

## **Social Media use in the Research Workflow**

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### **Background**

This study considers the use of social media in the research workflow. Social media and how they are impacting on research practices is the second theme to emerge from the Charleston Observatory and these findings develop this topic.

In recent years there has been considerable comment on the use of social media as a communications channel in all aspects of society. This study set out to answer the following direct questions:

- a) are social media impacting upon researcher workflows?
- b) how influential are age and other factors in shaping the demand for social media?
- c) if so, how should publishers and librarians respond?

### **Key findings**

1. Social media have found serious application at all points of the research lifecycle, from identifying research opportunities to disseminating findings at the end. They may not be the same tools, and they are certainly not the same researchers, but social media are most definitely making an impact on scholarly workflow.
2. The three most popular social media tools in a research setting are those for collaborative authoring, conferencing and scheduling meetings.
3. The most popular tools used in a professional research context tend to be mainstream anchor technologies or 'household brands', like Skype, Google Docs, Twitter and YouTube. Researchers seem to be largely appropriating generic tools rather than using specialist or custom-built solutions and both publishers and librarians need to adapt to this reality.
4. Age is poor predictor of social media use in a research context. Researchers under 35 are generally more likely to use at least one social media application than the over-35s. This finding is a broad generalization of a much more complex picture when we look at specific tools, which show strikingly different patterns of take up by age. We should be very careful indeed of applying 'digital native' narratives to social media.

We are grateful to Emerald Group Publishing, the project's sponsor, for access to their mailing lists. We also thank Cambridge University Press, the Charleston Library Conference, Taylor & Francis, University College London and Wolters Kluwer for their generous support in kind in the form of access to their mailing lists.

## **Methodology**

This report is an exploratory data analysis of the preferences, perceptions and self-reported behaviour of nearly two thousand (1,923) researchers who are currently using social media tools to support their research activities. In the analysis presented here we use a contrast group of 491 researchers who have yet to use social media in this way to get a little closer to understanding the factors that shape demand and take up.

We deliberately sought a sample that was rich with academics who are currently using social media in their research. We could have framed the survey invitation differently, to draw on a truly representative random sample of opinion about social media, but we chose not to. No attempt was made in this report to claim that so many per cent of academics use social media.

Almost 100,000 invitations were sent out by email and 4,012 people took part in the survey using Survey Monkey Professional (including some librarians, publishers and university administrators, whose views are not included in this report). The response rate was at least 4 per cent, but probably more like 6 per cent if we factor for the issues just mentioned.

This is a large sample by any standards. The survey was distributed online through six very different channels and this has the advantage that we were able to reach all disciplines across a very wide geographic range (with responses from 215 countries). Any systematic biases in one mailing list are likely to have been at least partially offset by different biases in the others. The final dataset is a “non-probabilistic convenience sample”. That means that we cannot generalize from these findings to the whole population of researchers with any confidence, and we certainly cannot and never intended to answer questions of the form, ‘What percentage of researchers use tool X in their research?’. What we do have, though, is a large and reasonably balanced sample of real users.

### **What social media tools do academics use in their research?**

The survey asked respondents specifically about their use in a research context of eight categories of social media tools:

- Social networking
- Blogging
- Microblogging
- Collaborative authoring tools for sharing and editing documents
- Social tagging and bookmarking
- Scheduling and meeting tools
- Conferencing
- Image or video sharing

These categories were defined by example in the questionnaire: so for each we offered a list

of generic and research-specific tools (such as Nature Network, LinkedIn and Facebook to exemplify the kinds of tools that fall under the social networking umbrella). The relative popularity of these tools among active social media users is shown in Figure 1. The percentages add up to more than 100 since many researchers are using tools in more than one category concurrently.

Figure 1: Popularity of various types of social media in research  
*Active social media users: percentages using each category of tool*

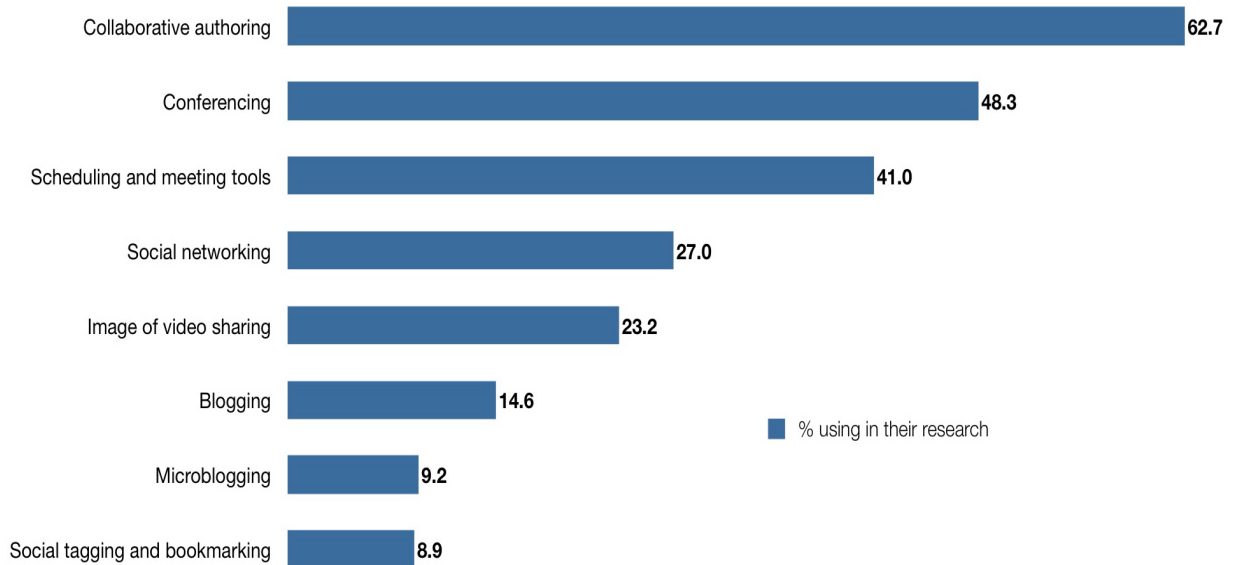
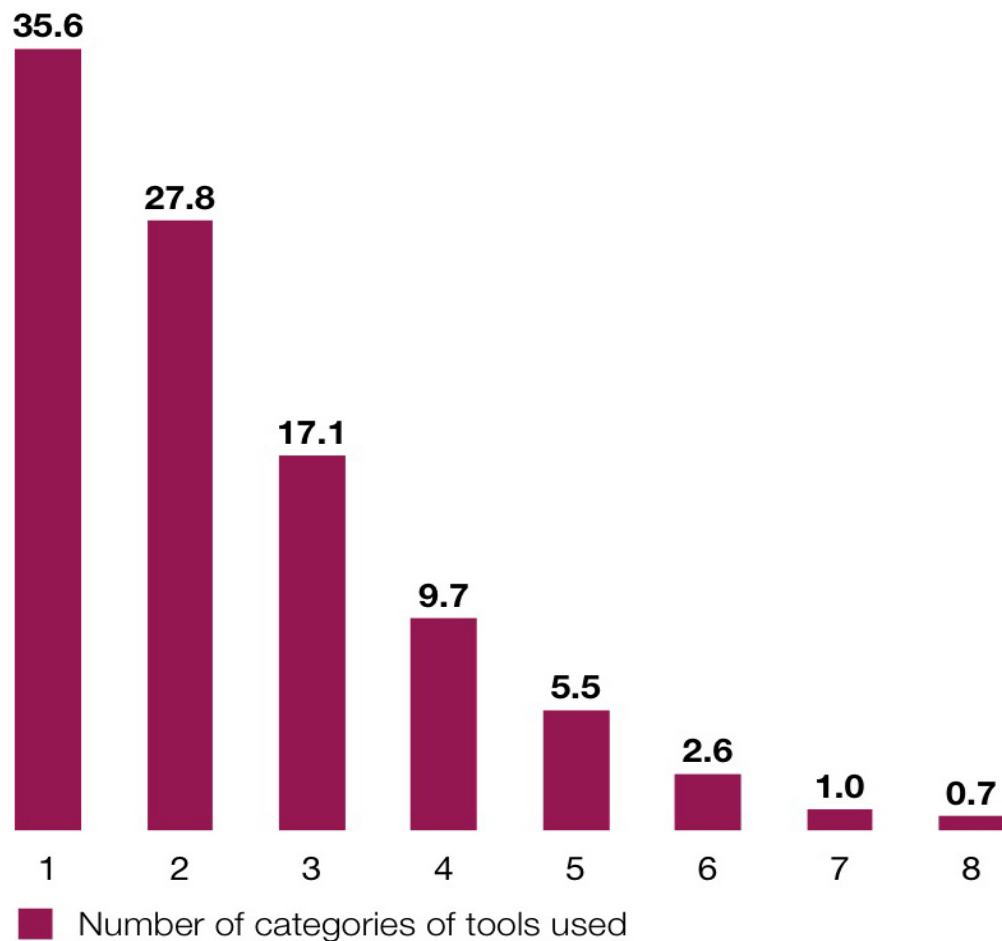


Figure 1 shows that the most established (collaborative authoring, conferencing and scheduling) tools are also the most popular. The least popular (microblogging, social tagging and bookmarking) tools are the newest, so we might hypothesise that they have yet to reach their full take up. This issue will be taken up later in this report when we look at technology adoption patterns.

While all the tools studied have found a place in the research lifecycle, a large majority of social media active researchers (63.4 per cent) use tools in only one or two categories, and very few researchers are using the full gamut of what is possible, as can be seen in Figure 2.

Figure 2: Popularity of various types of social media in research  
*Active social media users: percentages using each category of tool*



This raises the question of which tools are used together when academics include social media in their research. Figure 3 is a correlation matrix. Pairs of tools which are frequently used by the same researcher are indicated by higher values.

The two most common tool pairings are blogging / microblogging (Pearson correlation 0.46) and social networking / microblogging. The relationships are expressed in the heat map. Intense green means the tools are used by the same person, red means this is rarely the case.

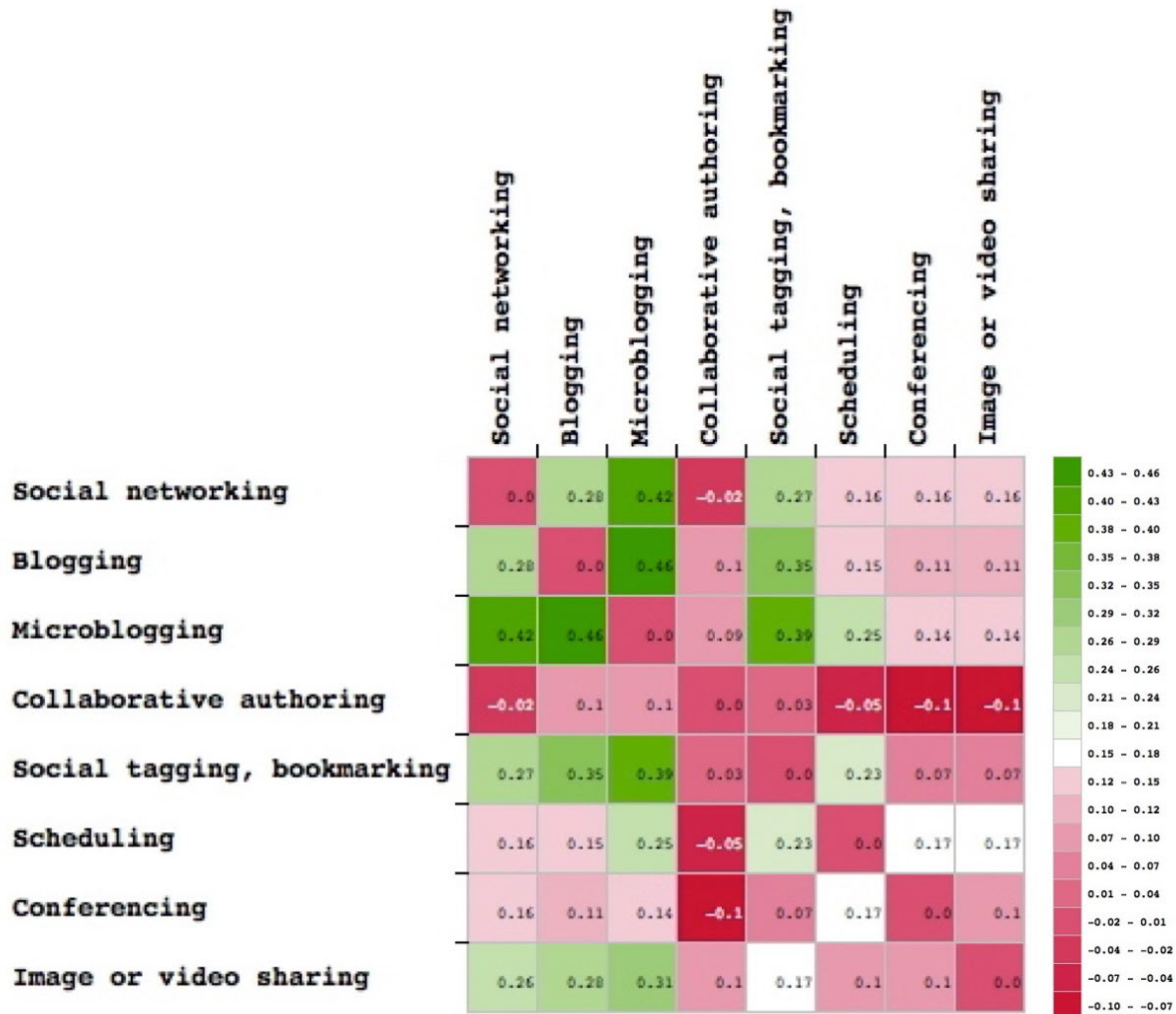


Figure 3: Use of social media in research  
*Heat map of the data*

### Who uses social media in their research?

Since we have a contrast group of researchers who do not use social media, we are in a position to compare and contrast them with those who have already taken up the challenge. This should give us a better insight into the demographics of current users, and this may offer pointers to the future. There are quite large differences in the take up of social media by subject discipline (Table 1).

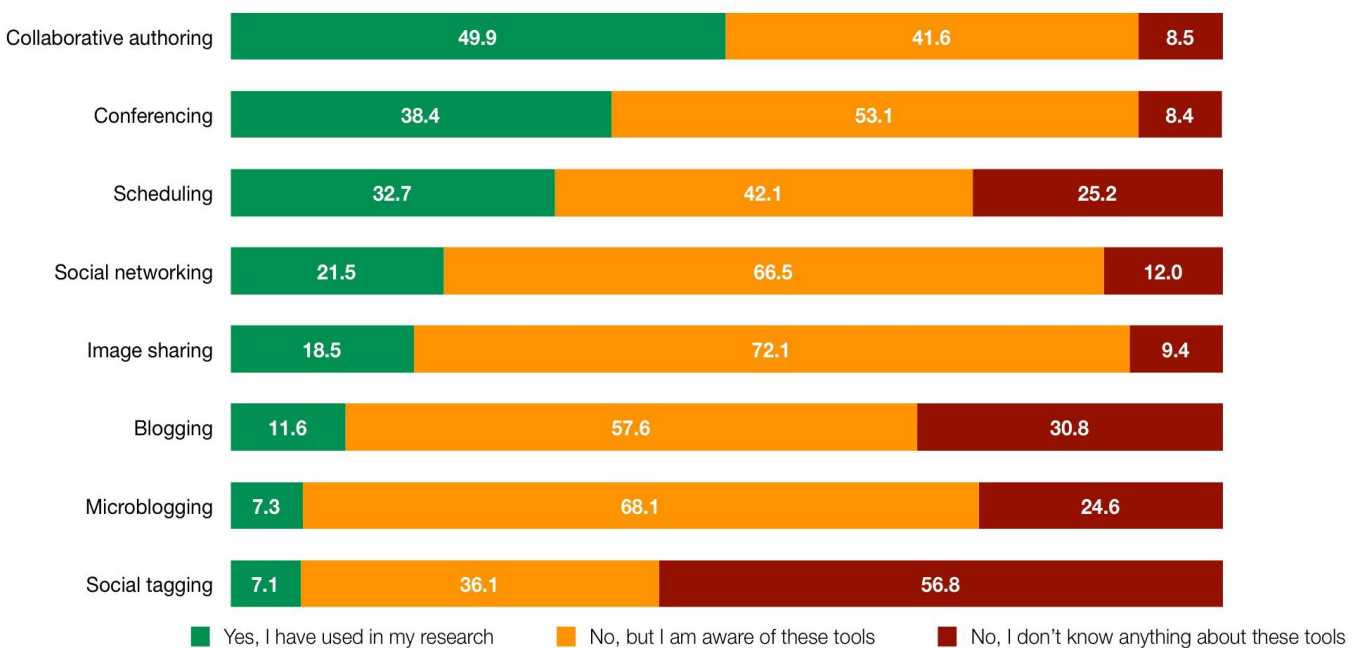
Table 1: Use and non-use of social media in research by narrow subject discipline  
*Percentages within disciplines*

*Use social media tools in research*

|   | <i>No</i>   | <i>Yes</i>  |
|---|-------------|-------------|
| <i>Earth sciences</i>                     | 5.0         | 95.0        |
| <i>Environmental sciences</i>             | 10.0        | 90.0        |
| <i>Physics</i>                            | 11.4        | 88.6        |
| <i>Pharmacology and toxicology</i>        | 12.5        | 87.5        |
| <i>Neuroscience</i>                       | 13.0        | 87.0        |
| <i>Life sciences</i>                      | 15.8        | 84.2        |
| <i>Social sciences</i>                    | 16.0        | 84.0        |
| <i>Mathematics and computer science</i>   | 16.3        | 83.7        |
| <i>Chemistry and chemical engineering</i> | 17.8        | 82.2        |
| <i>Materials science and engineering</i>  | 17.9        | 82.1        |
| <i>Arts and humanities</i>                | 20.8        | 79.2        |
| <i>Biological sciences</i>                | 21.7        | 78.3        |
| <i>Health sciences</i>                    | 25.2        | 74.8        |
| <i>Business and management</i>            | 26.3        | 73.7        |
| <b><i>All disciplines</i></b>             | <b>20.3</b> | <b>79.7</b> |

This leads on to consider awareness of social media tools among the research community.

Figure 4: Use and awareness of social media in research by type of tool  
*Yes = Researchers who use any social media tools*



While this analysis does not demonstrate that social networking and (micro)blogging will become much bigger feature of the research landscape with any certainty, the direction of travel is clear with 68.1% of respondents aware of microblogging despite just 24.6% having used this tool.

Microblogging, social tagging and bookmarking are relatively favoured by younger researchers' conferencing, image and video sharing by the over 35s. These are of course much longer established technologies, designed for different applications. Perhaps there is a role difference here, with more senior academics perhaps being more likely to be involved in project negotiations with remote partners, or preparing presentations for conferences.

It is common wisdom that the young are more comfortable and familiar with new media and it is tempting to fit these findings into a 'digital native' framework. That would be a mistake as Figure 5 demonstrates.

Figure 5: Use of social media tools by age group  
*Researchers who use at least one social media tool in their research*

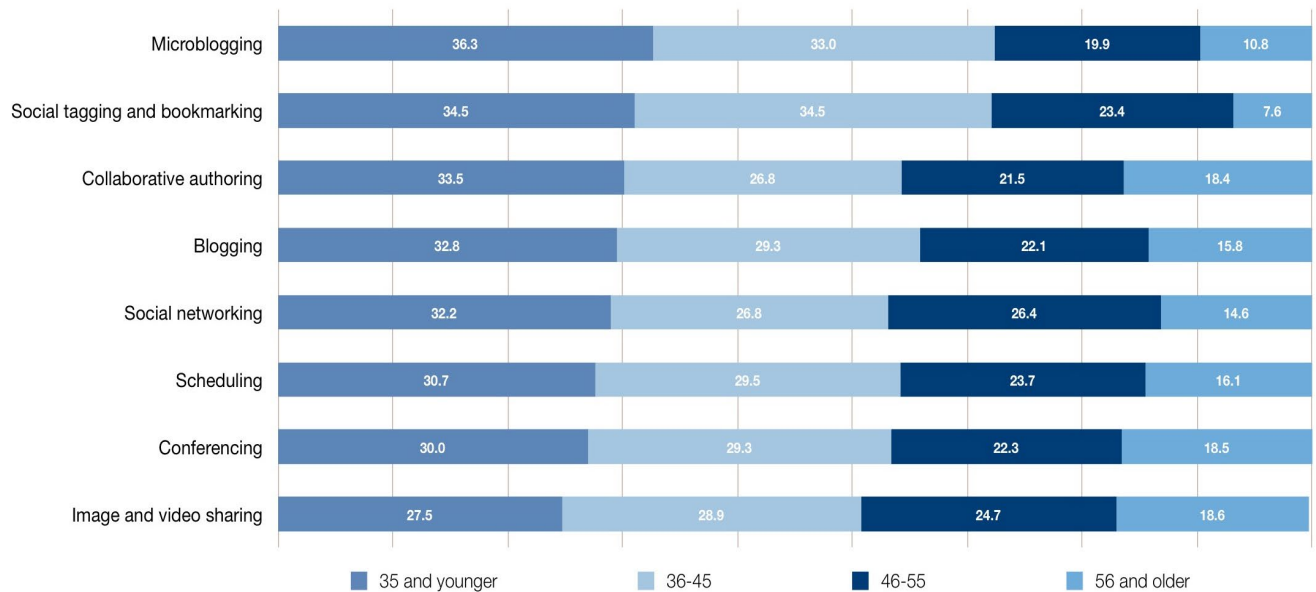
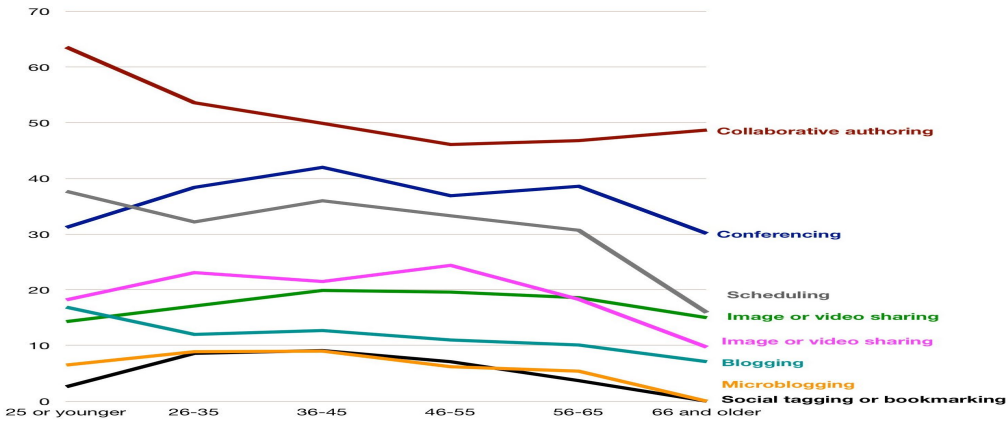


Figure 6 breaks out the age distribution of research users of each of the eight tools in more detail. It is very difficult to detect any general overall pattern. In fact, the surprise is that the distributions are relatively flat: strikingly so if we were to disregard the over 65 age band. Yes, there is a broad distinction between the under- and over-35s, and it is statistically significant: but it is absolutely not a case of yes or no.

Figure 6: Use of social media in research by age group  
*Percentage of users within age bands*



### Is it just the early adopters?

One of the key demographic questions used in the survey is Rogers' well known typology of consumer behaviours towards new technology. With any new technology, there are time delays in people's adoption. Some (the innovators) are very quick off the mark and keen to experience new things as soon as they come onto the market. Others prefer to wait, possibly anticipating a later fall in prices, possibly because they want to wait until those technologies become established and their friends and colleagues tell them they are 'must haves'.

Table 2 shows clearly that Rogers' demographic is a very powerful predictor both of actual use and of awareness of social media tools. The very high levels of awareness among the early and late majority below suggest that we are looking at a moving target: it would not be at all surprising to find much higher levels of social media use across all age bands, were we to return to this survey and repeat it in twelve months' time. This is especially so, since the data in the previous figure show that social media are by no means a digital native phenomenon.

Table 2: Use of social media in research by technology adoption behaviour  
 Percentages within technology adoption type

|           |           | ROGERS' TECHNOLOGY ADOPTION TYPE |                |               |         |  |
|-----------|-----------|----------------------------------|----------------|---------------|---------|--|
|           | Innovator | Early adopter                    | Early majority | Late majority | Laggard |  |
| Non-users | 7.4%      | 11.9%                            | 18.9%          | 28.7%         | 30.1%   |  |
| Users     | 92.6%     | 88.1%                            | 81.1%          | 71.3%         | 69.9%   |  |

Cramer's V=0.182, approx. significance=0.000

As well as a subject and age differences, take up of social media in research is patterned by geographic region lower in Asia and Northern America than in the rest of the world. ??? **CHECK I.R. COMMENTS HERE**



Table 3: Use and awareness of social media in research by geographic region  
Percentages within region

|           | REGION |                           |                  |       |        |         |             |
|-----------|--------|---------------------------|------------------|-------|--------|---------|-------------|
|           | Africa | Latin America & Caribbean | Northern America | Asia  | Europe | Oceania | Middle East |
| Non-users | 15.4%  | 18.1%                     | 24.5%            | 23.3% | 16.6%  | 18.8%   | 20.4%       |
| Users     | 84.6%  | 81.9%                     | 75.5%            | 6.7%  | 83.4%  | 81.2%   | 79.6%       |

Cramer's  $V=0.068$ , approx. significance= $0.012$

Finally in this section, sex is not a predictor of social media take-up (Table 4), there is no statistical difference in the proportions of users and non-users by men and women.

Table 4: Use of social media in research by sex  
Percentages within gender

|           | SEX    |       |
|-----------|--------|-------|
|           | Female | Male  |
| Non-users | 19.0%  | 21.4% |
| Users     | 81.0%  | 78.6% |

Cramer's  $V=0.029$ , approx. significance= $0.149$

In conclusion, compared with our contrast group of academics who do not use social media in their research, users are:

- 1.91 times more likely to be innovators or early adopters
- 1.27 times more likely to be found in the arts, humanities and social sciences
- 0.67 times less likely to be found in biosciences and health
- 1.68 times more likely to use a smartphone or other mobile device in their lives
- 1.27 times more likely to say that their main style of research is to work with collaborators in different disciplines, and 1.58 times more likely to say that peers outside of their institution are extremely influential drivers of social media use
- 1.23 times more likely to say that students are extremely influential drivers of social media use
- 0.67 times less likely to say that their main style of research is to work with colleagues in their own department

- 1.66 times more likely to strongly agree with the proposition that social media enhance academic esteem through the greater visibility it affords them
- 2.11 times more likely to use an iPad in their lives

These figures are a snapshot at one point in time, and they will be of interest to publishers and librarians in that they tell us something about the vanguard of early users. The main finding in this section is that it is simply not good enough to wrap social media use up with baggage about digital natives. Social media may not yet have fully invaded the research space, but the indicators here suggest that they are likely to make a very significant impact among most age groups over the next few years.

### Social Media and the Research Life Cycle

A key aim of the survey was to focus in on current actual users of social media and how these tools actually fit into their research workflow, using the schematic below as a guide. Although research does not happen in quite the tidy and sequential way that this diagram suggests, it is nonetheless a useful way to think about how tools are used, when, and for what purposes.

Figure 7: The research lifecycle  
*Schematic*



We asked questions using this framework for each of the eight categories of tools separately, so the resulting data is rich and complex. In fact, the complexity of the data is difficult to absorb in tabular form and is more easily comprehended in visual form. The next eight figures (8 to 15) are

radar or 'spider' diagrams and they need a little explanation. Each figure represents a different social media tools. The outer points on the wheel correspond to the diagram above: reasons why that particular tool might be used (or not used) in a research project and at what point.

The spokes of the wheel are what the users tell us about perceived usefulness on a four point scale where 4='extremely useful'. The coloured lines represent the four broad subject categories employed in this study.

Taking the first (Figure 8) as an example, we can see instantly that biosciences and health occupy the largest area (i.e. these users find social networking generally more useful than the other disciplines), business and management the smallest area (i.e. less useful). The shape of the web is very similar for all four subjects and the perception is that social networking is most useful for the dissemination of research findings, in research collaboration and, perhaps surprisingly, in helping to identify research opportunities.

A very different pattern can be seen in the case of Figure 13 (scheduling tools) which self-evidently find major application in research management and collaboration but nowhere else. Two overall impressions are formed by quickly scanning these diagrams. The first is the very high incidence of points that lie in the range 2 (useful) to 3 (very useful). Social media have found a place in the research workflow for many academics and are proving their worth. The other impression is that with the exception of scheduling tools, which have a very limited and specific use, social media are generally finding useful application at all phases of the research lifecycle.

Figure 8: Social networking and the research lifecycle  
*Perceived usefulness on a four-point scale where 1=Not at all useful and 4=Extremely useful*

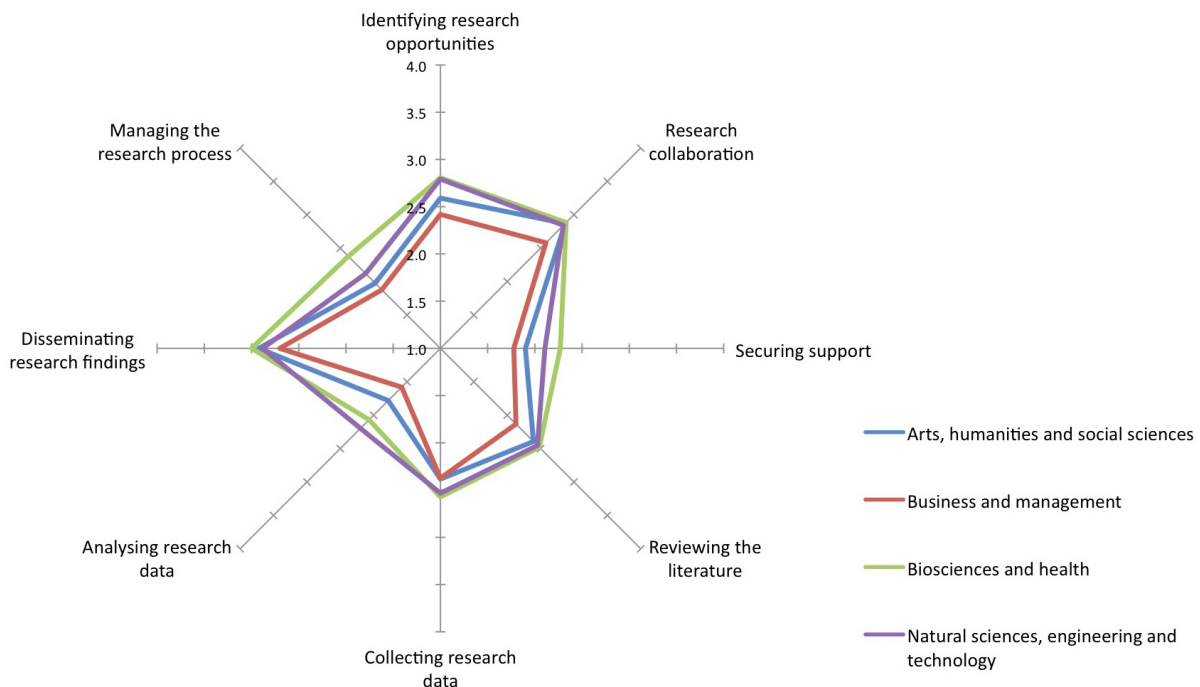


Figure 9: Blogging and the research lifecycle  
*Perceived usefulness on a four-point scale where 1=Not at all useful and 4=Extremely useful*

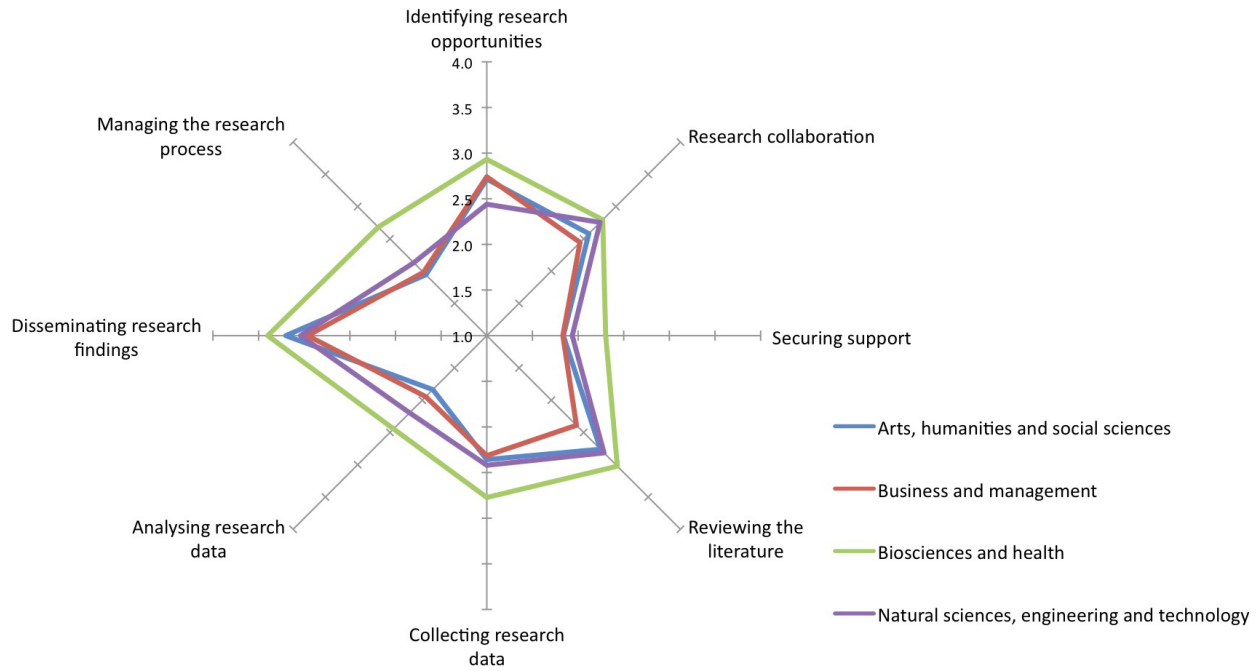


Figure 10: Microblogging and the research lifecycle  
*Perceived usefulness on a four-point scale where 1=Not at all useful and 4=Extremely useful*

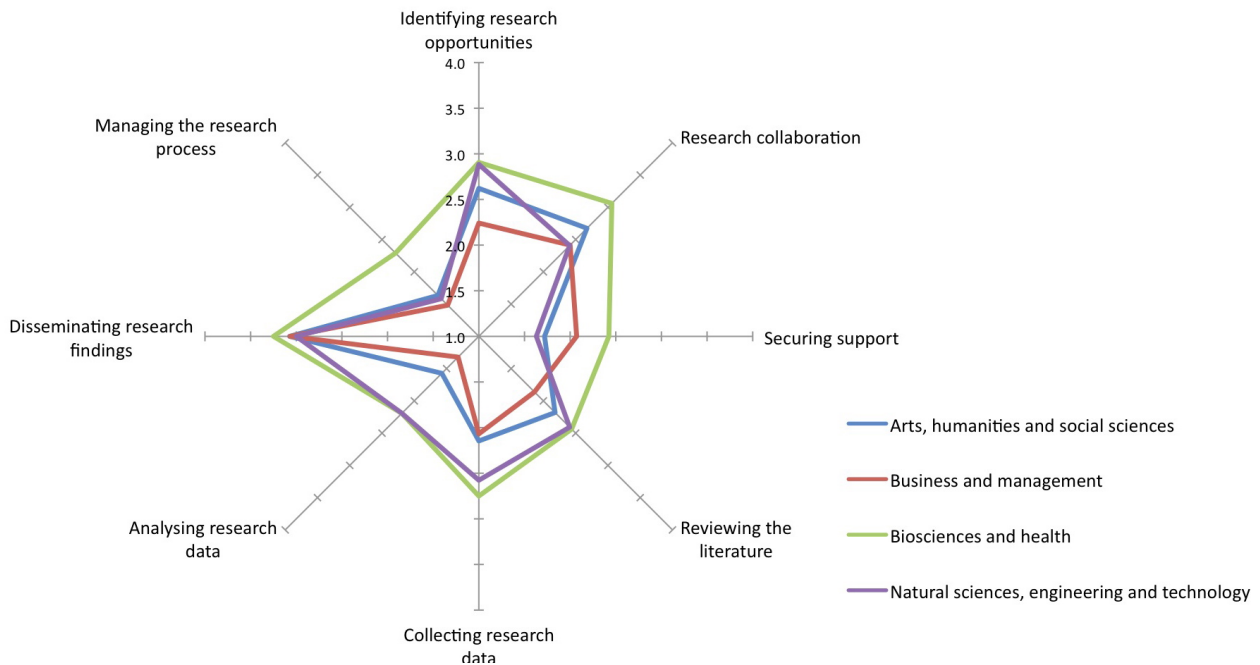


Figure 11: Collaborative authoring and the research lifecycle  
*Perceived usefulness on a four-point scale where 1=Not at all useful and 4=Extremely useful*

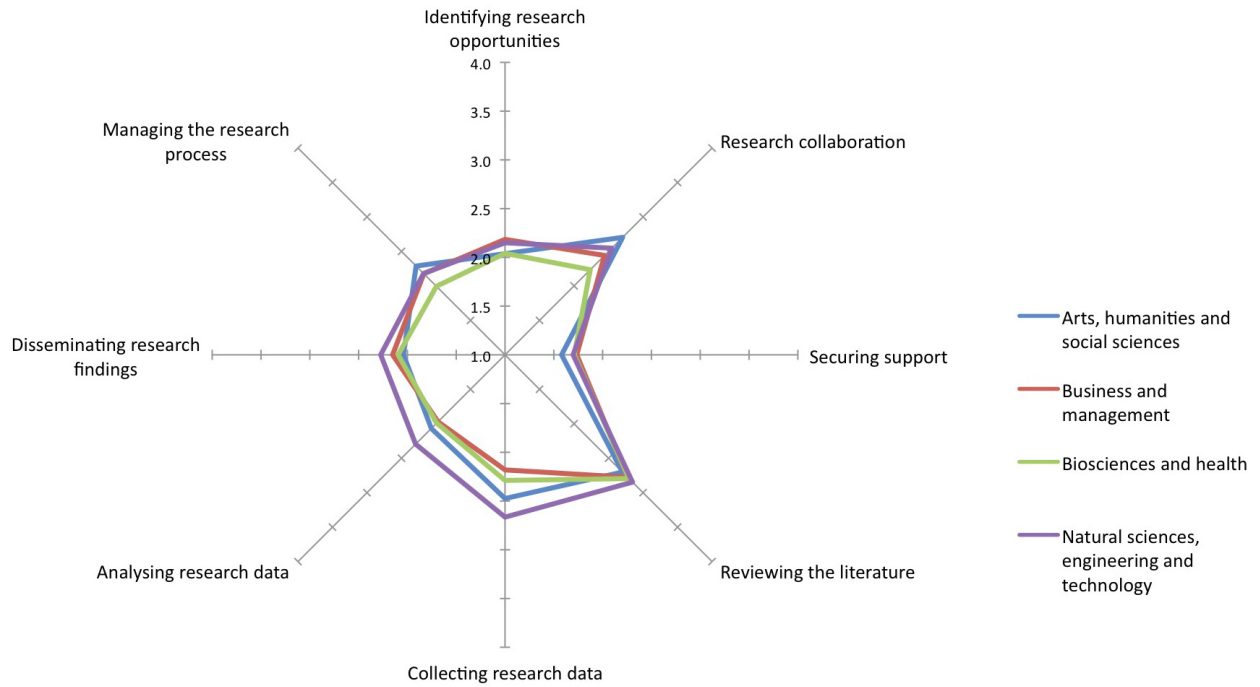


Figure 12: Social tagging and bookmarking and the research lifecycle  
*Perceived usefulness on a four-point scale where 1=Not at all useful and 4=Extremely useful*

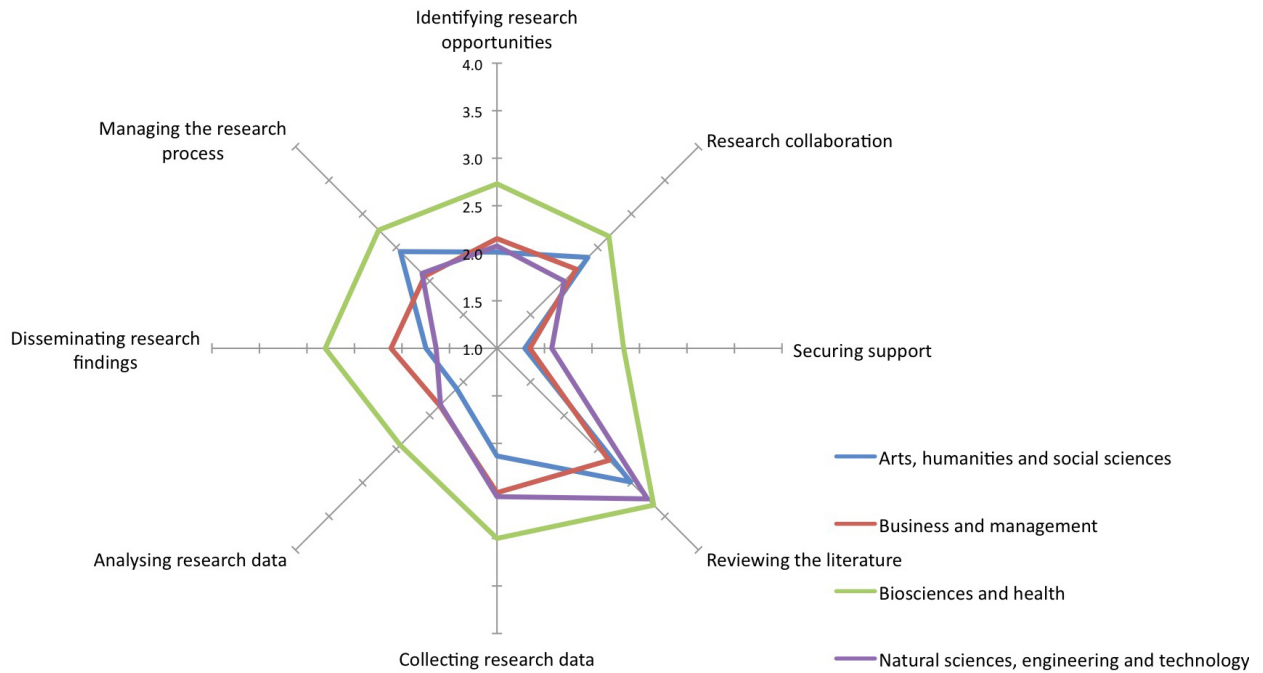


Figure 13: Scheduling tools and the research lifecycle

*Perceived usefulness on a four-point scale where 1=Not at all useful and 4=Extremely useful*

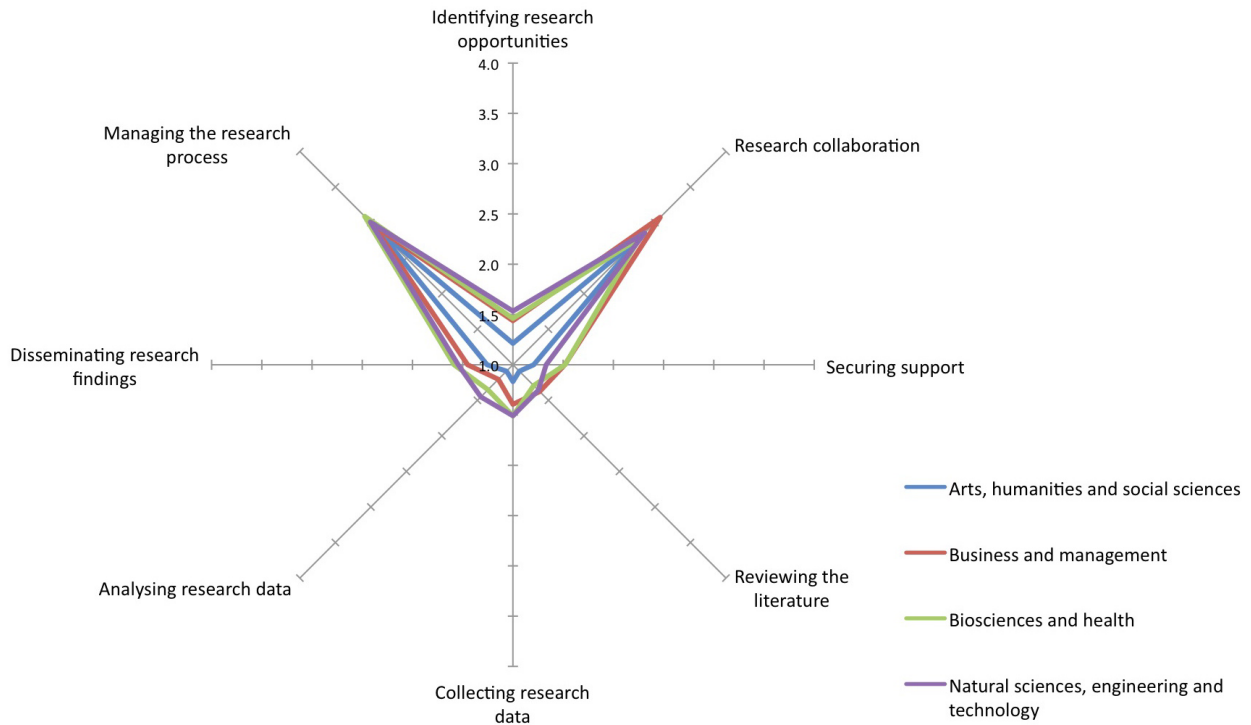


Figure 14: Conferencing tools and the research lifecycle

*Perceived usefulness on a four-point scale where 1=Not at all useful and 4=Extremely useful*

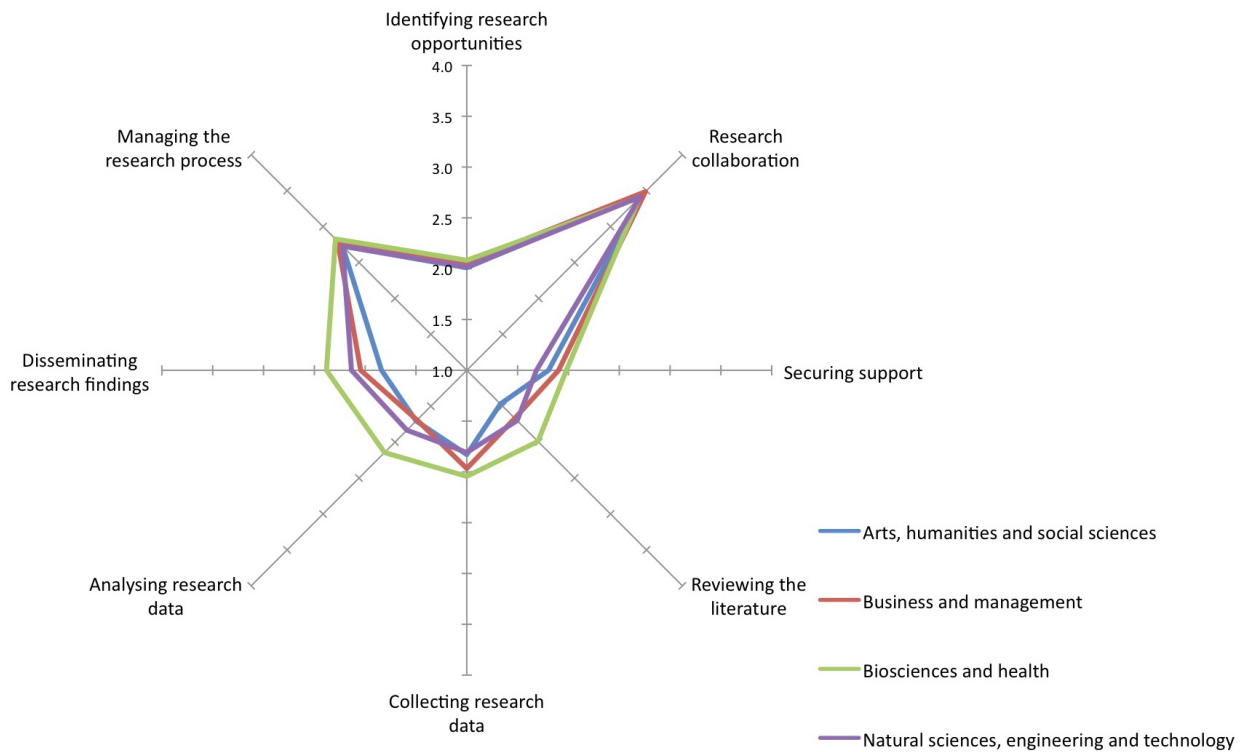
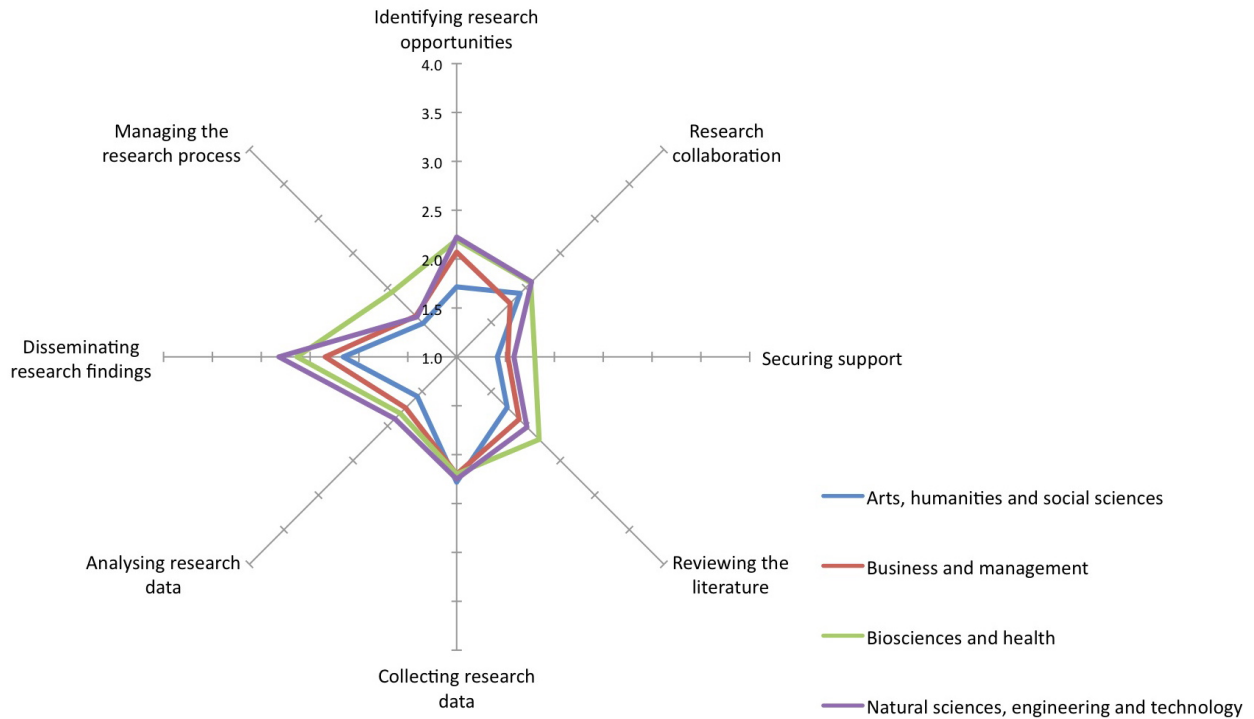


Figure 15: Image or video sharing and the research lifecycle  
*Perceived usefulness on a four-point scale where 1=Not at all useful and 4=Extremely useful*



For each group of social media tools, we invited respondents to enter their preferred tools in a free text box. Represented as a word cloud (Figure 16) we see a very familiar list of household brands, not tools developed specifically for research lifecycle management. It seems that researchers, who also use these generic brands in their personal lives outside work, are appropriating them for their research. Does this mean that there may be a gap in the marketplace for more bespoke, custom tools? There are opportunities for these household brands to develop into the academic sphere, possibly. We will explore this question further in the focus groups.

Figure 16: Social media tools most frequently mentioned  
*Word cloud where font size is proportion to frequency of mentions*



## Drivers, perceived benefits and barriers to social media use in research

In this section, we look at the factors that tend to dispose researchers favourably towards social media, or turn them off.

### Drivers

Figure 17 tabulates the reasons why researchers use social media. The most important are personal initiative, the fact that technology means these tools are easily available and can be used, and their perceived contribution to faster, more efficient research.

Figure 17: Drivers of social media use in research

*Mean preference scores where 0=not at all influential and 4=extremely influential*

|                                     |             |
|-------------------------------------|-------------|
| <b>Personal initiative</b>          | <b>3.25</b> |
| <b>Technology</b>                   | <b>2.99</b> |
| <b>Need for speed</b>               | <b>2.93</b> |
| <b>Peers outside my institution</b> | <b>2.81</b> |
| <b>Colleagues at my institution</b> | <b>2.68</b> |
| <b>Students</b>                     | <b>2.63</b> |
| <b>Management</b>                   | <b>2.45</b> |

The decisive driver to use social media is the pressure from peers outside of the respondent's own institution. Collaborative research across remote institutions clearly demands new solutions to the problems of research co-ordination, management and communication that are more sophisticated than email or telephone. For those users for whom outside peer pressure is less of an issue, personal motivation comes in as the next most important driver. This is entirely consistent with the earlier findings that innovators and early adopters are trailblazing the use of social media. These tools are generally very intuitive and require little or no third party maintenance, so an issue for our focus groups will be to tease out whether 'personal initiative' is a positive, or a negative in these sense that universities are simply not providing appropriate research lifecycle management tools?

The third most important driver is the perceived the need for greater speed. The competitive pressures on researchers are more acute than they have ever been, so any contribution towards greater efficiency in the management of any area of research is likely to be warmly welcomed and taken up.

### Perceived benefits

Researchers associate a number of perceived benefits with social media use (Figure 26) and the key really is the ability they offer to be able to communicate effectively with diverse audiences, often at remote distances.

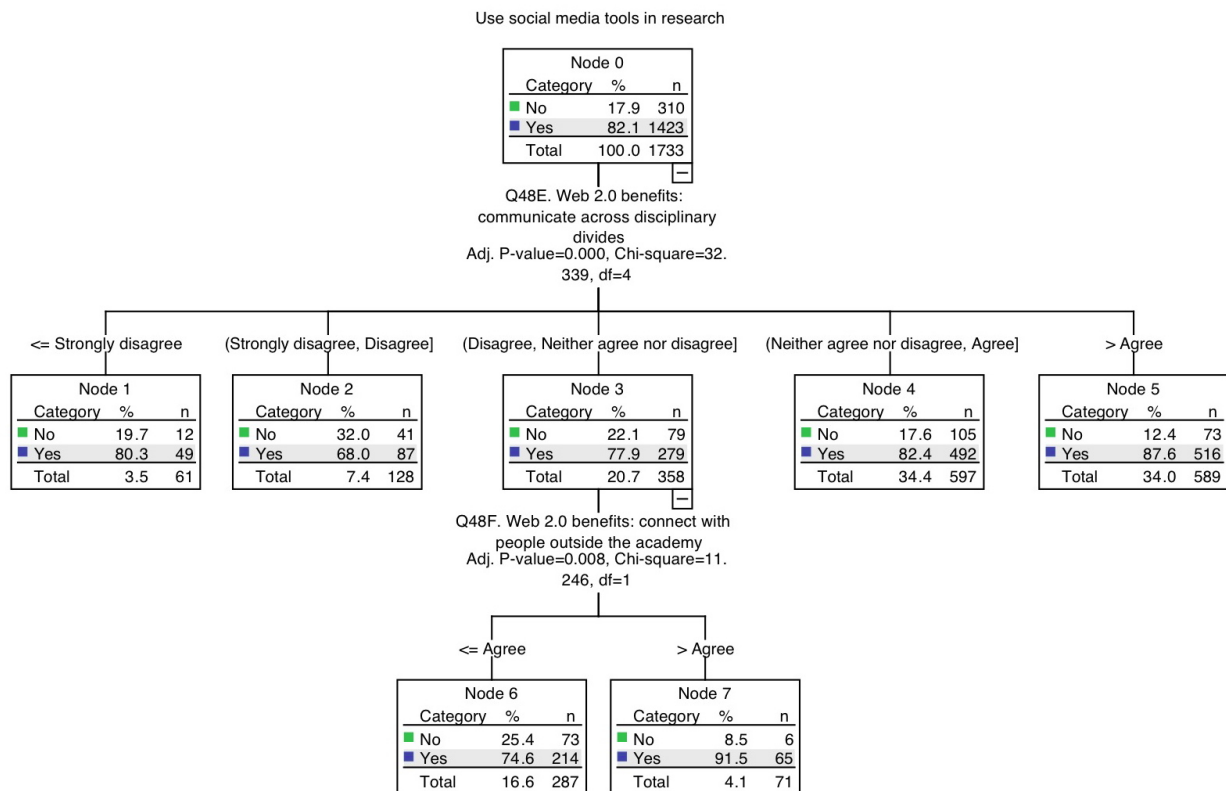


Figure 18: Perceived benefits of social media use in research  
 Mean agreement scores, where 1=strongly disagree, 5=strongly agree

|  |      |
|--|------|
| Communicate internationally              | 4.23 |
| Faster dissemination                     | 4.07 |
| Connect with people outside the academy  | 4.05 |
| Ability to target research communities   | 3.95 |
| Greater access to research content       | 3.92 |
| Ability to cross disciplinary divides    | 3.84 |
| Attract more citations                   | 3.57 |
| Greater esteem through higher visibility | 3.54 |

These findings suggest that researchers associate social media positively with a wide range of benefits. But which are the most important in predicting actual use? The next classification tree (Figure 19) strongly suggests that the ability to cross disciplinary divides, is the killer application, followed by the ability to reach out across geographical limitations.

Figure 19: Perceived benefits of social media use in research  
 Classification tree and chi-squared statistics

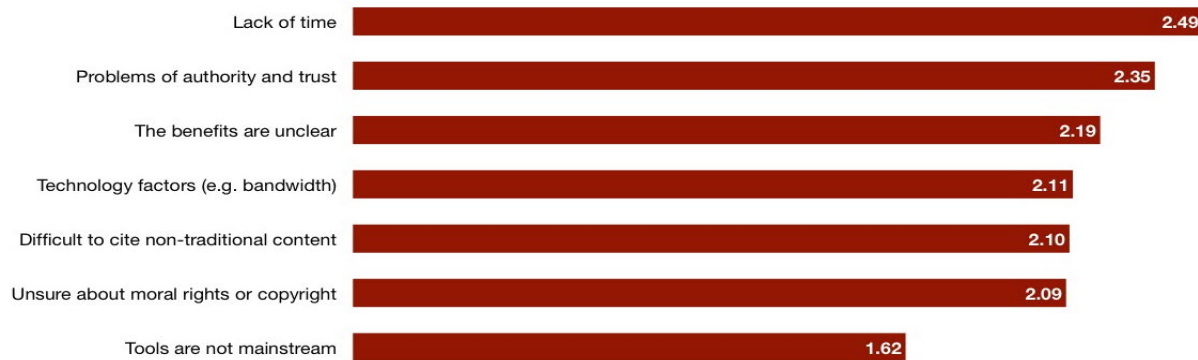


## Barriers

We also asked respondents seven questions about factors that perhaps inhibited them from using social media in their research. Figure 28 below tabulates these findings.

Figure 20: Barriers to social media in research

Mean preference scores where 0=not at all influential and 4=extremely influential



The most important barrier, in terms of actual use, is a lack of clarity over the precise benefits that might accrue to the researcher. There are, as we have seen, many users who have discovered the benefits for themselves, through personal curiosity, trial and error. But, for the undecided, there is much uncertainty and this constitutes a real barrier.

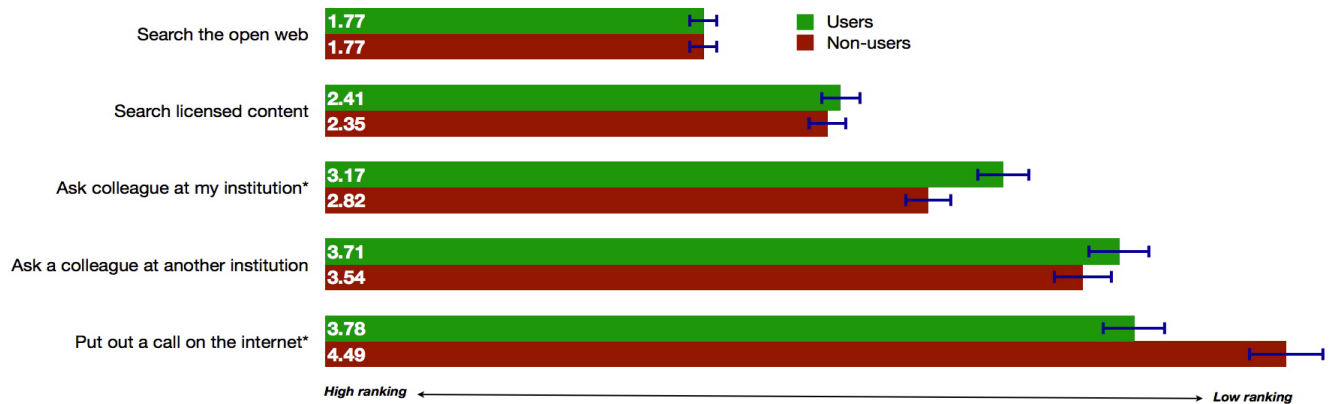
### Discovery, access and dissemination

Of course, we have to understand social media use in the broader scholarly communication context of how academics discover, access and disseminate scholarly information.

We asked researchers to rate their preferences for the different ways they can search for and discover scholarly content (Figure 21). By far their most favoured route is to search the open web, followed by licensed e-content made available through their institutional library. The error bars represent 95 per cent confidence intervals around the mean, so we can see that there is no discernible difference between social media users and our contrast group in this respect. Both groups are also equally likely to consult and expert at another institution. Where they do differ is that the social media active researcher is much more likely to put out a general call for information, perhaps on a listserv or a social network. They are also less likely to seek out an expert in their own institution. Whether this indicative of a degree of isolation where they work, or whether they just think in broader terms is an issue for focus group follow up.

Figure 21: Scholarly information discovery preferences: social media users and non-users

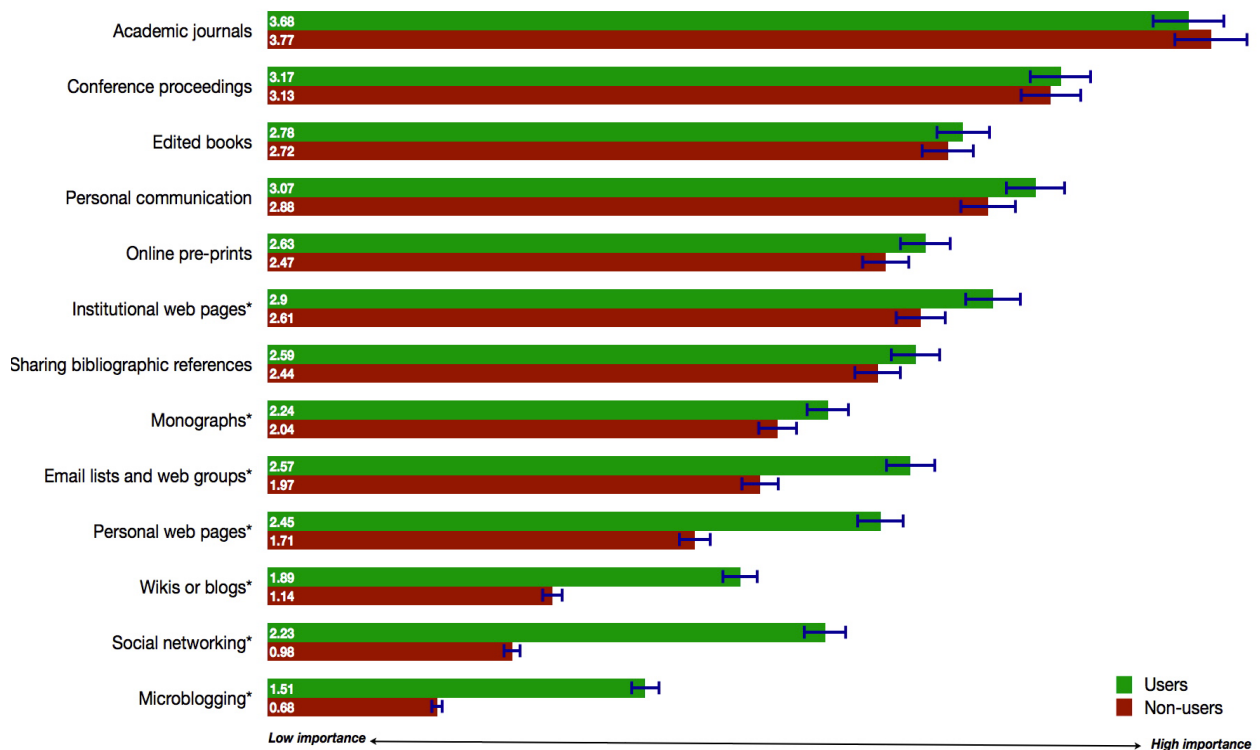
Preferences expressed on a scale where 1=Most favoured and 5=Least favoured



When we turn to their preferred modes for disseminating research, again we find no difference in terms of the way that users and non-users of social media regard traditional publishing channels (Figure 22). Long-established formats such as the journal, conference proceedings and edited books are still king. What is different, though, is that active social media users are far more 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. This is unsurprising, but the rapid rise of personal dissemination brings with it some big implications for publishers (especially) and librarians.

Figure 22: Importance attached to specific dissemination channels: social media users and non-users

*Preferences expressed on a scale where 1=Not at all important and 4=Extremely important*



## Recommendations to publishers and librarians

We took the opportunity to ask researchers to think about what publishers and librarians could do to make their lives easier.

The strong message to publishers is that researchers want to be able to read content on any platform without hindrance, especially more senior researchers (see Table 5). In next place, they want publishers to make more progress with linking journal articles with the data that underpins their argument. The consensus for RSS, multimedia and multilingual capabilities is much weaker.

Table 5: Recommendations for publishers by age band

*Preferences expressed on a scale where 1=Highest priority and 5=Lowest priority*

*Insert table*

Table 6: Recommendations for publishers by subject

*Preferences expressed on a scale where 1=Highest priority and 5=Lowest priority*

*Insert table*

The message to librarians is even clearer (Table 7). Way at the top of the researcher wish list would be the ability to search across all local licensed e-content using a simple search tool like Google. By comparison, they do not seem at all interested in libraries moving into the social media space, either in a curatorial fashion (cataloguing and preserving nontraditional digital materials) or by providing social media 'bells and whistles' to the library catalogue.

Table 7: Recommendations for librarians by age band

*Preferences expressed on a scale where 1=Highest priority and 5=Lowest priority*

*Insert table*

Again, there is some variation by subject, but little of any statistical significance. Two data points that stand out are that both social science and business and management researchers are much keener on socially tagging the library catalogue than expected.

Table 8: Recommendations for librarians by subject

*Preferences expressed on a scale where 1=Highest priority and 5=Lowest priority*

*Insert table*