a significant role in researchers' citing behaviour. According to Stremersch et al. (2007), in marketing the number of citations an article receives depends upon 'what one says' (quality and domain), on 'who says it' (author visibility and personal promotion) and not so much on 'how one says it' (title length, the use of attention grabbers, and expositional clarity).

Contrary to widely held beliefs (Cronin, 2005), personal knowledge of the author has little or no influence on citations, although early career researchers are more likely to cite more and to be influenced by the authority of the author cited (RIN, 2009). According to White et al. (2004), who base their contention on a study of personal relationships and communication behaviours in an international group of researchers from seven disciplines, this is so because who you know pays off only if the people you know have something worth knowing.

Researchers see the need to tailor their citations to meet the requirements – perceived or actual – of specific journals and their editors (RIN, 2009). The over-reliance on *proxies* (such as the impact factor) for quality assurance is seen by many as a dangerous move away from the in-house assessment of scholarship and toward the increased outsourcing of peer review (Harley et al., 2010).

9

7.3 Publishing/Dissemination

There is not a consensus as to what are the most important factors that attract authors to publish in a journal. According to Mabe and Mulligan (2011) it is refereeing quality and refereeing speed, closely followed by perceived reputation and impact factor. However, according to Rowlands et al. (2004) it is access to a highly targeted, if not necessarily a very large readership that is the most important, and only then comes the quality and standing of the journal. For Housewright et al. (2013) it is the journal's area of coverage - how close it is to faculty's immediate area of research, the journal's high impact factor, and the journal's being widely circulated and 'well read' by scholars in the field. Other factors deemed important are the journal's policy of allowing publication for free, speed of publication, and selectivity in article acceptance (this last is seen as a proxy for quality). The factors reported to be of the lowest priority are the journal's being freely available on the internet and its accessibility to developing countries.

Despite commonly held beliefs to the contrary (RIN, 2009), researchers abide by the stated ideal in research-intensive institutions of 'quality over quantity' (Harley et al., 2010). Thus, quantity is not seen as more important than quality; that is, researchers proclaim that they prefer to publish higher quality papers, even if it means publishing less (Mulligan and Mabe, 2011).

Many researchers believe that the current environment puts pressure on them to publish too much, too soon, and in inappropriate formats. In deciding when, where, and how to communicate their work, researchers may have to make choices between speedy dissemination to a desired audience, and less speedy publication in a high-status journal (RIN, 2009).

Established scholars exercise significantly more freedom in the choice of publication outlet, although in the sciences high-impact publications remain important for garnering research grants throughout a career (Harley et al., 2010).

There is a widespread perception among UK researchers that the REF and the related policies of their institutions put pressure on them to publish in journals with high impact factors rather than in other journals that would be more effective in reaching their target audience, or to use other channels altogether (RIN, 2009). Not surprisingly a commonly identified barrier to the adoption of web 2.0-based modes of scholarly communication is that these may not be recognised by existing systems for quality assurance and evaluation (RIN, 2010).

Researchers who wish to communicate their work quickly to a wide range of audiences do so via working papers, reports, and conference proceedings, but these are often thought to have low status and prestige in the academic world (RIN, 2009). Nevertheless, nearly two-thirds of the researchers in Mulligan and Mabe's (2011) study testified to the importance of informal exchanges via bulletin boards and conferences, although in areas where researchers want their findings to remain confidential (e.g., Earth Sciences, Chemistry) this is less so.

Long-established formats such as peer reviewed journals, conference proceedings and scholarly monographs remain researchers' preferred mode for disseminating their work results (Housewright et al., 2013; RIN, 2010). As Harley et al. (2010) report, the advice given to pre-tenure scholars is consistent across all fields: focus on publishing in the right venues and avoid spending too much time on public engagement, committee work, writing op-ed pieces, developing websites, blogging, and other non-traditional forms of electronic dissemination. Indeed, according to Housewright et al. (2013) only about a third of their respondents make their research results available via blogs.

Nevertheless, as the RIN (2010) study finds, researchers are broadly supportive in their attitudes towards Web 2.0: even non-users are more likely to define themselves as enthusiastic rather than as skeptical or uninterested. Active social media users are likely to use the Internet as a complementary activity, disseminating their findings through email lists and web groups, personal web-pages, wikis, blogs, social networks, and Twitter (Nicholas and Rowlands, 2011; Rowlands et al., 2011; Tenopir et al., 2013).

Age is probably no longer a significant factor determining social media use. Thus RIN (2010) found that high usage of Web 2.0 based tools is positively associated with older age groups and those in more senior positions, although more junior and younger researchers are more likely to be frequent users of social networking. However later studies suggested that this was no longer the case. Tenopir et al. (2013) find that high-frequency users or creators of social media are more likely to be age 50 or younger. Apparently then, as Nicholas and Rowlands (2011) point out, age is a poor predictor of social media use in a research context, with the real difference between old and young being the passion exhibited for social media by the young; for them there is more to it than simple use. It is also about a philosophy, a culture.

Uptake of open access for disseminating research findings – either through publication in open access journals or through deposit of articles in open access repositories – has been slow. Over 60% of the participants in the RIN (2009) study believe that open access repositories are either 'not important' or 'not applicable' to the dissemination of their research. This, as the authors contend on the basis of previous research, may reflect scholars' concerns that open access outlets will be not be rated highly by peer reviewers –

either in the REF or on interview panels – or in any bibliometric analysis (RIN, 2009). Still, according to Ponte and Simon's (2011) study, conducted two years later, most researchers preferred the free distribution of verbatim copies of their work and would also accept modified re-distribution. Some, though, preferred a free distribution which is still managed by a publishing house. Crucially, only a tiny percentage (1.7%) of their respondents preferred the currently common subscriber-only model. In fact, authors' perceptions of 'commercial' open access seemed to be generally positive, with unrestricted access to scholarly information being the value associated by far the most strongly with this form of publishing.

In sum, the conclusion of this extensive review of the published data on trustworthiness is that not much has changed over the past decade. Authors repeatedly said that researchers stick to their traditional ways of assessing trustworthiness in every aspect of their work; at most, here and there they dabbled in a bit of Web 2.0 based communication, and the dabbling is slowly increasing.

8 Results

In responding to the project's main research questions (listed at the beginning of this report), we have drawn together the data from both the qualitative (focus groups and critical incident interviews involving UK/USA researchers) and quantitative strands (questionnaire and, for usage section only, log data covering researchers from around the world) of the project. The data are brought together, but not merged. This is because the scope, questions, circumstances and characteristics and sizes of populations studied are not the same, especially in regard to country coverage, and it is important to keep this in mind when interpreting the data. Where the two sets of data say the same thing or support each other (triangulate), this is pointed out. Where the data sets seem to be saying different things reasons for this are provided. In general, the quantitative data provides the big picture and the statistically significant information on diversity and difference, whereas the qualitative data provides explanation, insights and the personal side to things. In the reporting of the results, we lead sometimes on the qualitative data and sometimes on the quantitative data, and this depends on how this works best for the trust issue being addressed.

The questions are not mutually exclusive and there is some overlap in the answers to the research questions. This is deliberate so that questions can be answered without reference to other questions. Thus, topics like using and reading information will be discussed in the context of various questions, for instance, those regarding ease of use, social media and diversity.

8.1 Trustworthiness in respect to using and reading scholarly information

If we were going to see any changes in behaviour in regard to trustworthiness, it would surely be here that we would see it. This is partly because it is a scholarly activity where researchers have more freedom to experiment and be innovative because it is less regulated. It is also arguably the area where there has been most change and innovation as a result of the digital transition; especially since the scope and use of commercial search engines has become so much more marked and what with the advent of more and different types of information sources enabling a whole new range of choices.

According to questionnaire respondents, the most important criteria used to establish the trustworthiness of what they use or read has not changed, nor, probably, would we really have expected them to have done so. These criteria are those associated with personal perusal and knowledge, the credibility of the data and the logic of the argument and content. Nearly half of all respondents said they were *extremely* important. Next, more surprisingly, perhaps, came the abstract, with well over 40% of researchers saying it was *extremely* important, with life scientists considering them more important than colleagues from other disciplines. The abstract's importance is a testament to its value in making fast evaluations in an extremely busy and crowded digital information environment. Abstracts have always proved popular (Nicholas, Huntington and Jamali, 2007), but they are undoubtedly becoming more so. These three criteria were rated well above the others. Open access publications were said to be assessed purely on their merits but were not thought to be inherently untrustworthy. As interesting are the criteria researchers did not rate highly (in order of least importance): country of affiliation, number of downloads (perhaps explained by the fact that they are not widely available), platform (e.g., publisher's website, search engine) and publisher. Ease of access, while not a key determinant (after all who is going to admit to this?), was nevertheless acknowledged to be an important factor by a third of all respondents.

Questioned further about the trustworthiness of specific sources and channels researchers agreed that peer reviewed journals were the most trusted information source of all. Life scientists were most concerned that what they use was peer reviewed. Peer reviewed journals were followed in importance by personal recommendations. Impact factors were generally thought to be important, but a sizeable minority of researchers thought them not to be very important. Life scientists though found them more important than their colleagues in other disciplines.

Although, as we have heard, researchers laid huge emphasis on peer review, interviewees and focus group participants nevertheless felt that 'internal' trust characteristics, determined by personal inspection, was the best way of establishing what is good to use and read. Evaluations were thought best left to professional judgment and not to an

anonymous third-party. They agreed about the importance of abstracts in trust decisions and came up with explanations for their popularity. There was too much published, too little time to read it and the widespread adoption of an information seeking and consuming style best described as bouncing meant researchers have no choice but to depend on document proxies (abstracts). Screening and cross-comparisons were made at the abstract level, not at the full-text level. Abstracts, like articles, were usually read if structured and well-written, partly because if they were poor in these respects, so too would be the article. In fact, so important were abstracts that researchers wanted them to be quality-controlled and to be properly reviewed. They needed to be able to trust the abstract.

Interviewees and focus group participants backed up questionnaire respondents on the trustworthiness of open access publications, although some expressed concerns about poor or absent refereeing and a few worried about the status of items deposited in an institutional repository. However, even if they wished to, what is not clear is how they can easily discriminate against open access journals, because most abstracts/articles do not come with a sign saying that they are open access. And the likes of Google, typically the favoured search engine, cover all articles irrespective of business model, and indeed give priority to OA articles in their hit-lists. A few researchers admitted to using papers in institutional repositories even if they were not published, but they were mature researchers who felt they were able to discriminate. Concerns about poor (or absent) peer reviewing of open access articles did not always result in widespread checking of an open access journal's peer review polices.

In respect to criteria that were not thought to be as important for purposes of determining trust, focus group participants and interviewees generally concurred with the questionnaire respondents in pointing to country of affiliation, number of downloads, platform (e.g., publisher's website, search engine) and publisher. And further explanation was provided:
   a. While nobody actually said that, as a matter of principle, they would not read/use an article from a developing country, given what they said elsewhere about poor rejection rates of papers from these countries, it may be that they approach articles from certain countries with caution.
   b. Even in the cases where researchers knew what usage scores were the view was that they were not something to trust as they were too easily gamed and were, anyway, thought to be indices of popularity and not quality.
   c. Google Scholar, the most popular discovery system, regardless of discipline, was regarded as a trustworthy source.
   d. While journal name was an important element of trust, the name of a publisher (their journals or website) was not when it came to choosing material to use.

As to peer reviewed journals, which questionnaire respondents rated so highly, most focus group participants were more guarded, expressing the view that it came into play more in

considerations where to publish. For usage purposes you could not rely solely on peer review to guarantee quality; it was just part of the trust decision making.

Personal recommendation rated highly among questionnaire respondents and was also very important for focus group participants and that is the main reason why most researchers play down problems of trustworthiness in respect to usage. Because, if something of interest was out there, their long-established networks would tell them about it; they did not need to go looking. Personal networks helped greatly in searching for material and keeping up to date. In fact, many researchers did not routinely search, or rarely did so, and relied instead on colleagues to alert them to relevant content. This was normally undertaken through conventional email channels and meetings, but Twitter was also sometimes used for this and researchers followed people who they can rely on to update them. They would trust these sources because they can see who the information came from. Friends also gave them tangentially relevant content (because they can see how it may be relevant), which is very important but may not be found by normal searching. By definition the personal network works best for more established researchers, who were very well represented in the focus groups; early career researchers were still building theirs and used social media to help with the building.

Focus group participants expressed the same doubts about the value of trust proxies, such as impact factors, in usage decision making, and explained why: a) they provide too narrow a view of the research literature; b) they were attached to a journal and not to an article: thus you could get poor articles in a high impact factor journal and equally you could get good articles in a low impact factor journal; c) it could be a lottery as to which journals obtained impact factors; d) the very fact that a journal has an impact factor meant it was bombarded by developing country authors trying to enhance their career and this had a detrimental effect on quality; f) high impact factor journals tend to be stylized and safe and lack innovative and fresh papers; g) when looking for content to read it was not always clear what a journal's ranking was. On the plus side, however, IFs were useful in the absence of author knowledge, and were particularly useful in related or peripheral fields, and especially for early career researchers. Finally, researchers said that the size and homogeneity of the field partly explained the value of proxy-trust metrics in article selection; thus, if a field is small or homogenous, you were more likely to know authors and not need to resort to a quality proxy.

In respect to trustworthiness mention was also made of:
- **Choice.** A wider range of sources of information were recognised as having become available to researchers. Some were now trusted more than they once were. For example, a large number of researchers willingly admitted to using Wikipedia as a starting point and argued that it had become more reliable.

- **Digital sources**. Some established researchers questioned whether electronic sources could be regarded as authoritative if there was not a print version of the source (book or journal) available also. The majority of early career researchers expressed the exact opposite opinion; that in fact digital was the new authority.
- **Journals**. The question was raised by one group about what was meant by a journal these days because most researchers searched via a database and dived straight into the article, avoiding the journal front door, and hence the branding. The decoupling of articles from their journal has important trust and badging implications.
- **Libraries.** Most focus groups volunteered comments on libraries and largely in a negative or nostalgic fashion. Researchers clearly did not go near them, in terms of physically visiting them, anymore. The assumption has to be that they just did not see libraries as the point of entry to the knowledge/information/ideas they looked for as researchers. Even though they use e-journals available through library subscriptions, libraries, once the guardians of quality, in the eyes of researchers seemingly have no role to play today.
- **Google and Google scholar** were very important finding tools, with library websites, federated search engines and publisher platforms rarely mentioned. Gateway sites such as PubMed Central were mentioned positively, but not frequently.

The data from the mini study of a scholarly publisher's usage logs for 2012, important because it is evidenced based, and not based on self-reporting, confirmed what previous CIBER studies have found (RIN, 2011) that is:

Levels of activity are very high, but variable, and engagement is low. The evidence:
- One million pages were viewed per day. High levels of activity indeed, but there is a huge variability within that. Twenty per cent of the journals accounted for 50%of page-views, so there was a marked concentration in use. The most popular journal attracted more than 10,000 page-views per day and the least popular obtained fewer than 10 page views per day. The important question, of course, is whether any of the variation can be put down to variations in perceived quality; that is whether you can equate number of views with quality? A check on this using impact factors as quality proxies for journals used did not prove conclusive.
- Downloads are considered to be as close you can get to a satisfaction metric in the logs and about 30,000 full text articles were downloaded per day. However, just 3% of visits resulted in a download. They were dwarfed by abstract views; around 650,000 a day, a consequence of: a) their navigational and fast information consuming properties; b) the fact they were free to view for all and a possible surrogate for the full-text. From the logs then it appeared that scholars often check and cross-check to establish relevance and trustworthiness, and abstracts greatly helped them in the task.
- The publisher's website received about 150,000,000 visits per year, but the average visit lasted less than two minutes (106 seconds) and saw fewer than three pages viewed.

Nearly three-quarters were bouncers, just viewing one page. That is not to say there was not more engaged searching going on, but just not a lot of it.

There is a prevalence of search engine searching.

- Twenty two per cent of traffic (32 million visits per year) emanated from Google, another 13% (around 20 million visits per year) from Google Scholar. Clearly Google was a popular and trusted search pathway. The rest of the search engines generated another 2 million referrals. Search engine users typically were bouncers, people who viewed one page in a visit, and this created the typical searching patterns described above. Even the third most popular referrer was a scientific gateway service, which was responsible for about one third of a million visits. Interestingly, by comparison, relatively little traffic comes from academic institutions.

What does this behaviour tell us about trustworthiness and quality in terms of usage in the digital environment? It would be easy to jump to the conclusion that a good number of scholars don't like what they find, either because of bad/mediocre quality, or simply that much of it was irrelevant. The views of researchers in the qualitative studies (above) would support this contention. This could be a consequence of: a) the huge reach of the web and the great expansion in scholarly publishing, which has brought about a lowering in overall quality; b) the shotgun approach of search engines, which inevitably creates many false hits. There are other possible explanations for this form of behaviour:

- Scholars just do not have the time to wade through the information flood, which says something about the thoroughness or otherwise of the evaluation process.
- It could be a function of easy and always-on access, which engenders a topping up or snacking form of information feeding.
- It is a reflection of massive and changing choice, creating a churn in use.
- It is a direct result of end-user checking, because in a disintermediated environment, remote from the library, users had to make trust and authority decisions themselves, and they did this by sampling the hit lists.

All the usage data from the questionnaire and qualitative studies point to the fact that researchers did not take account of the search platform in their decision making about what to read/use. Neither did they talk about library and publisher platforms in regard to their information seeking. Yet, libraries and publishers think they are very important. From the log studies, it does appear that researchers tend to use their platforms as warehouses, places to obtain the full text. This, together with the fact that they tend to get much of their reading material from colleagues and they do use and trust Google and the main subject gateways, might well explain the short visits so characteristically found in the usage logs of publisher and library websites. After all, if you know what you are looking for already, you are not going to dwell long in the publisher/library space.

8.2 Trustworthiness in respect to citing

Because of the singular importance citations have to researchers – they have a bibliographic, bibliometric and an increasingly key performance indicator role – the interviews included a critical incident element with questions about citations made in a recent publication of the interviewee. There were other reasons for focusing on citation behaviour: a) it provided a fix on a specific and documented part of researchers' scholarly communication activities about which people could be reminded and questioned; b) citing required the author to choose and select from a large number of publications and we learnt a lot about the role trustworthiness played in this; c) there were unethical or other reasons for citing, that were perceived by the researcher as not part of "normal" practice; such citation practices were not best discussed in the public glare of the focus groups.

According to interviewees, the top five reasons for choosing/trusting a citation were: 1) the author was known to the researcher; 2) the journal or conference proceedings were known to the researcher; 3) the reference was a seminal work in the field; 4) the reference supported their methodology; 5) the research group/institution was known to the researcher. This clearly shows that personal knowledge was the main way to establish the authority of the source, except in cases when it was beyond question that it was a seminal work. Seminal contributions were highly trusted even in fast moving fields, although in some cases the field was so new that there were no relevant papers older than ten years. Seminal papers were trusted because the results recorded and the theories derived from them had become knowledge on which new and successful research had been built. The other ways, such as checking methods or citation counts, can be seen as things to do when researchers did not know enough about the source, though they may still use them as a quick check on sources they did regard as reliable. We found no change in citation behaviour as a result of technological change, though technology has made available such tools as citation indices in a way which was not possible before.

There are political issues involved in citing: researchers may feel the need to cover their backs and give credit to improve their chances of acceptance; there are people they have to cite to get accepted and they only have a real choice over a few of their citations. They can also game to improve their academic standing. Conventions and practices identified in the interviews and also in the focus groups included: 1) cite your own work to increase your H index; however, there are some controls on this, thus EU applications exclude researchers from listing them; 2) cite papers in the journal to which the manuscript is being submitted, and again there are controls on this (the Thomson Reuters Journal Citation Reports, for instance, takes action if too much self-citation of a journal is detected); 3) reviewers ask authors to cite their own papers; 4) citing very high impact articles because they set the

research agenda/benchmark and represent the very pinnacles of science (provide a halo effect); 5) cite post hoc – use citations to support your position, give your ideas more weight (this is particularly important if your ideas are original or novel), even cite non journal articles to achieve this; 6) citing the first source on the topic and the most recent one is essential; 7) cite review articles as a form of bibliographical shorthand (you don't have to individually cite all the pertinent articles). However, on the whole such gaming (though recognized) was usually something done by someone else.

Over half of the researchers interviewed claimed that they always checked a potential citation using their own criteria to establish that it could be trusted. Researchers were adamant that in most cases they "read" any paper that was cited by them. Reading in the digital age, of course, did not mean reading the whole document.

With time and experience academics become more confident in their judgment and citing decisions. They become familiar with the top journals and authors, and learn who is known for producing quality work. Researchers often started the citation selecting process with the abstract, then the methods, then the major figures, and then they would examine the entire article. Interviewees thought that even if the source was unfamiliar, they should still be able to understand the methodology to judge its reliability. If they saw a mistake in the calculations or mathematics, they would not trust the material. Abstracts were very important tools to determine the article's reliability. If the abstract was poor, the researcher most likely would reject the article. Researchers rarely looked at the dataset (if available). Researchers also looked at a source's bibliography to establish trust. They looked for the citations they expected to see (e.g., top authors, seminal works, and key journals). If key references were missing, they would be on-guard. If the participant was not familiar with an author, they would "Google" the author for previous work, university affiliations, and other credentials. When the research was cross disciplinary, researchers would often ask colleagues at their university or from within their circle of trust for help.

Authors then weigh up very carefully what they cite and tend to cite material they regard to be authoritative (and certainly not social media). Researchers always preferred to cite peer reviewed sources. Peer review was thought of as the main indicator of authority, quality and reliability. Researchers were aware of problems such as the time peer review might take, the bias of reviewers and the involvement of academic politics. Trust in peer review did not depend on scrutiny but, as we have seen, scrutiny was normal in most cases.

Journals were more heavily cited than other publications. This was true even in areas of the social sciences where monographs may be a major vehicle for scholarly communication. The journal name could add credibility to the author. Journals known to have rigorous peer review processes were especially seen as objects of trust. When citing an article, it was the reputation of the journal in the field that was more important than ranking by impact factor.

Younger academics had learnt the relative reputations of journals in the field from their supervisor but they were sometimes swayed by the impact factor, especially as there was so much pressure to publish in journals with a high impact factor. Open access journals were less trusted on the whole than other journals; however, where the question of open access came up, researchers agreed that they would cite peer reviewed open access journals. They came into the category of newer and therefore less established journals articles which needed special scrutiny.

Conference papers were cited often in disciplines, such as engineering and computer science, where conference proceedings are an important information source. Such papers often provided a clearer statement of the concepts and results than in the more rigid and concise journal article. Conference proceedings were almost always seen as less authoritative than full academic papers, but there is recognition by researchers that some conference proceedings are more trustworthy than others: there is a consensus here within the discipline or field. The status of different conference proceedings reflected an understanding of the methods for selection of content or the quality of the peer review, as a result of which not all papers were accepted in the proceedings.

In the sciences social media were never cited. There have been some widely publicized initiatives to use the blog format in mathematical research (Gowers and Nielsen, 2009). However, scientific researchers in relevant fields interviewed were adamant that this was not the way scholarly communication would or should work in the future: one major source of concern was that the open mode meant that some of those commenting were not recognised specialists in the field (and could not be trusted). The implication was that post publication review might not be trusted in the way that pre-publication review was trusted. In the social sciences blogs were very rarely cited in the sense that they represented authority like book or journal citations. Such citations only occurred when there was no appropriate reference from a formal channel such as a journal. Blogs or websites were usually seen as "sources" in the sense used by historians and cited in that sense.

Social science academics from teaching intensive universities said they would not cite something they had not read and would cite anything, including trade publications, because their sources are in many formats.

In regard to finding supporting references for their papers, most researchers agreed that they could find reliable sources anywhere, but a few participants of different ages and disciplines thought the top "hits" in a search were more trustworthy. Many researchers started with Google or Google Scholar then switched to a more specialized database, such as PubMed Central, when they had a more defined search query. They were more likely to trust the top "hits" in a scholarly database than a search engine. In some cases, researchers

found appropriate databases in an unfamiliar field, again starting with Google. Researchers also used Google to check the credibility of an author.

From the interviews, and less so from the focus groups, 12 established citation practices were selected for the questionnaire to see what the levels of agreement were in the population at large. Because some of these practices could be regarded as being unethical, questionnaire respondents were not asked directly whether they conducted such practices, but how prevalent they were in their fields. Researchers identified as most prevalent: "citing the most recent source published on a topic," "citing the seminal source on a topic," and "citing the most highly cited information sources" as the most characteristic of their discipline.

Ethical considerations were very evident in the responses. Researchers rated the following activities poorly (in descending order): (1) citing one's own work to improve one's citation ranking; (2) citing papers in the journal to which an article is submitted for publication to increase chances of acceptance; (3) citing papers mentioned by reviewers to increase chances of acceptance; (4) citing sources disseminated with comments posted on a dedicated website (open peer review); (5) citing a pre-print that has not yet been accepted by a journal; (6) citing only sources published in developed countries; (7) citing the published version of a record but reading another version found on the open Web.

The questionnaire results largely support the findings of the qualitative studies in that the data confirmed that:
- Researchers were less easy-going in regard to what they cited than what they read.
- Researchers cite open access journals if they are peer-reviewed – three-quarters said so.
- Social media mentions were not regarded as indicators of trustworthiness for citation purposes and there was more support for usage as a factor in the choice of citations.
- A journal's impact factor is not a very important factor when citing - one-third of researchers thought it was.
- Many (45%) researchers did not cite conference proceedings unless there was no choice.
- Many (40%) researchers cited authors they knew because they trusted them.

The key difference between the qualitative and questionnaire data was that in the former's case knowing an author was the main reason for trusting a source, whilst in the latter's case it was not thought important.

There were some important disciplinary differences. Social scientists believed more strongly than researchers in other disciplines that it was important to cite the most highly cited information sources; those in the humanities believed that citing the seminal information source published on a topic was more important; physical scientists thought it more

important to cite the first information source published on a topic; and life scientists more strongly believed in the importance of citing the most recent information source published on a topic.

8.3 Trustworthiness in respect to publishing research

It can be argued that of the three scholarly activities that were researched, this is undoubtedly the one that most concerns researchers: their performance and productivity in regard to publishing goes a long way in determining how they are measured and rewarded as researchers. It is the activity they talked longest, most eloquently and most happily about in focus groups but less so in interviews, where the emphasis was on questions about citations and social media (and many did not use the social media). Consequently, trustworthiness and issues of quality came to the surface more readily; they mattered more.

Turning to the questionnaire results and taking first the characteristics researchers look for when placing their research, not surprisingly, relevance to the field came well to the top, with almost everyone saying this was the case. This was followed by peer review, again unanimously agreed upon. Being published by a traditional publisher came third and highly cited fourth. There is nothing new here. The characteristics that are not so important when deciding to place a publication are (least important first): it being based in a country known for the quality of its research; the fact that it is open access; it has both an online and a print version; and it is published by a society the researcher's field.

The choice as to where to publish can be subject to influences outside a researcher's control. Thus over half (56%) of respondents said they are heavily or somewhat influenced by institutional research policy directives or mandates when they select a venue to publish their research. Of those that were pressurized, most were pressed to publish in high impact factor journals, traditional sources (e.g., journals and monographs), and international journals. Clearly there were pressures in regard to open access publishing, with nearly two-thirds of respondents saying they were being influenced to publish that way. Researchers were also pressed, but less so, to publish in sources which are (also) available in hard-copy. There was not much pressure to blog or tweet research from an academic perspective, though some funders now mandate it as an outreach activity.

Around three-quarters of researchers felt peer reviewed journals were attractive because they contain high quality content. Respondents also strongly agreed that researchers who do not have tenure have to publish in good journals to build a reputation, and that to attract research funds they have to publish in high impact journals.

Despite having placed open access lowly on the list of important factors for choosing a place to publish their research, most researchers had no problems with publishing in a peer reviewed open access journal. Having a reputable publisher was important, but not as important as being peer reviewed. Few thought that OA publications were generally of low quality and there was support for the fact that open access journals make trustworthy information accessible in countries where journal subscriptions cannot be afforded.

A sizeable minority (nearly a third) published in conference proceedings to reach their target audience and test the veracity of their ideas. Just a quarter felt that their website was central to ensuring the reliable dissemination of their research work to their target audience. The majority of respondents did not agree that blogging was a good way to test the veracity of their ideas or that social media was a good way of communicating with their target audience. Depositing work in a subject repository first, in order to reach a wider audience, was not a popular activity. There was some support for the belief that depositing in an institutional repository increases use and citation of a researcher's work.

The fact that, in the questionnaire, relevance to the field was rated the top factor when it came to placing research findings, comes as no surprise. It is a given, researchers are after all, above all else, communicating to a specialised subject community, often a relatively small one. However, the questionnaire and qualitative work also shows that, while relevance is, in theory anyway, the most important characteristic, in practice, other factors can intervene, in particular the pressure to publish in high impact journals created by institutional and national research policy directives and tenure concerns. Researchers thought that this had a negative impact on creativity and lead to a distortion in where articles really should be placed. It is felt that early career researchers are particularly disadvantaged, because it has got worse over the years. One focus group participant said: "It is a shame they could not choose a journal in which to publish on a fitness for purpose basis; now it was all about IF scores." More on this under the impact factors section.

Peer review was the second most general important characteristic, but the first most important trustworthiness characteristic. The qualitative data also points to the fact that peer review is in fact the central pillar of trust. Focus group participants and interviewees explained that it provides "a degree of certainty about the quality of the product. It shows that someone has put in an effort and that it had been validated by a community of scholars." It was a familiar, reliable and traditional practice and, as a result, was thought to be an important scholarly attribute, which enables researchers to search, use, cite and disseminate with confidence. On the one hand, researchers want to be published in journals that have robust peer review (despite the heartaches involved), and, on the other, they feel secure in citing peer reviewed material.

While there was a strong attachment to peer review, most researchers in the focus groups prefaced their expression of trust with recognition that there were problems with the way it was undertaken. They were not blindly trusting of peer review, and they still needed to examine the author, content, and other criteria to judge quality. The most frequent criticisms were that reviewers were biased and the system not transparent enough. They also thought the peer review system allowed for some low quality articles to be published. However, when delving into the mechanisms of peer review you find that there is no consensus as to how it might be improved, particularly in the often quoted area of double blind reviewing. Nobody wants any slacking in peer assessment. In fact, rejection rates are thought to be a badge of honour and a sign that the system is working as it should: rejection rates were mentioned with reference to how hard it was to get papers published. One journal promotes the fact that 90%of submitted papers are rejected. This was thought of as arrogant, intimidating and a put-off by one academic, but others were less critical of the practice, and another editor said, with a degree of pride, that they rejected more than 70% of submissions, and the number had been going up over the years.

What researchers liked about the peer review process:
- It led to an improvement in quality. Suggestions from referees generally improved an article, even if it was rejected. It was said that it was worth submitting to top journals, even if you had no chance of being accepted, just to get quality feedback.
- The fact that publishers organise it. Nobody wanted any changes in the arrangements. Indeed, it was emphasised time and time again that this was the really important role for publishers, not (for example) marketing.
- Blind reviewing, because reviewers are freer to comment.

What they did not like:
- Its slowness. Authors need to obtain a decision within a couple of months. It is a weakness that predatory OA publishers take full advantage of (in their advertising, if not in reality).
- Hands-off editors. Editors are the ultimate judges, they should be proactive and not always heed their reviewers, overturning them if they felt they were lightweight, or misunderstood the peer reviewing process. They should also be a release valve for the peer review process, which too often fails to allow for freshness and innovation.
- Light touch peer review. While researchers found the traditional peer evaluation system slow, ponderous and sometimes intimidating, they felt it actually led to better papers.
- Being misunderstood by the reviewers.
- Open refereeing, because it inhibits reviewers.
- It operated too much like a closed-shop, making it difficult for new authors to join.

- The variable quality of reviewing. This was put down to the pressures on reviewers to get the job done quickly; as a consequence, quality is being sacrificed. This meant poorer papers were getting through and plagiarism not detected.
- Reviewers coming up with completely conflicting views.

And what were they unsure of:
- The benefits of author-suggested referees (e.g., authors will suggest their friends; authors can avoid referees whom they suspect of foul-play).
- The practice of post publication peer review, which is meant to determine a paper's long-term status.

Focus group participants and interviewees confirmed that in virtually all cases, irrespective of discipline, when researchers were talking about trusted outlets for their work, they were talking almost wholly about journals, and not any old journals, but peer reviewed journals, usually published by a reputable publisher. Researchers took them very seriously indeed. Book, report and conference paper publishing are just a footnote in the scholarly CV, even in fields which treat monographs as a serious option. The peer review element was key, as, too, was the fact that they were measured very visibly and relatively easily, in the shape of impact factors and citation scores.

The interviews enriched our understanding of the pressures researchers experienced to publish in peer reviewed journals. All researchers thought they knew what they needed to do to get tenure or, in the case of the UK, do well in the Research Excellence Framework (REF), and that is to publish in top, peer reviewed journals. There was overwhelming agreement that external pressure had grown in recent years and, implicitly, that this pressure interfered with the free exercise of their deployment of trust criteria. The perception among those interviewed in the UK was that the importance of the journal was defined by impact factor and not, as they preferred, the prestige of the journal in the discipline or the nature of the audience. Social scientists on the whole were less happy with the system than scientists. Happiness with the system did not depend on the age of the scientist. Some researchers (particularly social scientists) hoped that the system would become more flexible with greater recognition of monographs or blog postings.

However, some early career researchers, particularly in the social sciences were not so enamoured with peer reviewed journals. Some felt that because of their junior status and limited involvement with it, there was not a lot they could say. One said pointedly that peer review is so much part of the academic establishment that it was too big to shoot at it. Another said that the system is broken and people know it, but there is a conspiracy of silence. Some of the reviews they get are deeply disturbing. "It is so difficult navigating the ideology enforced by the journal." It was not clear to some participants whether their

(rejected) papers were just low-standard or whether it was because of a disagreement with the ideology. It was difficult for them to push new ideas; they spent much of their time getting the language right. They were not convinced that blind reviewing was actually blind. There was also a question about the accountability of reviewers. There needs to be more transparency.

Academics from teaching intensive universities were also less trusting of peer review journals, mentioning news items on academics faking their research in a peer reviewed journal. It was said that peer review depends on honesty on the part of all the players and that was not guaranteed.

The questionnaire highlighted that to publish with reputable publishers figured fairly highly in the minds of researchers, and interviewees provided confirmation of this. Top publishers were known and in a way respected, although in the social sciences there was significant hostility, or at best ambivalence, to the role of publishers.

The questionnaire disclosed that researchers wanted to publish in highly cited outlets; it was rated as the fourth most important factor. However, impact factor did not come up as much as might have been expected in the focus groups and interviews.

Paper submission for early career researchers is determined by their mentors and "the rules" are passed on by them to those they mentored, and they encourage them to publish in journals with impact factors. Younger researchers did in some cases put forward the view that high impact factor journals were likely to contain papers that had been properly peer reviewed.

Established researchers were less impressed. They make a distinction between where they would like to publish (and will do when they retire) and what they do now and what they tell their students to do. Some felt they were being manipulated and gamed, boosted by self-citation and open access publishing. Thus, some high end articles were worse than some rejected papers. It was the quality of peer review that really counted. There was a tacit hierarchy of journals in a discipline which governed a lot of decisions depending on what level of journal was deemed appropriate (by an experienced researcher) for the level of likely interest in the paper.

Academics from teaching-intensive universities would have preferred to publish in anything other than a highly ranked journal. For them research dissemination was more than peer progression or meeting some kind of quality quota - they wanted to publish in the most relevant place, where it could make a difference. As a focus group participant said: "We have to get away from this industrialised, packed, industrial approach to research dissemination".

At odds somewhat with the questionnaire findings, interviewees revealed very mixed views about the academic value of open access. This was in spite of the fact that open access was seen as a good thing for the developing world and for outreach. It could partly be because few of them admitted to publishing in an open access publication. Thus, when researchers (there were not many) had published in an open access publication, they were pleased with the result, trusted the peer review process and it affected their attitude for future choice of where to submit. In general, however, open access publications were regarded with suspicion as a vehicle for scholarly communication. It has to be noted that we interviewed very few biomedical researchers – the area where open access publishing is strongest. Researchers were especially uneasy about the author pay model that underpins gold OA publishing. The passing of money seems to sully the transaction. There was some concern that you could pay your way into publishing, so undermining rigorous review. There was concern about a possible two track peer review process, with OA articles being treated more leniently by reviewers because of the income generated. There were also concerns that academics, because of funder mandates, might have to publish in OA journals and that subscription journals might feature different content and authors. For instance, many researchers in the applied sciences and humanities, do not obtain much in the way of research funding and, as a consequence, cannot find the money to pay to publish in OA journals.

There was a little more support for green OA (no money exchanged) in the focus groups, but not a great deal more. Ironically, publishers, who of course also publish OA articles, appear much more pro-OA than their authors. The other downsides of OA publishing mentioned were:

1. Poor quality. Although it was not expressly said, the feeling was that lower-grade researchers, and especially those from foreign countries, published in open access publications.
2. It was political. There was a sense that it was being imposed rather than something that was actually needed. But however actively OA journals are advocated, senior and medium-ranking academics advised those they mentored and influenced to publish in the best journals and these were usually subscription journals.
3. It was a form of 'vanity publishing' full of 'self-deluded authors'. Full of junior people wanting to fix their CV by saying they were an author or editor.
4. It was thought to be poorly run and unprofessional. OA publishing fails to recognise that there is a good deal of professionalism and standards behind publishing, whether talking about websites or print journals. People are deluded into thinking you can deliver OA for nothing. Few participants seemed to realise that traditional publishers produce OA articles and journals.

Not surprisingly, very few expected a totally open access environment to emerge where all research outputs would be available free to all. They mostly seemed to assume a mixed economy, where open access journals co-existed with subscription or toll access journals.

In the interviews there was interest in outreach and in the use of social media to reach out to the public and to practitioners. In the UK this was partly due to the 20% of REF scores allocated to "impact", but generally there was a lot of interest in an engagement agenda. It was not entirely due to policy pressure. Researchers in applied areas were committed to "translation", to making their work comprehensible and relevant to the practitioner community they worked with. All researchers, moreover, were interested in reaching the public. Even researchers who had very little interest in the social media saw an increased role for social media in outreach but complementary to journals, rather than replacing them. The questionnaire concentrated on researchers target audience so it is not known whether these views and actions are more widely held.

As mentioned previously, nobody saw social media as being an alternative to journal or even book publishing. Facilitators raised the results of a previous CIBER focus group on social media, which revealed that in one discipline at least younger researchers saw social media giving them a way of communicating ideas and information that could not be published in traditional journals, which are fixated on impact factor scores. While there was some sympathy for this view, nobody came forward with similar examples.

In the UK, the massive impact of the Research Excellence Framework (REF), or rather the beliefs researchers or their departments have about the REF, and the pressure from the REF to publish in high impact or otherwise ranked journals has a negative impact on creativity and leads to a distortion in where articles really should be placed. It was penalising inspirational and creative academics, who are needed in universities. The REF is said by some to be guilty of forcing people to publish more than they otherwise would, something which leads to higher levels of poor content being published. Some researchers however felt so confident in their status at very high ranked universities and in their ability to obtain grants because of the quality of their research that they professed to ignore REF pressures. More and more universities are prescribing metrics as a proxy for quality, meaning lower ranked ones joining the game, when they really should not. In the US, the mechanics of the tenure system are not that dissimilar and it attracted similar criticisms to those made by UK researchers.

8.4 Influence of easy access

When questioned in focus groups and interviews, researchers were generally reluctant to acknowledge that in a world of plenty, always available information, there might be a

temptation to grab the first document they see. No doubt part of the reason for this arises from the fact that would not want to admit this temptation in public. It is something that researchers do not feel comfortable about. However, a number of social scientists did air their concerns, saying that the ease of searching carried with it a risk that they might be sacrificing quality for speedy discovery. They admitted to using what they could get hold of most easily: for instance, what the library has access to, or, they could obtain directly from the author via an email contact they had. In the words of one social science researcher, 'Any barrier will put you off chasing something'. While few researchers admitted to choosing research material on the basis of its prominence on a search engine hit-list, they readily admitted to doing this in regard to non-research activities, especially university administrative and management activities; and leisure activities could be added to this list.

Researchers in the more anonymous environment of the questionnaire were more likely to say they were influenced in what they used or read by ease of access factors, but not heavily so. Thus, the levels of agreement to both of the following statements were around the 30% mark: a) If the information is not central to my research area, the ease of availability of a source is more important than its quality; b) When pressed for time, the ease of availability of a source overtakes considerations about its quality. What was very interesting from a Google Generation angle is that younger researchers were more likely to say that ease of access was a factor in what they used. Physical scientists were also more likely to say this.

Another approach to investigating ease of access is asking researchers about the discovery platforms they use. The 'trusted' big fat information pipe that researchers were connected to for usage purposes was, possibly surprisingly, not the publisher or library platform; it was in fact the internet. Hence the popularity of Google Scholar and the Google search engine with researchers, largely because they provided ease of access (one stop) and wide information horizons. Google Scholar was thought to be surprisingly good; researchers did not expect a quality scholarly product from such a commercial organisation, which has so many (commercial) fingers in so many pies. While librarians and scholarly policy makers, like JISC in the UK, argue that discovery is becoming increasingly complex and difficult, what with open access publishing and institutional repositories, researchers never mentioned this and, as it has already been noted, few saw libraries, the once-trusted intermediaries, as the point of entry to the knowledge, information and ideas for which they were looking.

A few social scientists in the focus groups aired concerns that easy (or lazy) searching carried with it a risk that quality was being sacrificed for speedy discovery. 'Any barrier will put you off chasing something'.

8.5 Influence of the social media

In general, the data obtained from interview and focus group showed that US researchers or social scientists generally were more likely to visit and engage in social networking sites, read or participate in blogs or communicate using Twitter than UK researchers or all scientists, but almost all researchers had a low level of trust in content received or discovered by this route. Often the only way researchers would trust social media material was if it was linked to a traditional source (e.g., a tweet about a peer reviewed journal article). Only a few – mostly young and early career researchers – thought that social media were anything other than more appropriate to personal interactions and peripheral to their professional/academic lives. Even regular blog readers cited journal articles even when they knew and respected the author of the blog in circumstances where formal scholarly communication was concerned.

The lack of interest in social media, either as a source of information or for networking, can be partly explained by the trust and validity problems that arise, but there were many other reasons: a) many researchers, although highly experienced in research terms, were novices when it came to social media ; b) they were antagonistic towards, it perhaps because they were novices; c) they did not consider it worthwhile spending valuable research time on getting to grips with its conventions; d) they were put off going down that route by the current higher education climate, which they felt favoured peer review, journals and citation indices; e) their view was that the (informal) language of social media was not suitable for scholarly discourse; e) they were aware that there were no measures by which content could be evaluated, whereas, traditional content had, for instance, impact factors and peer review; f) they did not use social media because there was no benefit to it - it didn't help their career. The intrinsic openness of various forms of social media always carried with it the possibility that non-experts would be involved in whatever discussions were being carried on: for some, particularly scientists, this represented "noise" – a waste of time.

While UK researchers generally expressed a lack of interest in using social media themselves, they said they knew people – usually younger people – who used social media a lot and quite a few of them expressed guilt about their own lack of involvement, especially when it comes to promoting their own work. It was perhaps a surprise that the study did not come across many of these 'other' people in the focus groups. Some researchers, mainly in the social sciences, did recognise that social media could be valuable in a scholarly context for: a) obtaining new ideas, stimulation and starting new conversations; b) the self-promotion of their research and articles, books and conferences which presented that research, especially in regard to public outreach/public engagement of what they were doing as academics paid for out of the public purse. Interestingly, what most interested researchers (when told by facilitators or other participants) was the possibility that social

media could increase their citations as a result of providing greater digital visibility for their publications. US researchers were a little more engaged with social media, with a number saying they used it for starting new conversations and sparking ideas. Again this probably related to the preponderance of social scientists interviewed in the US. Scientists were not interested in ideas offered by those outside their world. Not surprisingly, in the cases of those who researched on topics of obvious general interest, the use of social media was more likely to be considered. Older US researchers also voiced the idea that younger researchers were more likely to use social media, which is often claimed, but, with one striking exception, we did not engage with enough early career researchers to determine whether this was or was not a true reflection of trends. Instead, we need to look to the questionnaire data for confirmation (see following sections).

US researchers were more vocal in stating that they used many of the same standards to judge the quality of a social media source as they used to judge a traditional source (e.g., author, publisher or university affiliation), but UK researchers implied that this was their approach also. The difference was that US researchers viewed social media as a channel that offers new ways to contact one another, but which they chose to use depended on the criteria similar to those they applied to traditional channels. However, in the case of most UK researchers there was a sense that these new channels were rejected out of hand, except in the case of some early career researchers.

There were subject differences among US researchers, but not among UK researchers, with a few of the (older) medical scientists saying they trusted and frequently used blogs and podcasts by well-known academics in their field. Medical scientists in the UK did not volunteer this information. Blogs and podcasts were used not because of a general trust in social media, but because the information came from other trusted academics. Their fields depended on up-to-date information, and they viewed social media as a way to get that information in advance of formal publication, which was inevitably behind what was happening. In other words, communication in this way was part of traditional informal scholarly communication, but using new media.

The exception mentioned above was a focus group of early career researchers, held in the UK, that did lend support to the views expressed above that young researchers were more likely to use social media in their research work. This was a group of five, all social scientists bar one. However, they were scared to embrace social media fully and sometimes camouflaged its use, because in many cases their supervisors disapproved. These early career researchers said that as increasing numbers of young researchers use a wider range of dissemination and communication tools, it will become easier to get their research known and acknowledged. One researcher spoke for them all when he said he wanted to take full advantage of the 'dissemination plus world' we are all now part of. They could see many academic benefits associated with social media: a) helped them develop a personal

network; b) facilitated collaboration among researchers; c) speeded-up finding fellow researchers to work with; d) useful for keeping in touch with what is going on in the field; e) you could follow authors you were interested in; f) it was easy to find someone with a particular point of view. Despite the aforementioned advantages, there was a reticence to contribute too much to the social media, largely because young researchers did not want to let themselves down/show their immaturity. It was acknowledged that social media was open to 'grandstanding', self-publishing and promotion; but, on the other hand, was this not all part of climbing the academic ladder? Most worryingly, use of social media could have a negative impact on career development. It is so easy to comment today and in the digital world the record is always there. So, say you said something premature or immature twenty years ago, it could come back and bite you at a crucial time in your career development. These specific findings relate back to a more general and probably relatively new interest in public engagement demonstrated by a number of researchers of all ages. They also relate closely to the need for researchers to build up their own circle of trust, relationships with people they could confidently share their findings with and keep up to date with changes in their field

Almost all the researchers interviewed made a clear distinction between formal and informal methods of communication, with social media very much in the latter grouping and journals very much in the former. This was implicit. The terms were not used. Once again trustworthiness depended to a large extent on whether or not the form of communication was peer reviewed, and social media sources were not. As mentioned earlier, in the social sciences, it was accepted that ideas could be gained from the social media. They could be expressed in blogs. They could be conveyed in tweets or communicated on networking sites, such as Research Gate. Social scientists were interested in ideas from whatever source; whereas, in the sciences ideas from outside one's circle of trust were not welcomed. It is important to note that we are here referring to ideas, not information. Informal communication of information was trusted depending on who was doing the communicating. Were they part of the circle of trust within which researchers worked? Were they part of the wider circle of researchers known about? The medium did not matter much, if they were. As a generalisation, however, scientists did not cite knowledge transmitted informally as building bricks for their research conclusions, and in many disciplines, blogs were not cited at all. However, social media came into its own when the interviewees talked about outreach. Almost all those responding recognised the utility of social media as a way of reaching a wider audience.

Researchers, particularly, but not only scientists, often made the point that they themselves did not engage much with social media. There was too much "noise". They did not have time to engage in activities where those outside their expert fields might present ill-informed views and get in the way of proper scholarly interaction. Nevertheless, there was frequent mention of a member of the research group (usually categorised as younger) who

used social media to highlight the work of the group not only to the wider audience but also to their peers. Several older and busy researchers, whom we interviewed, expressed an anticipation that they themselves would engage directly and not indirectly with information received by this route, rather than by emails, telephone calls and direct contact at conferences – when they had more time.

Relatively few younger researchers presented themselves for interview but among established researchers there were frequently mentions of the way in which younger researchers worked. Younger researchers were perceived by their elders to be more knowledgeable about changes brought about by the digital revolution, especially the opportunities present by social media. In fact, younger researchers were normally more conservative in social media use as they needed traditional published outputs to get a job.

Generally speaking, the questionnaire data confirmed what we already knew from the qualitative strand, that the social media play, but a bit part in using, citing and disseminating activities, but there were hotspots of activity. In terms of use, Wikipedia was positively thought of, with around 40% of researchers saying that it has become a more trustworthy source of information. In respect to citing, the large majority of researchers felt that social media mentions were signs of popularity only and, as such, unlikely to be cited by them. In respect to dissemination (nobody talked about publishing), only a fifth of respondents used social media to disseminate research to their target audiences. But younger researchers and humanities scholars were more likely to do it. Approximately one fifth of all respondents blog about their findings in order to test the veracity of their ideas, with again humanities scholars the most active. Policy mandates were nudging more researchers to blog more, but no more than that.

8.6 Influence of open access publications

Publishing open access (OA) is a model which has become possible because of the digital revolution. When questioned about OA nearly all researchers welcomed open access as a concept good for the expansion of knowledge. Such positive remarks were sometimes accompanied by negative views on the profits of some publishers. Only a very small number of researchers, almost always with a particular mission to reach the developing world with their results, preferred to publish in open access journals, but all admitted to also publishing in top journals financed by subscription.

What complicates questioning about trust in open access publications is that in the minds of researchers there was a significant confusion about what the characteristics are which make something OA. This confusion was not connected to the ongoing debate about whether an open access article has to be re-usable as well as openly available. It was at a lower level: for

example, about the difference between open access and open source. This question came up in the US primarily in the focus groups, and not at all in the UK.

Some of the distrust, or dislike, of open access from an author and reader perspective, that was very evident in the focus groups and interviews, can be put down to misunderstandings and unfamiliarity. The most common misunderstanding was that OA journals were the sole products of a breed of new, not to be trusted publishers, interested in money above all else, when in fact many traditional publishers offer OA journals. This was almost entirely due to experience of the so-called "predatory" journals. Many of those interviewed or engaged in focus groups protested against the constant flow of emails asking for submissions, or inviting the recipient to join an editorial board. That being said at least one interviewee from the US did publish in a journal to which they were alerted by an email out of the blue and were happy with the experience: the article in question had been turned down twice in journals known to the author. Others who published in an OA journal from the stable of a well-known and respected publisher spoke warmly of the review process. Surprisingly, quite a number of researchers claimed to study the sites of known OA journals, new to them as potential authors, to discern the quality of the review process.

Another common perception was that OA journals are not peer reviewed or do not have proper peer review systems, when in fact many OA articles are subject to the same rigours as traditionally published ones. In the focus groups, it was sometimes appropriate to correct these misunderstandings, and then researchers retracted their earlier statements about ubiquitously never trusting open access and seemed to be willing to trust open access journals in certain circumstances. Distrust also diminished considerably (but did not quite evaporate) in the case of OA journals published by an established publisher. Those who did accept OA as just a business model, and could go along with the fact that you can still have a proper peer review, showed a surprising trust in publishers, which goes against all the branding arguments that are repeatedly made – the argument that publishers have no brand to speak of in most cases; and, in fact, goes against what we learnt from the questionnaire. Perhaps the publisher brand comes mainly into play when deciding whether an open access publication is to be trusted.

However, there was a palpable unease among some researchers about paying to have an article published. This may be because it is too much like 'buying' and that was something that jarred with researchers. Few researchers (but there were some) considered that paying to publish inevitably led to a distortion of the peer review process: because you were paying, fast-tracking and lower barriers might occur. At the same time there was no mention of the differing costs of article publishing charges (APCs).

When it came to matters of using or citing open access articles, researchers adopted the same criteria that they used when confronting any journal they did not know. Quality of

peer review was a trust touchstone. It has to be remembered that most of the interviewees worked in disciplines where there were few open access journals and certainly not established ones with impact factors. The one open access journal that was often mentioned was PLOS ONE. PLOS ONE has made a big point about only reviewing the methodology, and not the relevance or importance of a submission, but there was no discussion of what this new approach meant. PLOS ONE is speedy to publication, has a reasonable impact factor and the journal says it is peer reviewed.

In terms of disciplines, engineers seemed particularly hard to convince about the quality of OA journals; they were very suspicious of the 'real' motives behind OA and, indeed, the real need for it: 'after all is not everything free somewhere'. OA seems to have made little inroads in engineering, but it was suspected, even among engineers, with all the policy mandates behind it (especially from funders), that things will change. Indeed, there was even talk that the next REF in the UK would reinforce OA practices by only accepting publicly accessible material. A systems engineer seemed to have had a number of changes of mind regarding OA. He was initially against it, then moved to being positive as a result of being convinced by arguments saying articles will be more widely read and cited and is now convinced that the upheaval OA will bring is quite unnecessary because anyone who wants his/her 'stuff' can find it freely anyway, courtesy of author websites, Google and institutional repositories.

Researchers from teaching-intensive universities, by contrast, were generally supportive of OA on openness grounds and happy to cite and publish in OA sources; although, ironically, none had published in an OA journal. Early career researchers liked the principle of open access, but were scared to embrace it because they felt that academe has not made up its mind about it. If they published in an OA journal, or cited one, they might have backed the wrong horse and found, for instance, that they had published in a second-rate journal. As one researcher explained, "There might be a reputation threat".

The general message from the questionnaire was that, while clearly a lot of researchers were still to make up their minds, open access publications were thought to be trustworthy; nearly two thirds of researchers thought so. Fewer than 7% disagreed and the rest were undecided. Neither did researchers have problems with citing OA material, with two-thirds disagreeing with the statement that 'I don't cite articles published in Open Access journals because they are of low quality.' Those who answered the questionnaire were much more positive than those who were interviewed or were questioned in the context of focus groups, and this is partly to do with the fact that UK/US researchers, the subjects of the qualitative work, were more negative towards OA than researchers in other countries, especially from developing countries. Also, focus groups were often, in the UK at any rate, dominated by journal editors who usually were insistent that the way they worked was the right way.

Only a quarter of researchers said that whether a publication was OA was not an important consideration when deciding where to publish. Nearly a quarter thought OA a very or extremely important characteristic. The younger the researcher the more important they thought OA was, and especially so students. Other groups who thought OA to be relatively more important included: life scientists, researchers from South and Central America, Asia and Africa and those who were self-employed. Groups who thought OA to be less important included: researchers from North America, those involved in the administration of journals and researchers from research-intensive universities. Peer reviewing clearly helps the decision to publish, with three quarters of researchers saying that they would publish in OA journals if they were peer reviewed.

Researchers were asked whether depositing a version of their published work in an institutional repository increased usage and/or citations and thereby helped to build their reputation among their peers. Researchers were very split about this. Those from North America, highly developed countries, involved in the running of journals, and research intensive universities believed this was not the case, while those from Africa and commercial organisations believed it was the case. In the focus groups and in the interviews, repositories were very rarely mentioned and then not in the context of "green" OA.

The open-ended question in the questionnaire contained responses from researchers, many of who questioned the trustworthiness and reliability of open access journals, even though many believed that OA was the wave of the future with positive implications for research. The naysayers had a general distrust of open access because it has not proven the test of time and gained general acceptance from the academy. There was scepticism of the pay for publishing aspect of the open access journals and researchers commented that they would publish their works in an open access venue if the pay to publish was abolished; there was also a scepticism whether the academy generally accepts open access as 'counting' as publications. Open ended responses also confirmed that trust in OA falls on generational lines, "older researchers seem more sceptical of transparency in the process" and in general were the most vocal in their comments about the uncertainty of the open access format. Although not all OA journals charge authors, almost all serious OA journals in the sciences and social sciences do.

8.7 Influence of the availability of data

There was an expectation that the role of data, and how much access to data facilitated trustworthiness, would feature more than it actually did in the qualitative strand of the study. In fact, it was necessary to prompt interviewees to bring data into the discussion.

Nonplussed would be the best description of the reaction of many researchers, so much so that the role of data was not featured as a question in the questionnaire survey.

Although access to full content was much more important to interviewees than access to data when determining trustworthiness, increased access to data is seen as one of those aspects of change that are positive. There were, however, issues of trust presented by data, largely because in the case of many databanks there was doubt about the policy relating to ingest which did not (it was felt) involve satisfactory selection criteria. This meant that researchers have to decide for themselves given the size and complexity of the data. The idea of the data set being attached to an article, with the article giving it authority, is thought to overcome some of these problems. It was also felt that the name of the research group the data were coming from was even more important in these circumstances.

It was also said that in evaluating the way in which the data set was created is as important as the data set itself. There were worries regarding the persistence of links and whether they can be relied upon. The ability to search across different databases was a big change which has already changed working patterns, and this did raise trust issues in terms of assessing work in which researchers were not themselves experts. Researchers varied as to whether they found this to be an issue or not and this often depended on their relationship with co-authors and the extent of their research network. Some scientists explained that older hypothesises based on theory only could now be tested on data, because there were new techniques for collecting, measuring and viewing data. Thus, technology increased confidence in testing hypotheses because both theory and experiments could be used.

Mention was made about background data provided online to support a short article, as was the case with *Nature*, which was active in driving down the length of articles. Researchers felt these data are generally not trusted at the same level as the article itself because it was not clear whether they were reviewed or not (probably not). Open data was only just touched on as part of a general recognition of the importance of transparency. A psychiatrist who was familiar with genetic datasets recounted a story of datasets made freely available, which, when analysed, could identify the illnesses that individuals had. That seems to have put the frighteners on researchers making such datasets available in his field. He put forward the view that the fear of human identification, always a possibility, might prove a barrier to a whole class of databases becoming available in the health sciences.

Most researchers interviewed did not reference data. Those who did cite data said you could trust a particular database if you knew how it was managed and the provenance of the data – for example, who deposited the actual dataset. Trust depended a lot on the nature of the data and the nature of its use in the discipline. There were many different databanks and databases with different positions in different disciplines. Datasets in repositories were not mentioned at all.

8.8 Influence of preprints and rapid publications

These two scholarly channels provide (alternative) earlier versions of content, which are open to view and judgement. Interviews were the main source of information on these channels. The preprint culture was largely confined to some physics, maths and computer science fields. Preprints were generally seen as precursors to publication and as drafts. Thus, if for some reason, it was necessary to cite a preprint, say, because the author was eccentric or slow to get round to submitting to a journal, you would look at it closely, in much the same as you would with anything that has not been peer reviewed. Relatively low levels of participation in the focus groups and interviews by physicists meant we did not have substantial evidence on the use and value of preprints. Nevertheless, in the USA none of the researchers cited preprints. In the UK this only happened where there was no relevant journal article available in subjects served by ArXiv. Feedback through the network was seen as useful in preparing the authoritative paper. Thus, a researcher explained that he only left a preprint up for a short time (as little as a week) to gain feedback. Occasionally preprints did not become journal articles and their status was determined by comments. To the extent that the preprint was trusted and the degree to which it was trusted were determined by the researcher citing on the basis of his/her knowledge of the field and of the author.

Rapid publication is not usually differentiated from "normal" publication and usually operates only in biomedicine but there were some divergences from this generalisation that did not show up in the focus groups because only a limited number of biomedical researchers were present. Rapid publication is a somewhat ambiguous term in the way in which it is used by researchers, because it can just refer to quick publication online of a fully refereed paper often assumed to be the province of electronic-only journals, and thus (for some researchers), of open access journals. The journal's having a print version in fact makes no difference to speed to online availability and its being open access does not matter either. It can also refer to special "early view" facilities which many biomedical publishers offer. Such articles were made available online before copy editing and other checking done by the publisher. There are obviously trust implications similar to the questions raised by the early versions deposited in repositories, but these were surprisingly not raised.

The questionnaire asked about pre-prints in regard to citation behaviour only. The main finding was that citing a pre-print not accepted by a journal (yet) was not a practice prevalent in their field, but was thought to be more acceptable by younger researchers, physicists and researchers who published fewer articles.

8.9 Unethical practices

Fabricating research was a topic very much in the news and was discussed in the focus groups, including that undertaken by highly respected academics. It was felt that established academics could get away with it more easily because you would naturally trust such individuals, and hence it was probably more widespread than thought. In fact, it was felt that because of the high visibility of digital publishing and the massive readership for scholarly publications, it was the reader who does the whistle-blowing these days. Perhaps not quite as unethical as fabrication, editors said they found themselves faced with 'cut and paste or pick and mix jobs', even from top researchers looking to drive their article productivity up.

Plagiarism was said to be rife and more widespread than generally thought, and the focus groups participants were well-informed about this because many were editors or on editorial boards. It was thought to be especially a problem in engineering; this could be because there is more of it in the physical sciences or it is just easier to spot. All publishers scan for it, and knowing this, researchers were less likely to do it so levels have come down in recent years, albeit from historically high levels. One editor explained that currently, of the papers *accepted*, one in 50 were guilty of plagiarism. While early career researchers agreed that plagiarism was a no-no, they were rather less antagonistic towards cut-and-paste behaviour, providing attributions were given. While researchers from teaching intensive universities were not supportive of plagiarism, they were not as hard on it. They felt that it was a fuzzy area and understood the reasons/pressures for doing it. Self-plagiarism, they seemed to think, was a less serious offence; maybe not an offence at all. After all, they argued, does not article polishing and multiple authorship (attribution when maybe you did not write a line of the article) muddy the waters somewhat? Over half of the questionnaire respondents in every discipline thought that matters had got worse regarding plagiarism; social scientists, older researchers and researchers with low levels of article productivity were most convinced of this.

Ethical considerations were particularly evident regarding citation behaviour. Researchers in the questionnaire survey rated the following activities poorly: (1) citing one's own work to improve one's citation ranking; (2) citing papers in the journal to which an article is submitted for publication to improve its chances of acceptance; (3) citing papers mentioned by reviewers to increase chances of acceptance; (4) citing sources disseminated with comments posted on a dedicated website (open peer review); (5) citing a pre-print that has not yet been accepted by a journal; (6) citing only sources published in developed countries or (7) citing the published version of a record but reading another version found on the open Web.

Among the interviewees, there was some discussion of inappropriate citation practices, prompted by the critical incident analysis which formed a part of the interview. Not surprisingly, though many of the practices referred to above were mentioned, researchers were adamant that they did not take part in some of them - for example, (1) and (2) and (7). Some of the practices frowned upon by respondents to the questionnaire were not necessarily disapproved of – for example, quite a number of interviewees found the suggestions of reviewers (3) helpful. They did reject the idea that they were forced to accept the suggestions to get published. In some fields, as we have seen, citing a preprint was acceptable, but only if a journal article was not available. No-one suggested (5) but it is difficult to believe that some social scientists would have been unwilling to cite a source like this. Only citing references authored from developed countries (6) was not mentioned as a strategy, but if such references were the ones trusted there would not be any ethical reason not to restrict one's citing in this way.

There were those among the interviewees who had poor views of the standards of refereeing or the policies of specific journals, but there was much less discussion of such issues than there was in the focus groups. Very few of the researchers interviewed adopted the persona of a journal editor, even if they were.

8.10 Adoption of new measures of research impact (altmetrics and usage factors)

Focus groups and interviews produced little in the way of information on new research impact metrics. Most participants were not really aware or interested in 'altmetrics' - readership, diffusion and reuse indicators that can be tracked via blogs, social media, peer production systems and collaborative annotation tools, including social bookmarking, which are, arguably, the social media equivalents of citations and usage metrics. Of those who had something to say, most were very sceptical of what a like, re-tweet, bookmark or comment actually meant and thought that these were certainly not going to help them in their research appraisals and exercises.

Usage metrics, if not used or widely available, were easier to understand, but it is clear that researchers were unaware of all the possibilities on offer, so they were not talking on the basis of any real knowledge or experience. Those who ventured an opinion were largely negative: 1) usage counts were thought to be too easily gamed; 2) highly used articles were not said to be the best ones (when compared to editorial opinion); 3) downloads did not represent readings, because many were not read once they were downloaded; 4) usage was not a measure of good science or research but rather a consumption or popularity indicator, and media exposure could easily raise an article's count.

The questionnaire data showed something very similar, that is there was a general agreement that usage and social media derived metrics were indicators of popularity and

not quality or credibility, and, as such, of no help to researchers. Older researchers were more likely to believe this. There was also a significant difference in response according to the roles that researchers had. Those who worked as editors, on editorial boards or as referees (agents of the system if you like), who would be older researchers anyway, felt more strongly that usage and social mentions were mostly indicators of popularity. Researchers from less developed countries were less negative about altmetrics. Interestingly, and inexplicably, male researchers were also more likely to view usage metrics as simply popularity counts. Social media mentions were thought to be even less an indicator of quality and credibility than usage metrics.

8.11 Diversity

In general, for the focus groups and interviews, there was a surprising uniformity about the views, perceptions and behaviour of researchers in respect to trust issues, irrespective of differences in subject, country, age/experience and institutional background. If anything, scholarly communication appears to becoming standardized and commoditised. The widespread adoption of the digital peer-reviewed journal could well be behind this.

Of course the findings of the qualitative work can only hint at what is going-on and where differences might lie. While the questionnaire data, like the qualitative data, showed a remarkable consistency across the board in respect to the importance of the traditional pillars of trust (content quality, peer review, journal), it also exposed differences (hinted at in the focus groups) among age groups and countries when it comes to social media, open access publications and trust proxies (e.g., impact factors)

8.11.1 Age

Young or early career researchers (defined, for this study, as those 30 and under) were a research community of particular interest because, although not quite the Google Generation, they will have spent their careers and higher educational years in a largely digital environment, and, perhaps conditioned more by it. They are the new wave of researchers. What does the wave look like and how different are they from their more established and seasoned colleagues? In fact, the questionnaire showed there were quite a few differences and some of these are very significant.

Taking **usage and reading behaviour** first, young researchers, compared to their older colleagues, rated on average the following actions as more important when determining what to use/read:
- reading the abstract

- checking whether the source was indexed by an authoritative indexing body (e.g., ISI, PubMed)
- checking the name of the publisher
- checking whether author's country of affiliation is known for its research.

And these activities *much* more important:

- checking to see how many times it was downloaded
- checking where it was obtained from (e.g., publisher's website, library catalogue)
- taking account of colleagues' opinions.

In contrast those researchers over 30 thought the following more important:

- checking if the data used in the research were deemed credible
- checking if the arguments and logic presented in the content were sound.

And this to be *much* more important:

- checking to see if source was peer reviewed.

This shows that younger researchers, learning the scholarly ropes, relied much more on trust markers and the advice of colleagues. Older researchers were connoisseurs and more able to make their own judgments.

Young researchers also believed more strongly that:

- the journal's Impact Factor was important in deciding what to read
- if the information was not central to my research area, the ease of availability of a source was more important than its quality.

And *much* more strongly that:

- when pressed for time, the ease of availability of a source over-took considerations about its quality.

In contrast those over 30 believed more strongly that:

- peer reviewed journals were the most trustworthy information source.

It seems clear that younger researchers expend less effort to obtain information, so they were more likely to compromise the quality. In some of the focus groups, this tendency was suggested by senior researchers. The senior researchers saw younger researchers as a work in progress, still needing mentoring. It could be that the younger researchers lacked the confidence in their own judgement, which was so much a feature of the behaviour of mature researchers. Older researchers were, however, absolutely wedded to peer review. If they were so keen on checking the information source using their own judgement and well-tried ways of judging, why did they insist so strongly upon the filter of peer review? Perhaps, peer review is the very first filter, but it's not the only one. If an article is peer reviewed, it deserves a more in-depth scrutiny; if it's not, it's not given another glance.

In regard to choosing an **outlet for publication or dissemination**, young researchers considered the following more important:

- It is indexed by reputable/prestigious abstracting/indexing databases.

And these *much* more important:
- it was open access
- it was highly cited
- it was based in a country known for the quality of its research.

In comparison those over 30 considered the following to be more important:

- it was published by a traditional scholarly publisher.

And these *much* more important:
- it was peer reviewed
- it was published by a society in my field.

Young researchers viewed open access more positively as it offered more choice and helped them to establish their reputations more quickly; and again, relied more on trust markers. Older researchers were clearly more conservative; for them placement is more about their contacts than systems.

Young researchers agreed more strongly than their older colleagues with the statements:
- My own website is central for ensuring the reliable dissemination of my work to my target audiences.
- I tend to publish first in a conference proceedings, because it is a reliable way to reach my target audiences.
- I tend to publish first in a subject repository, because it is a reliable way to reach wider audiences.
- Depositing a version of my published work in an institutional repository increases usage and thereby helps to build up my professional reputation.

And *much* more strongly with these statements:
- I use social media to get out information about my research because it is a reliable way to reach my target audiences.
- Depositing a version of my published work in an institutional repository increases citation and thereby helps to build up my professional reputation.
- I tend to blog about the findings of my research, which is a good way to test the veracity of my ideas.
- I tend to publish first in a conference proceeding, which is a good way to test the veracity of my ideas.

On the other hand older researchers agreed more strongly with these statements:

- People who don't have tenure have to publish in good journals to build up a reputation.
- I publish in journals because a paper placed in a journal obtains a context, becomes part of a 'conversation'.

Young researchers clearly used all the outlets available to them in order to get their work published and in this respect made most use of the new digital services with which they were more familiar. Possibly, too, older researchers believed more strongly in a journal economy, younger ones in an article economy. The questionnaire findings about open access and social media were somewhat different to what had been learnt from the interviews and focus groups. And this could well be down to the fact that non-UK/US researchers, who were the focus of the qualitative work, were generally less positive of open access and social media.

In respect to **citing behaviour** young researchers saw the following as more important:

- Citing the most highly cited information sources.
- Citing the first information source published on a topic.
- Citing one's own work to improve one's citation ranking (e.g., H-Index).

And these *much* more important:

- Citing papers in the journal to which an article is submitted for publication to increase chances of acceptance.
- Citing papers mentioned by reviewers to increase chances of acceptance.
- Citing non-peer reviewed sources (e.g., personal correspondence, blogs, tweets).
- Citing a pre-print which has not yet been accepted by a journal.
- Citing sources disseminated with comments posted on a dedicated website (open peer review).
- Citing, if possible, only sources published in developed countries.
- Citing the published version of record, but reading another version found on the open web.

Young researchers agreed more strongly with these statements:

- From a trust perspective I'm more easy-going in what I read than what I cite.
- I don't cite articles published in open access journals because they are of low quality.

And *much* more strongly:

- The Journal Impact Factor is important for deciding what to cite.

Younger researchers seemed more willing to use any devices to improve their chances of acceptance and were much more liberal in their citation behaviour generally. Quite likely citing for them was about getting a foot on the ladder.

Regarding **changes to the scholarly environment** young researchers believed more strongly that:

- There are more outlets, it is easier to get published and as a result, there is a flood of poor quality material.
- There is a less strict/ less rigorous peer review process and as a result, there is a flood of poor quality material.

And *much* more strongly that:

- More researchers entering the field have raised standards.
- There are more unethical practices (e.g., plagiarism, falsifying, fabricating, citation gaming).
- Easily available metrics make the evaluation of trustworthiness easier
- The closer ties with researchers in my field, enabled by digital communication, make it easier for me to judge the trustworthiness of material.

Young researchers were highly appreciative of changes that have resulted in an improvement in the availability of quality filters, but it was not clear why younger researchers were so pessimistic about standards, quality and decency. It could be that the new generation of researchers, born into the realities of a postmodernist society characterised by a plurality of values, diversity, change and melt-down of authorities, take a more sceptical attitude to scholarly standards and measures of quality assurance in general?

The qualitative data provided some explanation for the behaviour and views described above, but it also painted, in some respects, a rather different picture. Thus, ask senior researchers and editors in focus group and interview whether their younger colleagues approached things differently and they said that if anything they were even more fixated on journal prestige and metrics than they were, because they have still have a career ladder to climb. And indeed, the young researchers questioned recognised that they had to publish in journals known for their quality if they were to get recognition and tenure. On the whole, with some exceptions in the social sciences, they accepted the traditional order of things as the way you do research. Because they did not have as much knowledge about, for example, people in their field who were trustworthy, they tended to lean more on external criteria such as impact factors than their elders. They saw themselves as apprentices, not as transforming scholarship, and as such looked to older professors for advice on all matters of quality.

However, a group of social scientists sounded a strident note, a note more in keeping with the findings of the questionnaire. While they did not deny any of the above, their attitudes and belief systems appeared to be different. They saw themselves as 'slaves' to a metric-based/journal focussed system, which they have to adhere to the rules to climb the academic ladder, but they thought the ladder was broken. For them journals were, in fact, a

manifestation of all that was wrong with the scholarly communication system. Journal writing was seen as just utilitarian. They would like to be more collaborative, after all, the social media tools were out there now, but they felt the face of academe was unchanging. What was not clear when the focus groups were being conducted, was whether what we were seeing was the start of a wave or an isolated pocket of opinion. The questionnaire results, while not conclusive, provide enough evidence to suggest it might be the former, albeit a small wave, mostly impacting on the social sciences and humanities.

At the other end of the scale, senior researchers, who were very well represented in the focus groups, and generally involved in the running of established journals, not surprisingly, take a more conservative and traditional view of the way journals should be run and championed their importance as trusted sources of information. Established researchers were also more likely to trust their experience to determine what was a trustworthy source; whereas, young researchers did not trust themselves as much and, therefore, depended on traditional metrics and other colleagues to tell them what to trust. Senior researchers trusted their ability to know what was trustworthy. All this was borne out by the questionnaire data.

8.11.2 Discipline

The questionnaire shows that, generally speaking, there were more discipline similarities than differences when it comes to trust judgements. The focus is on the differences found, many concerning life scientists:

- Life scientists believed more strongly than those in other disciplines that determining trustworthiness as to what they read/use was best accomplished by: (1) reading the abstracts; (2) checking the facts and figures; (3) checking the methods; (4) making sure it is indexed by an authoritative indexing body; and (5) seeing whether data used in the research are credible.
- Life scientists believed more strongly that: (1) the journal's impact factor is important for deciding what to read; (2) open access publications are peer reviewed and trustworthy; and (3) peer-reviewed journals are the most trustworthy information sources.
- Life scientists believed more strongly in the importance of citing the most recent information source published on a topic.
- Life scientists believed more strongly that when deciding where to publish their work the publication should be: (1) indexed by a reputable abstracting/indexing service; (2) highly cited; and (3) published by a society.
- When asked about the effect of institutional directives on their publishing decisions, life scientists felt more strongly that: (1) publishing in high impact factor journals; and (2) publishing in international journals was a direct result of these policies.

- Physical scientists agreed more strongly that: 1) to obtain research grants they have to publish in highly ranked journals; and 2) there are no problems publishing in an open access journal if it is properly peer reviewed.
- Physical scientists believed more strongly that it is important to cite: 1) the first information source published on a topic; and 2) researchers they know because they trust them.
- Physical scientists believed more strongly that there is: (1) an increased pressure to publish and this results in a flood of poor quality material, and (2) now a less strict/less rigorous peer review process than there was, resulting in a flood of poor quality material.
- Social scientists were more likely to say: 1) they are easier going in what they read than in what they cite; and 2) it is more important to cite the most highly cited information sources.
- Social scientists were more concerned about unethical practices and also believe that, as a result of more researchers entering their field, overall standards have been raised because research is now more competitive.
- Humanities researchers agreed more strongly that: 1) the editor and editorial board are important pieces of information to know when deciding where to publish their work; 2) publishing in traditional sources (journals and monographs) was most important; 3) citing the seminal information sources published on a topic was important.

The focus groups and interviews, not the best places to establish difference because of their subject imbalances, showed, too, that there were more disciplinary similarities than differences. It is possible that over the last decade there has been a convergence across the sciences and social sciences as far as research practices and behaviour relating to information is concerned: certainly the structure of the academic article has gradually become standardised across the majority of fields. Even the differences found were in regard to the evidence of a handful of researchers; education appeared to be slightly the odd one out in the UK and medicine slightly the odd one out in the US. In education, it appeared that communication and dissemination went on at many levels, and with so many audiences, with practitioners and policy makers, for instance. This meant having to disseminate via blogs and websites, as well as cite and use these sources/channels. Government websites seemed to be an important source of data, but were not thought reliable because political factors impacted on what was available at any one time. It also appeared that because official data was increasing unreliable (political), researchers had to turn to unofficial sources. Education also seemed to have its share of cliques, and, if you were not a member of that clique, you never got to publish in its journal. US medical scientists were the most frequent users of social media (or at least more willing admitted to it). Their discipline had immediate applied uses of research results, which meant that they were required to keep up with cutting edge research results, and they felt social media

allowed for the spread of ideas without the lag of traditional publishing. Neither of these findings were borne out by the questionnaire data. Maybe this is because we were dealing with populations that happen to be different because different types of researchers respond to requests to answer questionnaires from those who were happy with face to face interrogation.

Also, as has already been pointed out, some researchers, although regarding themselves as social scientists, had an academic background in the humanities which influenced their practices; there were significant differences in what sources they used and what they cited. The questionnaire provides partial support for this finding.

8.11.3 Country

The qualitative strand focussed on UK and US researchers, but the questionnaire covered all researchers, irrespective of the country in which they were located, in order establish whether the situation in the UK and US was different to the rest of the world. Undertaking an analysis by individual country would have been too unwieldy, given the number represented (118 countries) and, additionally, for many countries responses were too low to sustain any meaningful analysis. Instead, an analysis was conducted using the Human Development Index of countries. Statistically significant differences were found in regard to how developed a country was:

- Researchers from highly developed countries, such as the UK and US relied more on internal criteria when deciding on what to read and use. That is to say, they paid more attention to the quality of the content and less to external factors such as brand and reputation (e.g., name of journal or publisher) and authority (e.g., name of author, country affiliation). Researchers from less developed countries relied more on external factors, such as country of author, impact factor and number of downloads. From this, one might conclude that researchers from highly developed countries relied heavily on their circles of trust whereas it would seem, for instance, that in India and China researchers (medium developed countries) were not so confident and probably recognised that they were not yet within the same circles of trust.
- In regards to usage, researchers from very highly developed countries were less likely to compromise quality for ease of availability, even when they were pressed for time.
- Perhaps, surprisingly, researchers from developed countries were not as discriminatory in their citation behaviour in regard to publications originating from non-developed countries. Focus group findings suggest that they might have been trying to be politically correct in their responses.
- Researchers from highly developed countries were less likely to believe that depositing in repositories and social media can increase usage or reach a wider audience.

- With regard to citing, researchers from lesser developed countries were more likely to cite the most highly cited articles, their own works, and papers published in the target journal in order to increase the chance of their paper getting accepted. In this, they were rather like young researchers.
- Researchers from lower developed countries cared more about the country where the information source was based.
- Researchers from developed countries were more likely to agree that social media mentions/likes were only indicators of popularity and not quality or credibility.
- Researchers from developing countries were more likely to publish in open access journals.
- There were more policy directives in developing countries to stimulate or orient the publishing practices of researchers. In some countries, researchers were required to publish in sources that had a hard-copy version or encouraged to publish in open access journals. However, all those researchers influenced by policy mandates, whether from a developing or developed country, said that policies required them to publish in higher IF journals.

There were just a few differences between UK and US researchers; more UK researchers disagreed that the impact factor influences what they read and agreed that usage metrics were indicators of popularity and not quality or credibility. UK/US researchers differed from researchers from the rest of the world in a number of significant ways:

They were *less* likely to agree with the statements:

- Open access journals make trustworthy research information accessible in countries where journal subscriptions cannot be afforded.
- I tend to blog about the findings of my research, which is a good way to test the veracity of my ideas.

They were *more* likely to agree with the statements:

- Social media mentions/likes are indications of popularity only, not quality.
- Social media mentions/likes are indications of popularity only, not credibility.

In other words they tend to be more traditional in their scholarly behaviour and beliefs.

Because the focus groups and interviews were only undertaken in the UK and USA, there was clearly limited scope for investigating geographical differences. As the questionnaire data showed, there were few differences between UK and US researchers, because although the REF was a driving force in the UK, tenure was an equally strong driver in the US.

However, UK/US researchers did comment on the scholarly efforts and behaviours of their foreign colleagues who they had research or editorial links with. It was not the view of the majority of UK researchers that scholarship from the developing world was by definition of

no use and "unreliable". But it was clearly the view of a few that some of it is, especially that emanating from Africa and India; authors from these countries featured highly in papers they rejected. As to African authors, their material was thought to be very poor, largely because they were badly taught and because (in the social sciences) they assumed that research means surveys. UK editors clearly felt uncomfortable talking about the topic because of very high rejection rates for authors from developing countries. There was no question that any of the researchers would want to publish in a journal from a developing country, but they might just 'look' or 'glance' at an article from such a journal if it was in their specialisation.

US researchers' preferred English papers over non-English or ESL (English as second language) papers and a few medical scientists mentioned a preference for British-English or American-English papers in certain journals. In one medical discipline, there was already a high number of papers from the USA, so the journal favoured UK papers, and in other journals, it was the opposite. In the case of American-English versus British-English, the preference was not a result of quality, but when editors favoured English papers over ESL papers it was because of quality. It was thought, whether intentionally or unintentionally, that poor English was a sign of low quality because readability was a criterion for quality.

8.11.4 Other demographic differences

There were some institutional differences between the views of academics at research and teaching intensive universities in the UK. Researchers from teaching-intensive universities were patently more idealistic and the fact that they came from lowly ranked research universities meant they could indulge their passions (they were not expected to publish at the highest journal level). They were more social and caring and certainly did not care for metrics, hierarchies or competition. They were not academics being regimented for the UK's REF. Without the 'discipline' this brought, they were far more liberal and relaxed regarding trust and authority. As in the case with young researchers, they were critical of the existing scholarly system, seeing it, too, as too industrialised and commercial.

In order to investigate whether research productivity was a factor in trust judgements, researchers were also asked for the number of articles they had published in the past 3 years. This information was coded into three categories: 0–2 publications (low publishers), 3–10 publications (moderate publishers), and 11 or more publications (heavy publishers). The data show that heavy publishers were clearly seasoned professionals and believed more strongly that:
- Peer-reviewed journals are the most trustworthy information sources and most prestigious places to publish.
- Highly cited publications are where to publish.

- The article being indexed by a reputable/prestigious abstracting/indexing database is very important.
- Publishing in high impact factor journals is a direct result of institutional research policies.
- In order to obtain research grants they have to publish in highly ranked journals.
- There is an increased pressure to publish and as a result there is a flood of poor quality material.

8.12 Changes over time

On the whole interviewees and focus group participants said that there had not been many changes in the way they went about determining trustworthiness, but as we shall see there has to be a small question mark over whether time and practice has lulled them into thinking like this. Having said that, peer review and the journal still holds sway. In fact, it could be argued that peer reviewed journals are seen to be even more the place where researchers offer their finished research, except in those disciplines, mainly humanities, where monographs were sometimes more appropriate for the longer "messages". However, even in the humanities, journals appear to have a greater importance than they ever had. Driven ever on by institutional and national policy directives, such as the UK's Research Excellence Framework, the march of the journal has made suggestions of a new role for social media in scholarly communication irrelevant at least for the present. Publishing in top journals was still the main way to obtain a reputation, get a job, and obtain promotion.

The link too between peer review and quality was stronger than ever in an increasingly crowded and voluminous scholarly communications environment. Peer review was by far the most important characteristic of a reliable source, and this was universally agreed upon. Some established (and nostalgic) researchers even had a special level of trust in print, which was said to be 'reputable'.

Surprisingly, perhaps, information overload was not mentioned as a greater problem or challenge. The benefits of unparalleled access to information were so great that they more than compensated for any problems that arose from an over-abundance of irrelevant or mediocre information. The general view was summarised by one researcher, who preferred "to have problems with information management rather than problems with information retrieval". Finding things is relatively easy; managing the information flood is something else, requiring experience and skill, which, of course established researchers have, but early career researchers much less so. Mature researchers did not feel overloaded because they trusted their ability to judge quality and did not feel they needed to go outside the boundaries they were used to. As a result, newer sources (social media, open access) are more likely to be dismissed. Why take more time to examine the quality of a new source

when you can get the same or better information from a source you have used and trusted in the past?

Many researchers acknowledged the fact that there is more 'poor' stuff around, because it is more accessible and there were more opportunities to publish ('stuff' that would not have seen the light of day before). Despite this acknowledgement, the overall quality of research had risen. This rise in quality meant they could live with the bad and mediocre content. The result of more people entering the field, and the greater competition that comes with this increase, has led to the improvement in quality. Researchers thought that the increase in quality had largely taken place in a relatively small number of quality journals and it was the niche/specialist journals that have benefitted most from an abundance of run of the mill material. Interestingly then, most, but not all, researchers did not blame open access journals for the rise in poor or mediocre work, but rather it was the big increase in new subscription journals, which has now anyway come to an end. The rapid expansion in scholarly publishing and communications as a direct result of the digital transition has had its upsides and downsides then. The real downside has been the huge increase in the number of technically competent, but of limited interest, papers.

A minority of researchers did, in fact, mention that they had become much less trusting over the last decade. They no longer, for instance, assumed that because an article came from a high impact factor journal it would contain good science. They did not say that they no longer trusted people they knew and respected. It was the labels they no longer trusted. They also felt that papers were published (or sliced and diced) to fit metrics which was not necessarily the best way to present research. This seems like a trend towards trusting more in experience and judgement.

Researchers mentioned other changes:
- Most researchers interviewed had a clear narrative of how technology has changed their behaviour. 'Easier' was the most common word they used to describe the change. Use (through improved discovery mechanisms and greater availability) and dissemination had become easier with the emphasis very much on the former. The fact that the Internet provides a whole range of new ways of finding information was implicit. There were much better solutions for finding articles. Emails of corresponding authors were easily available and contacts much easier to establish. In many disciplines, papers were often either uploaded on social networking sites or available in other places on the Web.
- Young researchers had benefitted most by the increasing choice of journals available, thanks partly to open access publishing. There did not seem to be any worries about not finding an appropriate journal in which to publish.
- Technology was now in place to collect, measure and analyse research impact and individual performance.

- Cross-checking and fact finding was much easier to undertake on the Web; the credentials of documents or author, can be checked literally in seconds.
- Unethical practices, like faking research and plagiarism, were thought to be more widespread, thriving in a crowded and competitive digital environment, which, however, is not as anonymous as researchers think.
- In terms of dissemination, it was universally agreed that there was much greater pressure to publish than before, and to publish more quickly. On the plus side, it was easier to publish. The technical processes involved in submission had changed for the better. The use of online editorial systems was welcome as it tends to be associated with a speedier peer review process. Additionally, there was the pressure (from administration and funders) to reach outside the academic domain to practitioners and the public.
- Social media had established a foothold. It was increasingly useful for ideas, references and outreach. Social media were used to communicate with practitioners, which made the whole process easier and faster. More generally, there was a wider acceptance of social media as a means of communicating research to others in their fields, with some use of blogs for this purpose.

The questionnaire sought to discover what levels of agreement there were with some of the main changes flagged up in the qualitative strand of the study discussed above. Specifically these changes are: a) there is more poor quality material around because it is easier to get published, peer review is less vigorous and there is more pressure to publish; b) (despite this) there has there been an overall rise in standards because of the greater competition that comes with more researchers entering the field; c) researchers were acting more unethically; d) it was easier to spot poor material thanks to the widespread availability of metrics and better online connectivity.

The statement that received the most widespread agreement was: "There is an increased pressure to publish and as a result, there is a flood of poor quality material"; however, most respondents thought the statement was "somewhat" or "a little" representative of changes in their field. Overall, respondents did not think the available metrics made evaluating a source's trustworthiness easier or that there were more unethical practices around, although young researchers thought the opposite.

There were disciplinary differences regarding changes, with physical sciences researchers believing more strongly that: (1) there is an increased pressure to publish and, as a result, there is a flood of poor quality material; (2) there is a less strict/less rigorous peer review process and as a result, there is a flood of poor quality material available. Social Scientists were more concerned with unethical practices and also believed that, as there were more researchers in the field, standards have risen. Researchers also differed according to the number of publications produced. Thus, heavy publishers (more established researchers)

believed more strongly that there was an increased pressure to publish and, as a result, there was a flood of poor quality material, while low publishers were more concerned with increases in unethical practices and also believed that, as there were more researchers in the field, standards have risen. Researchers from highly developed countries felt much more strongly that things had changed regarding trustworthiness, such as a lowering in overall quality and an increase in unethical practices.

As we have seen, researchers emphasised the changes in the way they used or disseminated information. They had moved from a print-based system to a digital system, but it has not significantly changed the way they decide what to trust. The digital transition has not led to a digital transformation.

9 Conclusions

The consideration of scholarly information needs and practices presented in this study had as its key premise the possibility, not to say the probability, of changes in the trust-related values and practices of the scholarly endeavour. It seemed a likely conclusion that researchers' current perceptions of the quality and reliability of information sources and channels and their present-day practices of determining trustworthiness might have changed in the light of what can only be described as a digital revolution. What many have suggested as a greatly changed scientific culture in the market-driven systems of higher education, culminating in the relentless call for research productivity - perhaps even for quantity at the expense of quality - also seemed to necessitate that scholars approach the information sources, channels and metrics they use in conjunction with their research work more carefully than ever.

Alongside their proven and trusted information sources, channels and metrics, today's researchers also have at their disposal a host of novel, web-based ways and means, which could be used for establishing scholarly trustworthiness. These might make their information appraisal tasks less daunting — if, that is, they were put to judicious use. Over the last decade research, some of it by CIBER, has made it absolutely clear that researchers do not live in the proverbial ivory tower. Their modes of searching are much the same as the modes of searching that we find among people using Google to find out about the weather or to look up train timetables.

However, the overall picture emerging from the findings of this study bears testimony to researchers' almost universal preference for the age-old scholarly information evaluation practices dictated by their discipline-specific research work conventions. Although researchers may define their information needs in terms of the changing realities of conducting research, and may be more or less aware of the existence of the new tactics for

the quality and reliability assessment of information, such as the ubiquitous use of crowdsourcing, their information judgment practices seem to have remained by and large unaffected by such developments in the scholarly world and its information environs.

The results, then, of this long, large and robust investigation confirms what some commentators had suspected, but had little in the way of hard evidence to support their suspicions that the idea, methods and activities associated with trustworthiness in the scholarly environment have not changed fundamentally. In fact, arguably, the main change has been a reinforcement of the established norms in the face of the rapid expansion in scholarly communications and the digital information tsunami that it unleashed. Instead of looking to the future for a lifeboat, researchers have looked to the past and gripped established practices, traditional peer review especially, even more firmly.

The biggest finding has to be that peer reviewed journals retain and, if anything, have increased their lead as the preferred and trusted vehicle for formal research communication. In fact, most open access (OA) journals have largely adopted peer review in traditional form. There are much publicised exceptions, such as the procedures adopted by PLOS ONE, but this is still peer review and perceived as much by the great majority of researchers. OA journals have also retained the form of the traditional article, although there are additions (the article of the future) made possible by the move to the digital environment and, in some cases, post publication comment. The transformation of scholarly communication (much spoken about in some circles) is still something for the future. However, there were clear indications that peer review had become less trusted in some quarters, but it was still an important filter and an even more important filter was the personal network, which told researchers what was worth reading. The general lack of concern with information overload could be explained by the strength of the network or circles composed of other researchers who are known personally and whose work is known to be worthwhile. One of the reasons why researchers still attend conferences in such numbers is to see how other researchers handle the questions at presentations and during face-to-face social interactions. Contacts approved in this way became trusted and ongoing interactions were conducted by email, visits, and sometimes using the social media.

9.1 Usage and reading

Researchers certainly had more degrees of freedom in terms of what they used. Personal inspection of actual content and recommendations from colleagues and friends were the main methods for establishing trustworthiness. Abstracts, always important in making choices and top-line evaluations are, arguably, more important in the digital environment where the choices and uncertainty are that much greater. Peer reviewed journals were the most trusted source by a huge margin. Researchers were though split about the value of

impact factors in determining what to use/read. Social media, never fully trusted, were valuable for keeping in touch with events and publications. Library and publisher platforms were not central to discovery, but Google and Google Scholar were.

Researchers said they were influenced in what they used or read by ease of access and young researchers were most influenced. This helps explain the widespread popularity of Google Scholar and the Google search engine with researchers.

9.2 Citing

Little in the way of change was found in regard to citation behaviour as a result of the digital transition, although technology had made citation data and indices much more accessible and, thanks to Google, it was much easier to conduct background trust checks. In making choices, author recognition was most important, followed by the name of journal. The selection process typically started with the abstract, then the methods, then the major figures, and then the entire article would be read or, we assume, more usually scanned. Researchers always preferred to cite peer reviewed sources and because of this journals were more heavily cited than other publications. Open access articles typically came into the category of newer and therefore less established journal articles, which needed special scrutiny. It was completely out of the question to cite social media. One feature of citing behaviour, not much mentioned in the literature, is that many researchers in all fields check out with the aid of search engines what recent literature is available where the conclusions bear on the conclusions that their article has come to, or illustrate another application of the same methodology. Usually such newly discovered information sources (usually journal articles) are written by people not known to the author, but the authors were very confident about their ability to establish quality by closely examining the article, particularly looking at the methodology, or even the quality of micrographs.

9.3 Publishing

Where researchers publish was strongly influenced by institutional research policy directives or mandates, and the pressure applied is to publish in high impact factor, international journals. Impact factors very much come into their own when it comes to the dissemination of research results.

9.4 Social media

Arguably, informal scholarly communication has benefited most from the digital revolution, courtesy of social media, which were very much regarded as informal communications and treated as such. Personal networks and circles of trust were central to formal scholarly

communication and were made much easier to maintain by emails mainly, but also other social media. Young researchers were more likely to use social media in their research work, as were US researchers and social scientists, but almost all researchers had a low level of trust in content received or discovered by this route; good enough to use material sourced this way, but not good enough to cite or publish in. Young researchers wanted to take full advantage of the 'dissemination plus world' they were part of, but some said that they were restricted in their efforts by their senior colleagues. There is no doubt that mentors worked hard to make sure that younger scholars fully understood the conventions of their disciplines and abided by them. Younger scholars also used the social media to build their research network much more quickly than their older colleagues had been able to do in the past. Older social science researchers used social media to derive new or fresh ideas and for outreach purposes - to connect the public and practitioners.

9.5 Open access

In general open access publications were thought to be trustworthy sources, but only if they were traditionally peer reviewed. However, only a relatively small proportion of researchers, almost always with a particular mission to reach the developing world with their results, preferred to publish in open access journals. But all admitted to also publishing in top journals financed by subscription. Some of the distrust, or dislike, of open access from an author and reader perspective that was clearly evident can be put down to misunderstandings and unfamiliarity. However, there were genuine worries and these concerned ethical issues that arise from paying to get published and the quality of peer review, a real trust touchstone for open access publications. Despite the criticism and confusions, most researchers felt that open access was the wave of the future. Mandates were making a difference and would nudge more researchers towards open access authorship. UK/US researchers were generally more negative towards open access that their colleagues in the rest of the world. Researchers from developing countries and young researchers were most supportive of open access initiatives.

9.6 Data

Although access to full content was much more important than access to data when determining the trustworthiness of a piece of research, increased access to data was seen as one of those aspects of change that are positive. Because of the problems of assessing a large and complex dataset the idea of the data being attached to an article and author, with the article giving it its authority, was favoured. It was generally agreed that data should be peer reviewed.

9.7 Unethical practices

Overall, there was a feeling that matters have got worse in regard to plagiarism and in the minds of a number of researchers it was more widespread than generally thought. Social scientists, older researchers, and researchers with low levels of article productivity were most convinced of this situation. Some researchers, most notably younger researchers and those from teaching-intensive universities, thought that some forms of plagiarism were more acceptable than others. Thus, they felt that mild 'cut and pasting' was acceptable, providing attribution was given, and that self-plagiarism was also acceptable, if not overdone. Ethical considerations were particularly evident regarding citation behaviour and although researchers were firm in the belief that they did not game or cite for political reasons, they did know people that did this.

9.8 Altmetrics

There were no signs at all that alternative metrics were making any headway with the research community. Most researchers knew little about them and those who did know something regarded them as dubious popularity indices that had no bearing on research activities. Social media mentions were thought to be even less an indicator of quality and credibility than usage metrics. However, researchers from less developed countries were more positive in their opinions towards altmetrics, perhaps because it was more difficult for them to excel in regard to the citation indices.

9.9 Diversity

There was a surprising consistency across the board in respect to the importance of the traditional practices, pillars and markers of trust (quality content, personal inspection, peer review, journal). Nevertheless, there were some important differences in respect to discipline, country, and age when it came to social media, open access publications and trust proxies such as impact factors. Discipline differences were not as large as the research literature had led us to believe. It is possible that over the last decade there has been a convergence across the sciences and social sciences as far as research practices and behaviour relating to information is concerned. Certainly, the structure of the academic article has gradually become standardised across the majority of fields. However, life scientists did appear to think and behave differently, in that they were much more traditional, regimented, and did it more by the book.

Researchers from highly developed countries, such as the UK and USA, relied more on internal criteria when deciding what to read and use. That is to say, they paid more attention to the quality of the content and less to external factors, such as brand and reputation (e.g., name of journal or publisher) and authority (e.g., name of author, country

affiliation). Researchers from less developed countries relied more on external factors, such as country of author, impact factor, and number of downloads.

In the case of younger researchers (30 years old and younger), where, arguably, the differences were greater, they: a) were true to their stereotype in that they expended less effort to obtain information, so they were more likely to compromise on quality; b) viewed open access more positively as it offered them more choices and helped them to establish their reputations more quickly; c) compensated for their lack of experience by relying more heavily on trust markers, such as impact factors; d) used all the outlets available to them in order to improve the chances of getting their work published and, in this respect, made the most use of the new and innovative digital services with which they were more familiar; e) were more willing to adopt all types of citation practice to boost the chances of getting their paper accepted; f) were more pessimistic about scholarly standards and the quality of research.

So what about the younger researchers and the transformational desires of some of them? Do we see them as the thin end of the wedge? It has to be said that the jury is out, but clearly they are more sceptical. The wedge also seems to be largely populated by young social scientists and, possibly, humanities scholars. The explanation for this might possibly lie with the fact that social scientists are more interested in ideas and scientists more interested in hard and validated evidence.

9.10 Changes

Researchers have moved from a print-based system to a digital system, but it has not significantly changed the way they decide what to trust. The digital transition has not led to a digital transformation. Traditional peer review and the journal still hold sway. Measures of establishing trust and authority do not seem to have changed. Interviewees recognised a clear continuity in their trust behaviour in spite of technological changes. In general, however, researchers have become more sceptical about a source's trustworthiness and have developed an increased confidence in their own judgement.

There was hardly any talk about transforming scholarly communication, so often mentioned in the discussions among intermediaries, such as publishers and librarians. Social scientists were in some cases less accepting of the continuance of the traditional structure of journal publishing than scientists. Even scientists associated with open access journals were not interested in the opportunities presented by social media. We now seem to still have the old system with tweaks.

The biggest change was an increased pressure to publish, which was blamed for another change – the increase in poor and mediocre publications. Another major change is the way that libraries have become marginalised. The biggest surprise, perhaps, was that nobody talked about information overload. The explanation lies in the fact that researchers cope with the increase in information by utilising and maximising their personal networks.

To conclude the digital environment is not really challenging our understanding of trust and authority in terms of most of the research community, but it might be doing so in respect to part of the community – those living in developing countries and young researchers with their beliefs indicating an openness to change, transformations might be on the way.

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Appendix 1: List of working papers/draft articles

Paper title/working title	Description	Status
1. Trustworthiness in scholarly communications in the digital era: literature review	Review of all the studies and papers that have been written on trust and related issues in respect to scholarly communications over the past decade.	Draft paper
2. Trust and authority in scholarly communications in the light of the digital transition: determining the issues	Results of the first phase of the project – 14 focus groups, featuring 66 research academics. Purpose laying the ground, defining the scope and issues	Article submission
3. Changes in the digital scholarly environment and issues of trust	Results of the second phase of the project – nearly 90 interviews with research academics, featuring critical incident techniques	Article submission
4. Trust and authority of scholarly information in a digital age: results of an international questionnaire	Reports on the third phase of the project – an international questionnaire study to which more than 3500 researchers replied	Article submission
5. How scholars implement trust in their reading, citing and publishing activities: geographical differences	The Human Development Index (HDI) was used to compare researchers in different countries.	Article submission
6. The role of trust and authority as a reason for citing: how do authors decide what to cite?	Reports in detail on the citation behaviour aspect of the above mentioned study; focus on why researchers chose to cite particular references in one of their publications.	Article submission
7. Focus on open access aspects of trust		In preparation
8. Focus on Social media aspects of the trust		In preparation
9. Overarching article	Summary of the study, its main findings and policy implications	In preparation

Appendix 2: Survey Questionnaire

Aim of the survey

We are studying how emerging digital behaviors are challenging and, perhaps, changing concepts of trust and authority in the scholarly world. We wish to determine how researchers assign and calibrate authority and trustworthiness to the scholarly sources and channels they choose to use, cite, and publish in. We are seeking information from you about your behavior as a researcher with special reference to what you trust or find reliable. For more information about this project (funded by The Alfred P. Sloan Foundation) please see our websites http://cics.cci.utk.edu/cicsprojects/Sloan or http://ciber-research.eu.

Participating in the survey

This survey will take approximately 15-20 minutes to complete.

You may exit the survey or leave a question unanswered at any time. There is minimal risk attached to your participation. Any details about you, your work situation, and your organization will be kept completely confidential. Survey results will be kept under password protection for three years following the survey. Any papers or conference presentations will be based on the aggregated data without direct links to an individual survey response. You should be 18 or over to participate in this research.

About us

If you have questions at any time about the study or the procedures you may contact the primary researchers, Professor Dave Nicholas (Dave.Nicholas@ciber-research.eu) or Dr. Suzie Allard (451 Communications Building, 1345 Circle Park Drive, Knoxville, TN 37996; 865 974-1369; sallard@utk.edu). If you have questions about your rights as a participant, contact the University of Tennessee's Office of Research Compliance Officer at (865) 974-3466.

Prize draw

At the end of the survey there is an opportunity to enter your email address to enter a prize draw to win an iPad Mini. Your email information will not be connected to your survey answers. The prize draw will be on July 29, 2013.

Informed Consent

By clicking NEXT and completing the survey, you are indicating that you have agreed to take part in this research and give permission for us to gather and analyze the answers you provide.

USING AND READING INFORMATION

Q1. How important do you consider each of these activities when deciding what information to use/read in your own research area?

Extremely important, Very important, Important, Somewhat important, Not important
[Check one box in each row]

- Reading the information source (article, book chapter, etc.) in its entirety
- Reading the abstract
- Checking the figures and tables
- Checking the methods
- Checking to see the means by which it has been disseminated/published (e.g. in a subscription journal, an Open Access journal, a repository, a blog)
- Checking whether the source is indexed by an authoritative indexing body (e.g. ISI, PubMed)
- Checking to see if the data used in the research are credible
- Checking the name of the author
- Checking the name of the journal
- Checking the name of the publisher
- Checking if the arguments and logic presented in the content are sound
- Checking whether author's country of affiliation is known for its research
- Checking to see if it is peer reviewed
- Checking to see how many times it has been downloaded/ accessed
- Taking into consideration colleagues' opinions of it
- Taking account of where it was obtained from (e.g. publisher's website, university library catalogue, search engine)
- Other (please specify)

Q2. To what extent do you agree/disagree with the following statements concerning the quality and trustworthiness of information sources?

Strongly agree/ agree/ Neither agree nor disagree/ Disagree/ Strongly disagree/Don't know

[Check one box in each row]

- Peer reviewed journals are the most trustworthy information source.
- The journal's Impact Factor is important for deciding what to read.
- Wikipedia has become more trustworthy over the years.
- Open Access publications that are peer reviewed are trustworthy.
- I am very likely to read an article recommended to me by a colleague.
- If the information is not central to my research area, the ease of availability of a source is more important than its quality.
- My main criterion for finding out if a source is trustworthy is the content itself (e.g. whether it makes sense, it is consistent with what I believe etc.).
- When pressed for time, the ease of availability of a source over-takes considerations about its quality.

DISSEMINATING/ PUBLISHING INFORMATION

Q3. As an author, how important are the following attributes of an outlet when deciding where to disseminate/publish your research work?
Extremely important, Very important, Important, Somewhat important, Not important, Don't know
[Check one box in each row]

It is published by a traditional scholarly publisher

It is Open Access

It is indexed by reputable/prestigious abstracting/indexing databases, such as ISI or Scopus

It is highly cited

It is peer reviewed

It has both an online and a print version

It is based in a country known for the quality of its research

It has a reputable Editor/Editorial Board

It is highly relevant to my field

It is published by a society in my field

- Other (please specify):

Q4. Do research policy directives / mandates (e.g. national, university or departmental) influence where you publish your research?

Yes, heavily/Yes, somewhat/Not at all / I am not aware of any mandates

Q5. If yes, how are you influenced? Are you pressed to:

Extremely, Very, Moderately, Slightly, Not at all

[Check one box in each row]

- Publish in traditional sources (e.g. journals and monographs)
- Publish in high Impact Factor journals
- Publish in sources that have a hard-copy version
- Publish in Open Access journals
- Publish in national/local journals
- Publish in international journals
- Write a blog and/or tweet about your research
- Other (please specify)

Q6. To what extent do you agree/disagree with the following statements concerning the quality and trustworthiness of places to publish/disseminate your research?

Strongly agree/ agree/ Neither agree nor disagree/ Disagree/ Strongly disagree/Don't know

[Check one box in each row]

- As peer reviewed journals are the most prestigious place in which to publish, they are likely to contain high-quality material.
- People who don't have tenure have to publish in good journals to build up a reputation.
- I publish in journals because a paper placed in a journal obtains a context, becomes part of a 'conversation'.
- To obtain research grants I have to publish in highly ranked journals.
- I don't publish in Open Access journals because they are of low quality.

- I have no problem publishing in an Open Access journal if it is properly peer reviewed.

- Open Access journals make trustworthy research information accessible in countries where journal subscriptions cannot be afforded.

- I publish in an Open Access journal only if it is published by a reputable publisher.

- My own website is central for ensuring the reliable dissemination of my work to my target audiences.

- I use social media (e.g. Twitter, blogs, social networks) to get out information about my research because it is a reliable way to reach my target audiences.

- I tend to publish first in a conference proceedings, because it is a reliable way to reach my target audiences.

- I tend to publish first in a subject repository (pre-publication database), such as ArXiv, PMC, RePEc, because it is a reliable way to reach wider audiences.

- Depositing a version of my published work in an institutional repository increases usage and thereby helps to build up my professional reputation among my peers.

- Depositing a version of my published work in an institutional repository increases citation and thereby helps to build up my professional reputation among my peers.

- I tend to blog about the findings of my research, which is a good way to test the veracity of my ideas.

- I tend to publish first in a conference proceedings, which is a good way to test the veracity of my ideas.

CITING BEHAVIOUR

Q7. How characteristic of your discipline are each of the citing practices listed below?
Essential, Very characteristic, Characteristic, Somewhat characteristic, Not characteristic, Don't know

[Check one box in each row]
- Citing the most highly cited information sources

- Citing the seminal information source published on a topic

- Citing the first information source published on a topic

- Citing the most recent source published on a topic

- Citing one's own work to improve one's citation ranking (e.g. H-Index)

- Citing papers in the journal to which an article is submitted for publication to increase chances of acceptance
- Citing papers mentioned by reviewers to increase chances of acceptance
- Citing non-peer reviewed sources (e.g. personal correspondence, newspaper articles, blogs, tweets)
- Citing a pre-print which has not yet been accepted by a journal
- Citing sources disseminated with comments posted on a dedicated website (open peer review)
- Citing, if possible, only sources published in developed countries
- Citing the published version of record, but reading another version found on the open web
- Other (please specify):

Q8. To what extent do you agree/disagree with the following statements concerning the quality and trustworthiness of the sources you cite?
Strongly agree/ agree/ Neither agree nor disagree/ Disagree/ Strongly disagree/Don't know [Check one box in each row]

- From a trust perspective I'm more easy-going in what I read than what I cite.
- Usage metrics are indications of popularity only, not quality.
- Usage metrics are indications of popularity only, not credibility.
- Social media mentions/likes are indications of popularity only, not quality.
- Social media mentions/likes are indications of popularity only, not credibility.
- I tend to cite people I know because I trust them.
- I only cite conference proceedings if there's no other alternative because the work there is still speculative, and, as such, a little unreliable.
- I don't cite articles published in Open Access journals because they are of low quality.
- I have no problem citing an article published in an Open Access journal if it has been properly peer reviewed.

- I prefer to cite articles published in an Open Access journal only if they are of a reputable publisher.

- The journal Impact Factor is important for deciding what to cite.

CHANGES

Q9. To what extent do these statements represent what has happened in your research field over the past decade or so?

A great extent/ somewhat/ A little/ Very little/ Not at all/Don't know

[Check one box in each row]

- There are more outlets, it is easier to get published and as a result, there is a flood of poor quality material.

- There is a less strict/ less rigorous peer review process and as a result, there is a flood of poor quality material.

- There is an increased pressure to publish and as a result, there is a flood of mediocre/poor quality material.

- More researchers entering the field have raised standards.

- There are more unethical practices (e.g. plagiarism, falsifying, fabricating, citation gaming).

- Easily available metrics make the evaluation of trustworthiness easier.

- The closer ties with researchers in my field, enabled by digital communication, make it easier for me to judge the trustworthiness of material.

About you

1. Which of these broad subject headings best describes your subject area of interest?

Check only one
    Agriculture and Food Science
    Area Studies
    Arts
    Behavioral Sciences
    Biochemistry, Genetics and Molecular Biology
    Biological Sciences
    Chemistry and Chemical Engineering
    Computer Sciences and IT
    Earth and Planetary Sciences
    Economics, Business and Management
    Education

Engineering and Technology
Environmental Sciences
Geography
Humanities
Immunology and Microbiology
Law
Library and Information Science
Materials Science
Mathematics
Medicine, Allied Health and Veterinary Science
Neuroscience
Pharmacology, Toxicology and Pharmaceutics
Physics and Astronomy
Politics and International Relations
Public Health and Social Care
Social and Cultural Studies
Tourism, Leisure and Sport Studies
Other, please specify

2. Where do you work?

Check only one
Research-intensive University
Primarily Teaching University/College
Hospital or Medical School
Research Institute
Government
Commercial organization
Self-employed (e.g. consultant)
Retired
Other

3. Are you a [tick no more than two boxes]
    - Full-time researcher
    - Part-time researcher
    - Full-time faculty member
    - Part-time faculty member
    - Student
    - None of these

4. …Are you or have you been a journal editor?
    - Yes
    - No

5. Are you or have you been a member of the editorial board of a journal?
    - Yes
    - no

6. Do you review articles for journals?
    - Yes
    - No

7. How many years' experience (working in the field) do you have as a researcher? (Please write only a number like 1, 12, etc.)

    Years experience ……

8. Roughly how many journal articles have you published as author or co-author in the past three years? (Please write only a number like 2, 5, 11, etc.)

9. In which country are you based? (choose from the drop down list)

Alphabetical list of countries
10. How old are you (Please write only a two-digit number like 36, 54, etc)

    .....

11. Gender
    - Male
    - Female

Your comments

12. Finally, is there anything you would like to add about the issues of trust and reliability in using information?

13. If you would like to be entered into our Prize Draw and stand a chance of winning an iPad mini, please enter your email address below. The draw will be on July 29th.

Your email will not be used for any other purpose and it will not be passed on to any third party.

Thank you very much for your time
Please click on the link below to safely exit the survey