Social media and research workflow

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Key findings

1	Social media have found serious application at all points of the research lifecycle. The three most popular social media tools in a research setting are those for collaborative authoring, conferencing, and scheduling meetings.	*Fig.1, p.5*
2	Awareness of social media among members of the research community is high, but there is a large gap between awareness and actual use for the majority of tools.	*Fig.6, p.9*
3	Researchers in business, health, the biosciences, and the arts and humanities are less likely to use social media professionally than their peers in other parts of the academy.	*Fig.7, p.10*
4	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. As we have said many times before, the future is now!	*Fig.9, p.11* *Fig.11, p.12*
5	Age is in fact a rather poor predictor of social media use in a research context. Rogers' well-known model of technology adoption offers a far better explanation for take up: innovators and early adopters are 1.26 times more likely to use social media professionally.	*Tab.2, p.13*
6	Professional users of social media are 1.68 times more likely to use a smartphone or other mobile device than non-users; and 2.11 times more likely to use an iPad. This is consistent with the previous key finding.	*Text, p.15*
7	Researchers are using social media tools to support every phase 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.	*Figs 15-22, pp 17-20.*
8	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. Is this a sign, perhaps, that there may be a gap in the market for simple bespoke tools?	*Fig.23, p.21*
9	The key driver for the take up of social media is pressure exerted by peers outside of the researcher's own institution. Social media are helping to fulfill the demand for cheap, instant communication between researchers fuelled by the growth of collaborative and interdisciplinary research.	*Fig.25, p.23*

10 Use of social media is usually down to personal initiative, so a clear understanding of the capabilities and benefits of these tools is essential. Time-poor researchers are still unclear about the benefits of social media and this represents a major barrier to their take up. They also have serious concerns about the authenticity of crowd-sourced information.

Fig.28, p.25

11 Users and non-users of social media express almost identical preferences when they look for scholarly information. Their first preference is for the open web, followed by searching licensed e-content through their libraries, followed by asking a colleague. The only difference we could detect in this survey between users and non-users is that the former are more likely to put out a general call for information on a list serv or social network.

Fig.30, p.26

12 We find a similar pattern with regard to research dissemination. The traditional channels (especially journals, conference proceedings and edited books) are greatly and equally favoured by both social media users and non-users over informal channels such as blogs. Researchers continue to back dissemination routes that they know and trust. It is clear that social media users see informal tools as a *complement* to the existing system of scholarly publishing, not as a replacement. As a result, personal dissemination is on a steep upward curve, with implications for publishers especially.

Fig.31, p.27

13 Researchers, especially senior researchers, want above all for publishers to make content readable on all platforms. This, together with more progress in linking articles to their underlying data. They want the basics to work well, not more `bells and whistles'.

Tab.5, p.28

14 Researchers also sent a clear message to librarians. At the top of their wish list, and by a big margin, is a desire to be able to search across the full text of all locally-held licensed e-content using a simple interface like Google. This is seen as a much greater potential benefit than libraries moving into the social media space by offering users, for example, an opportunity to socially tag the library catalogue.

Tab.7, p.29

Background and aims of the research

The Charleston Observatory, established in 2009, is a mechanism by which the exciting ideas raised at the annual Charleston Library Conference can be researched and the results reported back to provide continuity and build.

The Observatory offers a platform where evidence can be collected globally in a robust manner and where all the key information stakeholders (librarians, publishers, agents and academics) can come together and share data for the benefit of all.

The Observatory's first project, sponsored by ebrary and Baker & Taylor and undertaken by CIBER, was to quantify the impact of the world-wide recession on libraries. The research received widespread acclaim and was in published in a number of international journals and cited in The Scientist. The topic this year, social media and how they are impacting upon research practice is just as big.

The aims of this study are to answer the following questions:

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

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.

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. Our 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.

Surveys have strengths and weaknesses. They offer an excellent starting point for exploratory research, because unexpected patterns often emerge, and these are springboards for asking new questions, or old questions in a different way. In the next phase of this study, we will be exposing the key findings from the survey to the critical gaze of researchers by running a series of focus groups to put some flesh on the bare bones of the numbers presented here.

What social media tools do academics use in their research?

This is not a conventional survey. 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 is made in this report to claim that so many per cent of academics use social media. Our email invitation was deliberately couched in such a way that we actively encouraged social media users to complete the questionnaire. To use an analogy, we are really interested in the views of drivers, not non-drivers, when it comes to their preferences for driving gloves.

In this first section of the report, however, we compare survey completions by the 1,923 academics who said they are currently using at least one category of social media tools for research purposes with a contrast group of 491 researchers who do not use social media. The purpose is to try to find answers to the questions like `Who uses social media in their research?' and `What tools do they use?'.

The survey asked respondents specifically about their use in a research context of eight categories of social media tools:
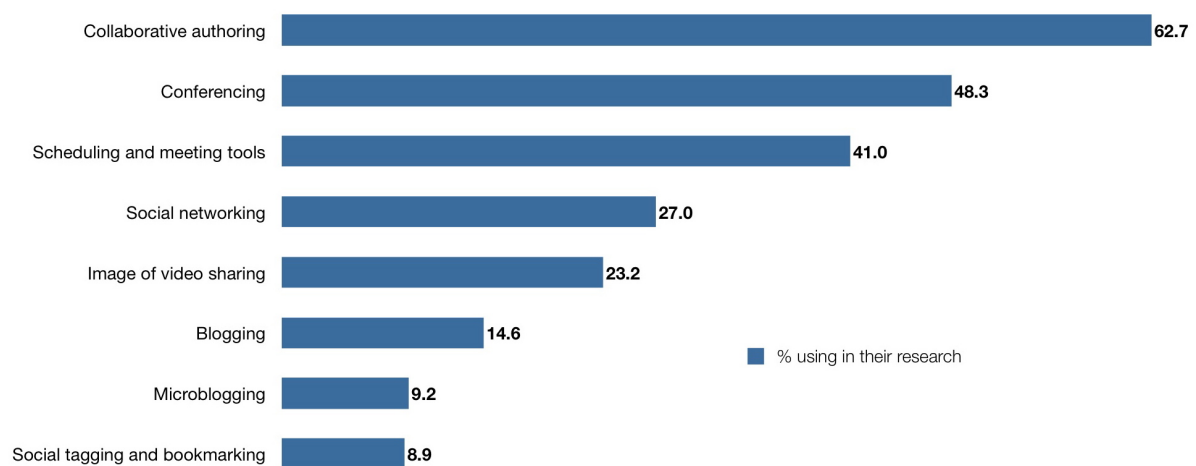
- Social networking
- Blogging
- Microblogging
- Collaborative authoring tools for sharing and editing documents
- Social tagging and bookmarking
- Scheduling and meeting tools
- Conferencing
- Image or video sharing

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

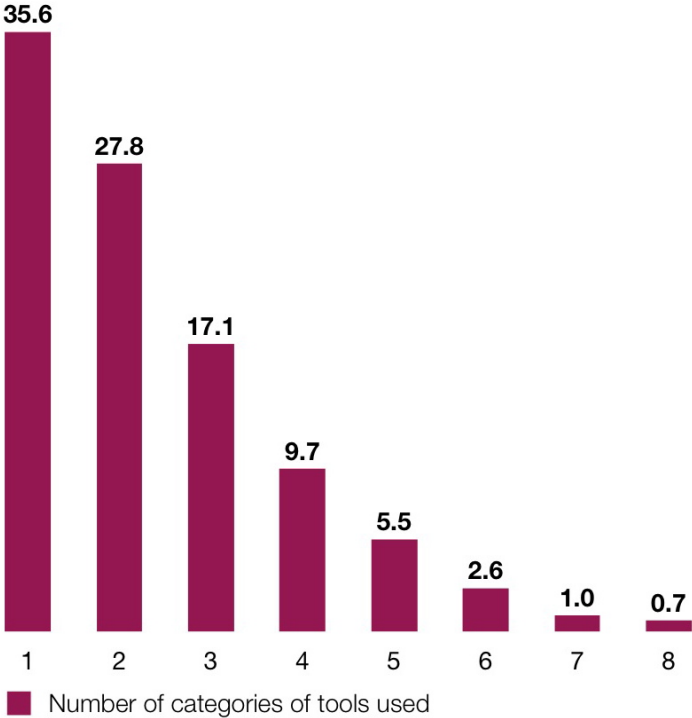| Category	% using in their research
Collaborative authoring	62.7
Conferencing	48.3
Scheduling and meeting tools	41.0
Social networking	27.0
Image of video sharing	23.2
Blogging	14.6
Microblogging	9.2
Social tagging and bookmarking	8.9

Social media and research workflow

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 `go together' when academics start to incorporate social media into their research workflow? Table 1 is a correlation matrix. Pairs of tools that are frequently used by the same researcher are indicated by higher values. Small or negative values indicate that a particular pair of tools is rarely in combination.

In this matrix, the two most common tool pairings are blogging / microblogging (Pearson correlation 0.46) and social networking / microblogging (0.42).   The relationships may be easier to see if the data in Table 1 are presented in a more visual form as a heat map (Figure 3), where intense green means that the tools are often used by the same person, and where red means that this is only rarely the case.

Social media and research workflow

Table 1: Use of social media in research: correlation matrix
Pearson coefficients (two-tailed)

	Social networking	Blogging	Microblogging	Collaborative authoring	Social tagging and bookmarking	Scheduling	Conferencing	Image and video sharing
Social networking		0.28**	0.42**	-0.02	0.27**	0.16**	0.16**	0.26**
Blogging	0.28**		0.46**	0.10**	0.35**	0.15**	0.11**	0.28**
Microblogging	0.42**	0.46**		0.09**	0.39**	0.25**	0.14**	0.31**
Collaborative authoring	-0.02	0.10**	0.10**		0.03	-0.5*	-0.10**	0.10**
Social tagging, bookmarking	0.27**	0.35**	0.39**	0.03		0.23**	0.07**	0.20**
Scheduling	0.16**	0.15**	0.25**	-0.5*	0.23**		0.17**	0.10**
Conferencing	0.16**	0.11**	0.14**	-0.10**	0.07**	0.17**		0.12**
Image and video sharing	0.26**	0.28**	0.31**	0.10**	0.17**	0.10**	0.10**	

**Statistically significant at the 1 per cent level
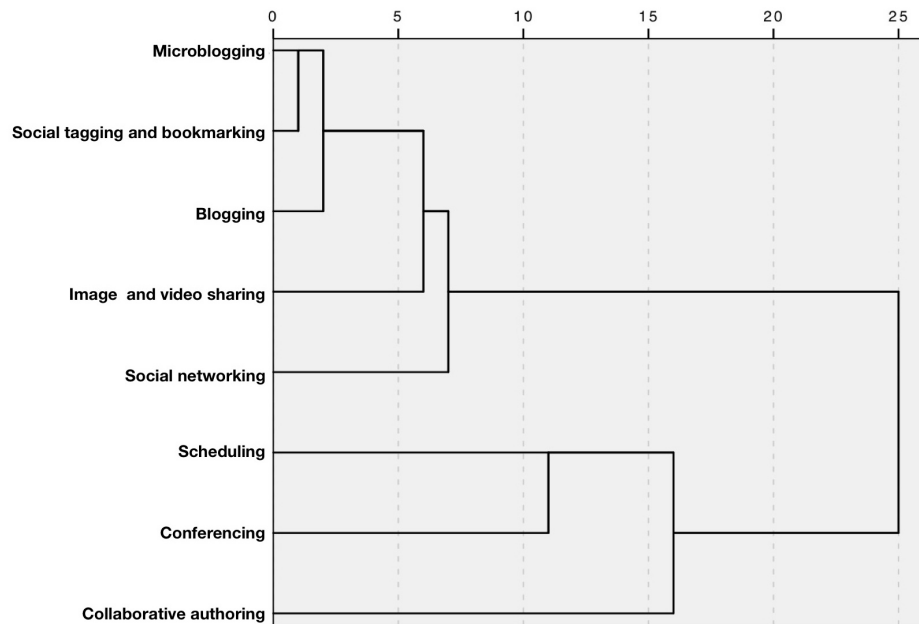* Statistically significant at the 5 per cent level

Figure 3: Use of social media in research
Heat map of the data in Table 1
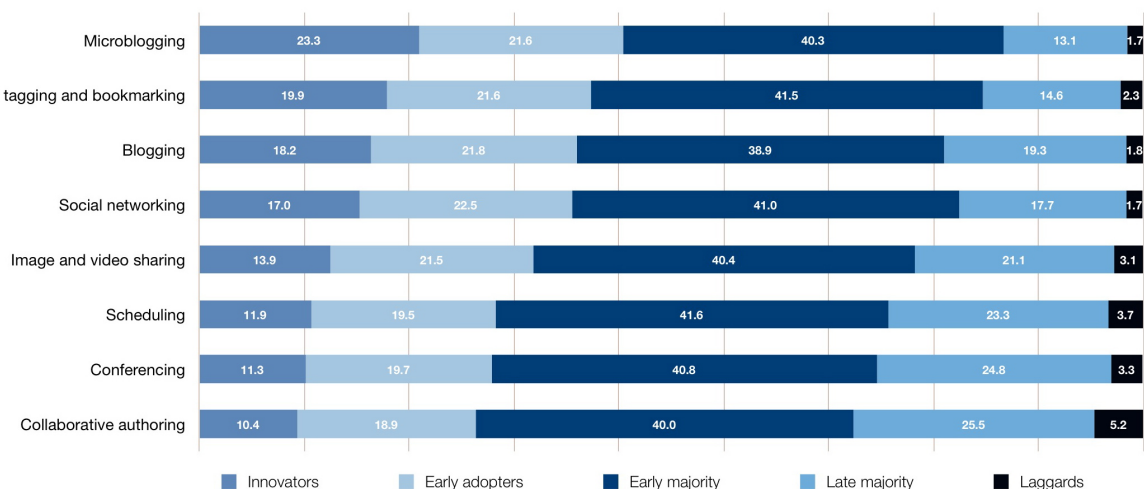
Social media and research workflow

Further evidence that the take up of social media tools is structured in some way and not random can be seen in the results of an automatic classification (Figure 4) using cluster analysis. This strongly suggests that there are two broad kinds of academic social media user. The first group makes considerable joint use of microblogging, social tagging / bookmarking and blogging. These researchers are also more likely to engage in social networking and image or video sharing. The other group focuses around longer established social media tools for scheduling meetings, organizing their diaries and sharing documents. Whether this dichotomy represents a real schism, or whether the gap will close as social media tools gain more traction remains to be seen.

Figure 4: Use of social media in research: cluster analysis
Dendrogram (Ward's method, squared Euclidean distances)

This interpretation certainly fits with the data in Figure 5, which breaks out the users of each social media tool by their technology adoption behaviour. The tools that characterize our first cluster above are also those that are the least established: those for which the smallest numbers of early and late majority and laggards have yet expressed an interest.

Figure 5: Use of social media in research: innovation behaviour by category
Percentages of Rogers' innovation types within each tool category

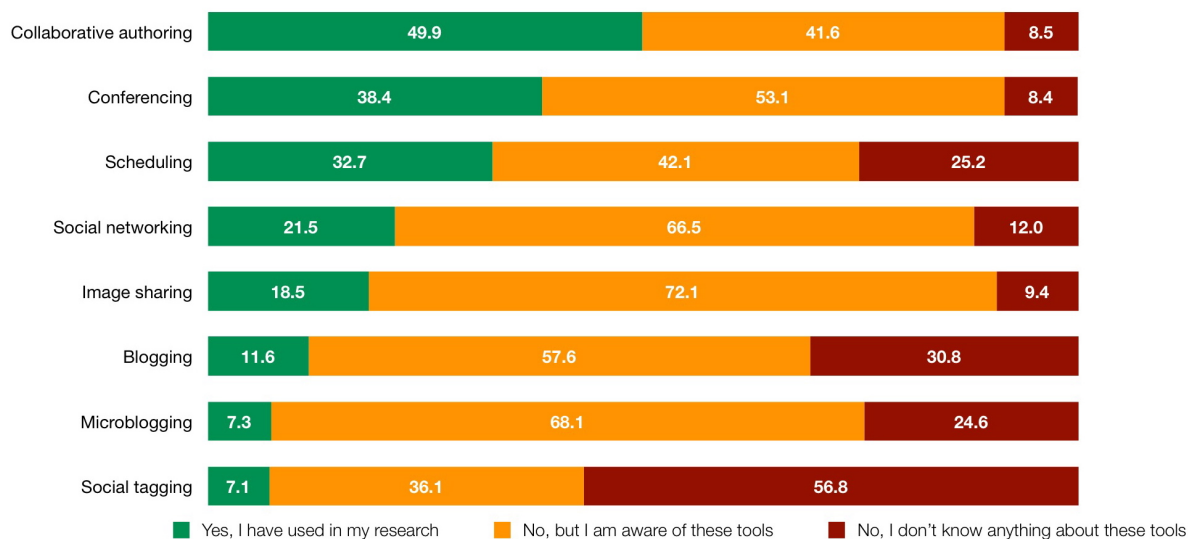|	Innovators	Early adopters	Early majority	Late majority	Laggards
Microblogging	23.3	21.6	40.3	13.1	1.7
Social tagging and bookmarking	19.9	21.6	41.5	14.6	2.3
Blogging	18.2	21.8	38.9	19.3	1.8
Social networking	17.0	22.5	41.0	17.7	1.7
Image and video sharing	13.9	21.5	40.4	21.1	3.1
Scheduling	11.9	19.5	41.6	23.3	3.7
Conferencing	11.3	19.7	40.8	24.8	3.3
Collaborative authoring	10.4	18.9	40.0	25.5	5.2

Social media and research workflow

These happen to be the tools with the lowest current levels of awareness among researchers (Figure 6).

Figure 6: Use and awareness of social media in research by type of tool
Yes = Researchers who use any social media tools

Tool	Yes, I have used in my research	No, but I am aware of these tools	No, I don't know anything about these tools
Collaborative authoring	49.9	41.6	8.5
Conferencing	38.4	53.1	8.4
Scheduling	32.7	42.1	25.2
Social networking	21.5	66.5	12.0
Image sharing	18.5	72.1	9.4
Blogging	11.6	57.6	30.8
Microblogging	7.3	68.1	24.6
Social tagging	7.1	36.1	56.8

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 and that outcome cannot be discounted.

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 2).

Table 2: Use and non-use of social media in research by narrow subject discipline
Percentages within disciplines

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

Social media and research workflow

Using a tree classification (an automatic procedure for detecting similar subgroups using chi-squared statistics) we can see, in Figure 7**,** that there is a big divide of nearly ten percentage points along subject lines. Academics in business, health, the biosciences, and the arts and humanities are less likely to use social media for research purposes than their peers in other parts of the academy.

Figure 7: Use of social media in research by narrow subject discipline
Classification tree and chi-squared statistics

Use social media tools in research

Node 0		
Category	%	n
■ No	20.3	491
■ Yes	79.7	1923
Total	100.0	2414

Q51. Narrow subject
Adj. P-value=0.000, Chi-square=32.017, df=1

Social sciences; Materials science and engineering; Environmental sciences; Physics; Neuroscience; Mathematics and computer science; Life sciences; Chemistry and chemical engineering; Earth sciences; Pharmacology and toxicology

Business and management; Health sciences; Biological sciences; Arts and humanities

Node 1		
Category	%	n
■ No	15.4	174
■ Yes	84.6	956
Total	46.8	1130

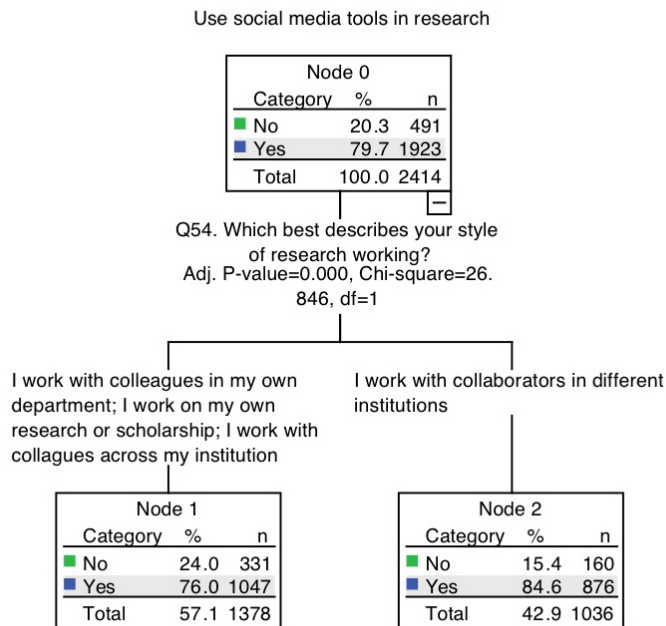| Node 2		
Category	%	n
■ No	24.7	317
■ Yes	75.3	967
Total	53.2	1284

As well as subject, personal research style is a powerful predictor of social media take up. The survey asked respondents, generally speaking, which *one* of the following options best described their style of research working?

- I work with collaborators in different institutions
- I work with colleagues across my institution
- I work with colleagues in my own department
- I work on my own research or scholarship

The answer to this question opens up a statistically significant gap between those who chose the first option and the rest (Figure 8). That social media should be valued especially by academics whose predominant mode of research work is across institutional boundaries is hardly surprising, but this analysis quantifies that difference: these researchers are 1.11 times more likely than the rest to use social media.
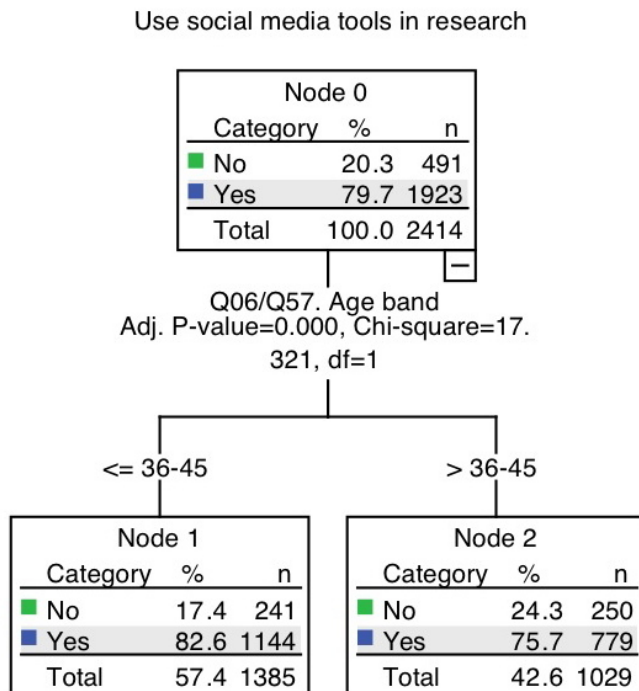
Social media and research workflow

Figure 8: Use of social media in research by preferred research style
Classification tree and chi-squared statistics

Use social media tools in research

Node 0 Category	%	n
No	20.3	491
Yes	79.7	1923
Total	100.0	2414

Q54. Which best describes your style of research working?
Adj. P-value=0.000, Chi-square=26.846, df=1

I work with colleagues in my own department; I work on my own research or scholarship; I work with collagues across my institution

I work with collaborators in different institutions

Node 1 Category	%	n
No	24.0	331
Yes	76.0	1047
Total	57.1	1378

Node 2 Category	%	n
No	15.4	160
Yes	84.6	876
Total	42.9	1036

Age is an interesting demographic when it comes to the use of social media in research. Broadly speaking, there is a break point around 35 years (Figure 9). Researchers younger than this are significantly more likely (82.6 per cent) to use social media professionally than the older group (75.7 per cent). This effect is statistically significant, but it is not large.

Figure 9: Use of social media in research by age group
Classification tree and chi-squared statistics

Use social media tools in research

Node 0 Category	%	n
No	20.3	491
Yes	79.7	1923
Total	100.0	2414

Q06/Q57. Age band
Adj. P-value=0.000, Chi-square=17.321, df=1

<= 36-45

> 36-45

Node 1 Category	%	n
No	17.4	241
Yes	82.6	1144
Total	57.4	1385

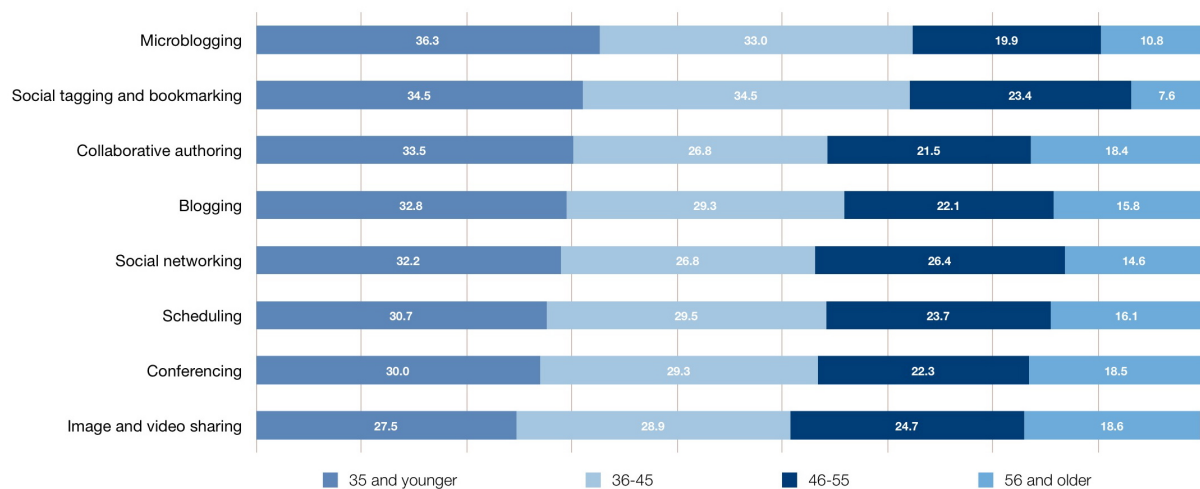| Node 2 Category	%	n
No	24.3	250
Yes	75.7	779
Total	42.6	1029

Social media and research workflow

This is a very crude simplification, however, since it pulls together reserachers who happen to use any of eight categories of social media tools. A more detailed picture is revealed when we look at the individual tools below (Figure 10).
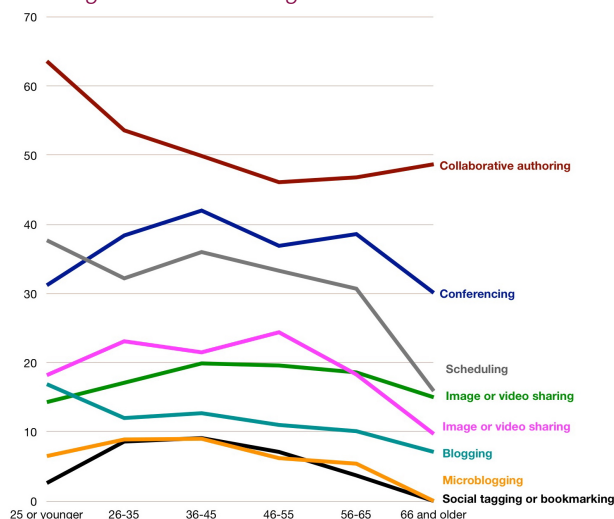
Microblogging, social tagging and bookmarking are relatively favoured by younger researchers' conferencing, image and video sharing by the over 35s. These are of course much longer established technologies, designed for different applications. Perhaps there is a role difference here, with more senior academics perhaps being more likely to be involved in project negotiations with remote partners, or preparing presentations for conferences.

Figure 10: Use of social media tools by age group
Researchers who use at least one social media tool in their research

As in so many areas of new technology, it is tempting to try to fit these findings into a `digital native' narrative, common wisdom being that the young are more familiar and comfortable with technological innovation. This would be a mistake, as CIBER's iconic Google Generation report found. Figure 11 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 really 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 11: Use of social media in research by age group
Percentage of users within age bands

Social media and research workflow

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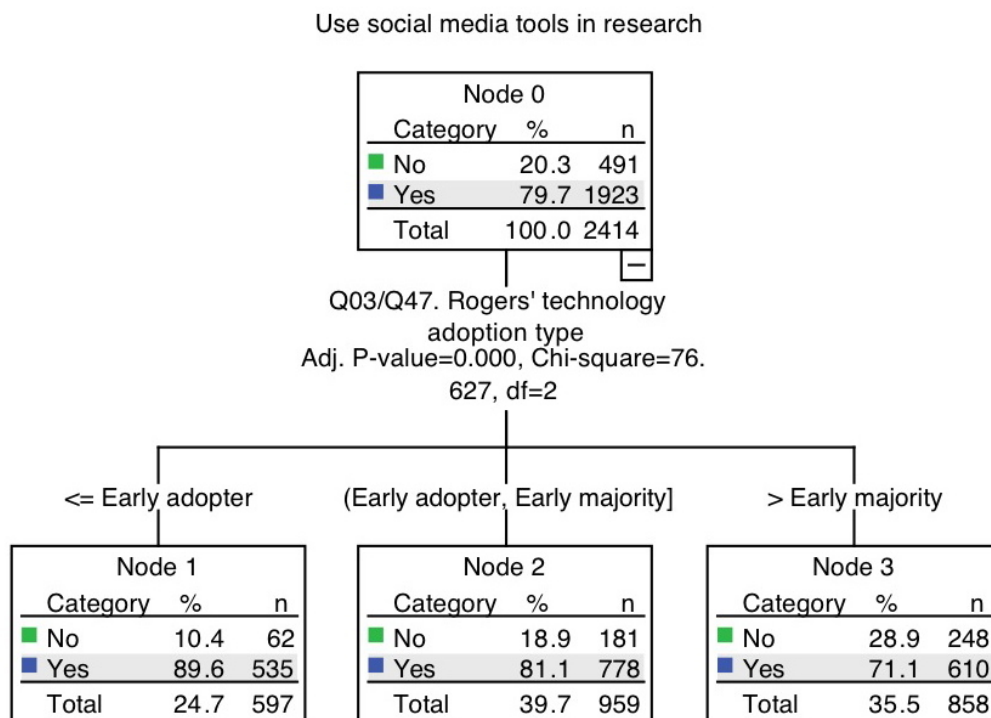
Table 2: Use of social media in research by technology adoption behaviour
Percentages within technology adoption type

	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

These points are emphasized in Figure 12 below, another tree classification. Innovators and early adopters are 1.26 times more likely than late majority and laggards to be using social media professionally.

Figure 12: Use of social media in research by technology adoption behaviour
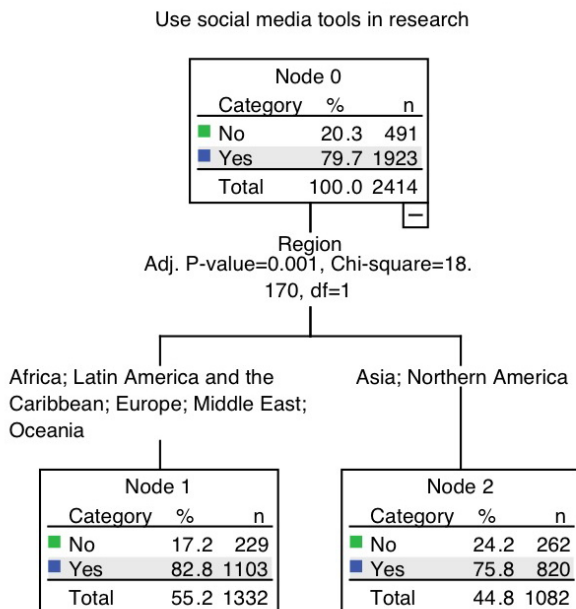*Classification tree and chi-squared statistics*

Use social media tools in research

Node 0		
Category	%	n
■ No	20.3	491
■ Yes	79.7	1923
Total	100.0	2414

Q03/Q47. Rogers' technology adoption type
Adj. P-value=0.000, Chi-square=76.627, df=2

<= Early adopter   (Early adopter, Early majority]   > Early majority

Node 1		
Category	%	n
■ No	10.4	62
■ Yes	89.6	535
Total	24.7	597

Node 2		
Category	%	n
■ No	18.9	181
■ Yes	81.1	778
Total	39.7	959

Node 3		
Category	%	n
■ No	28.9	248
■ Yes	71.1	610
Total	35.5	858

Social media and research workflow

As well as a subject and age differences, take up of social media in research is patterned by geographic region (Figure 14) lower in Asia and Northern America than in the rest of the world.

Figure 14: Use of social media in research by broad geographic region
Classification tree and chi-squared statistics

Use social media tools in research

```
            Node 0
   Category    %      n
  ■ No        20.3   491
  ■ Yes       79.7  1923
   Total     100.0 2414
                          [−]
```

Region
Adj. P-value=0.001, Chi-square=18.
170, df=1

Africa; Latin America and the
Caribbean; Europe; Middle East;
Oceania   Asia; Northern America

```
        Node 1                          Node 2
 Category    %      n            Category    %      n
■ No        17.2   229          ■ No        24.2   262
■ Yes       82.8  1103          ■ Yes       75.8   820
 Total      55.2  1332           Total      44.8  1082
```

The analysis in Table 3 is a little more detailed and finds Europe and Oceania (powered by Australia) as social media regional hotspots.

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%	76.7%	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

Social media and research workflow

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 14: 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 (15 to 22) 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 15) 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 20 (scheduling tools) which self-evidently find major application in research management and collaboration but no where 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.

Social media and research workflow

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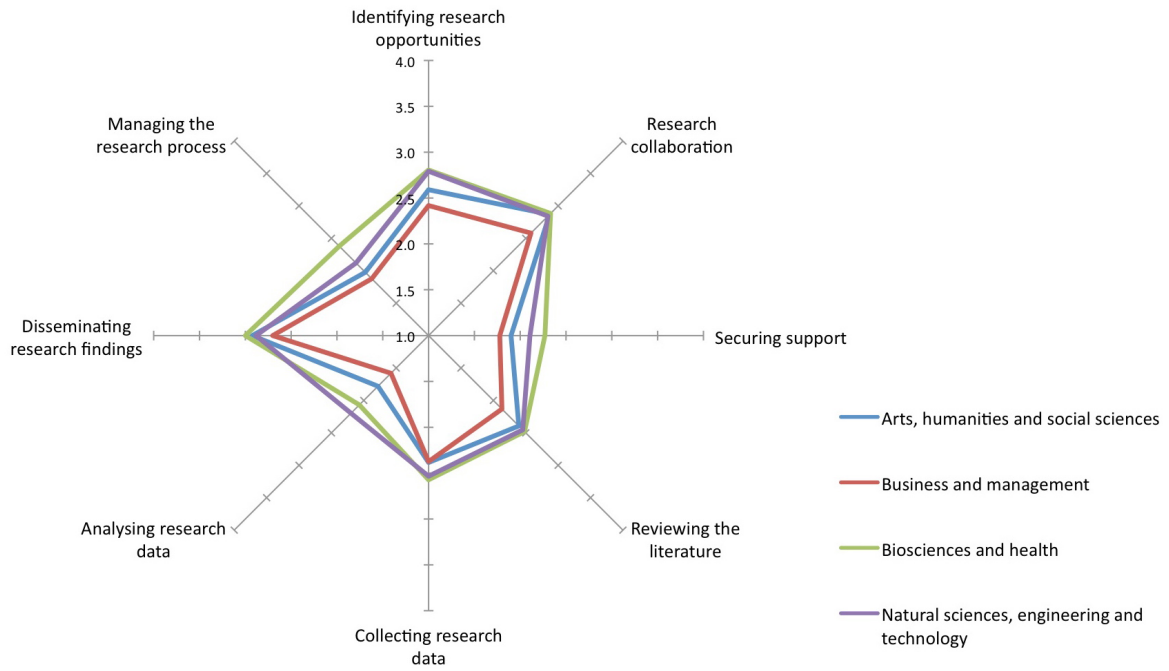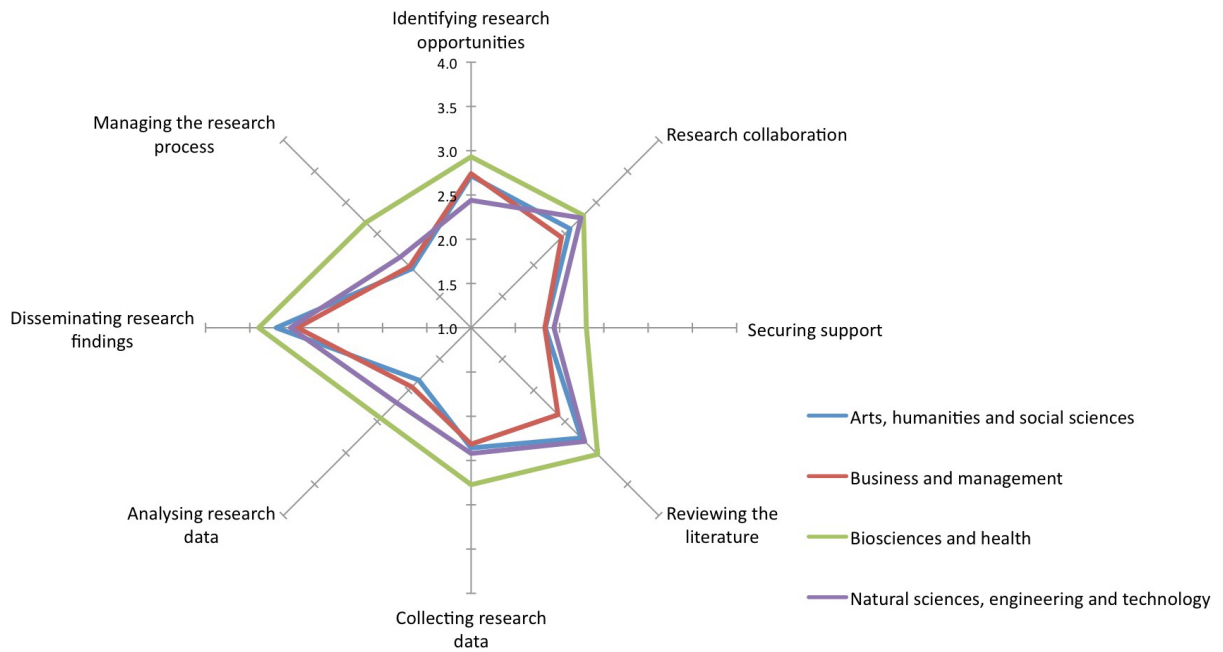*Perceived usefulness on a four-point scale where 1=Not at all useful and 4=Extremely useful*

Figure 16: Blogging and the research lifecycle
Perceived usefulness on a four-point scale where 1=Not at all useful and 4=Extremely useful

Social media and research workflow

Figure 17: Microblogging and the research lifecycle
Perceived usefulness on a four-point scale where 1=Not at all useful and 4=Extremely useful
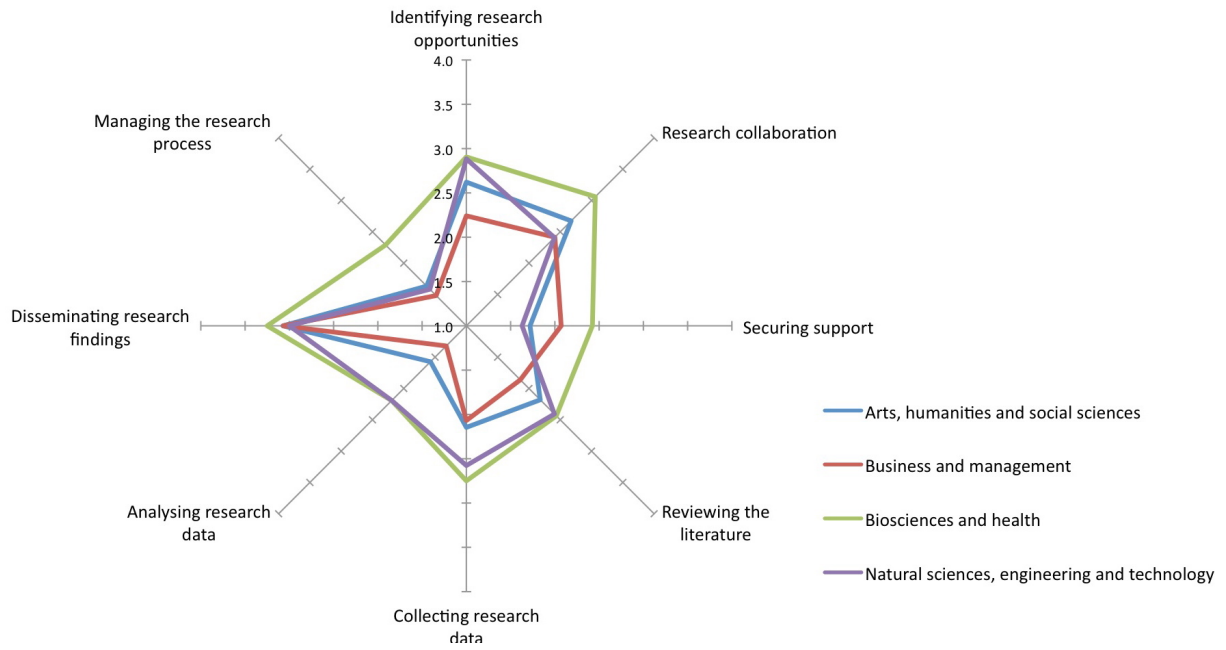

Figure 18: Collaborative authoring and the research lifecycle
Perceived usefulness on a four-point scale where 1=Not at all useful and 4=Extremely useful

Social media and research workflow

Figure 19: 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 20: Scheduling tools and the research lifecycle
Perceived usefulness on a four-point scale where 1=Not at all useful and 4=Extremely useful

Social media and research workflow

Figure 21: Conferencing tools and the research lifecycle
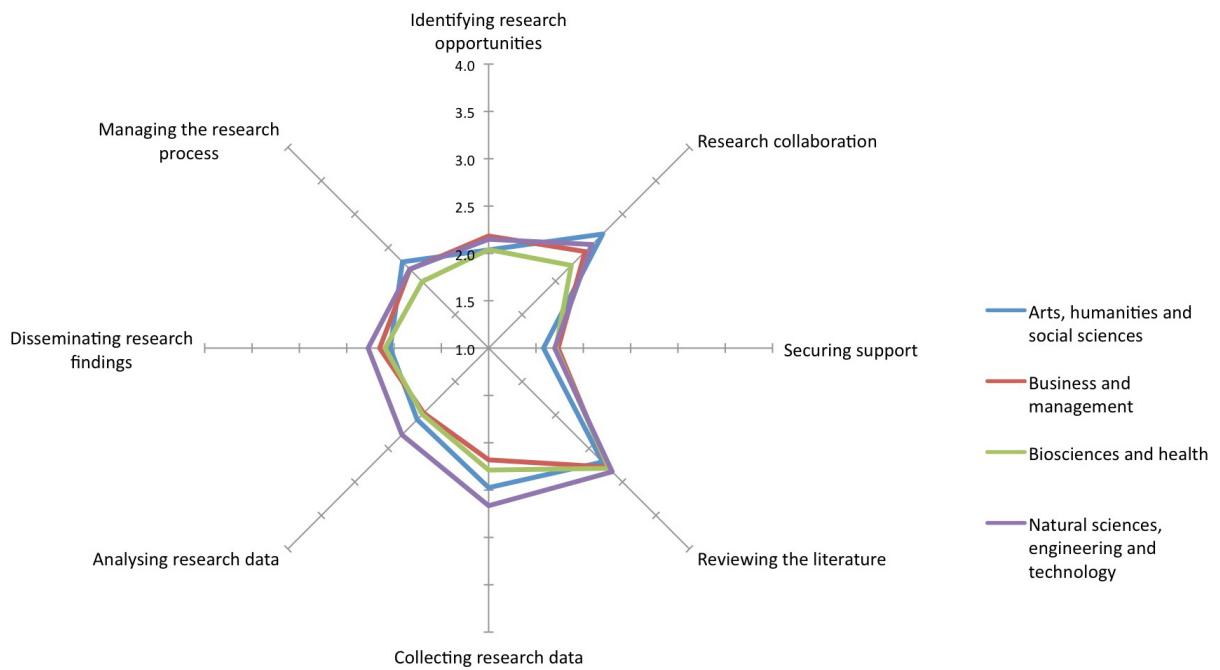*Perceived usefulness on a four-point scale where 1=Not at all useful and 4=Extremely useful*

Arts, humanities and social sciences

Business and management

Biosciences and health

Natural sciences, engineering and technology

Figure 22: 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

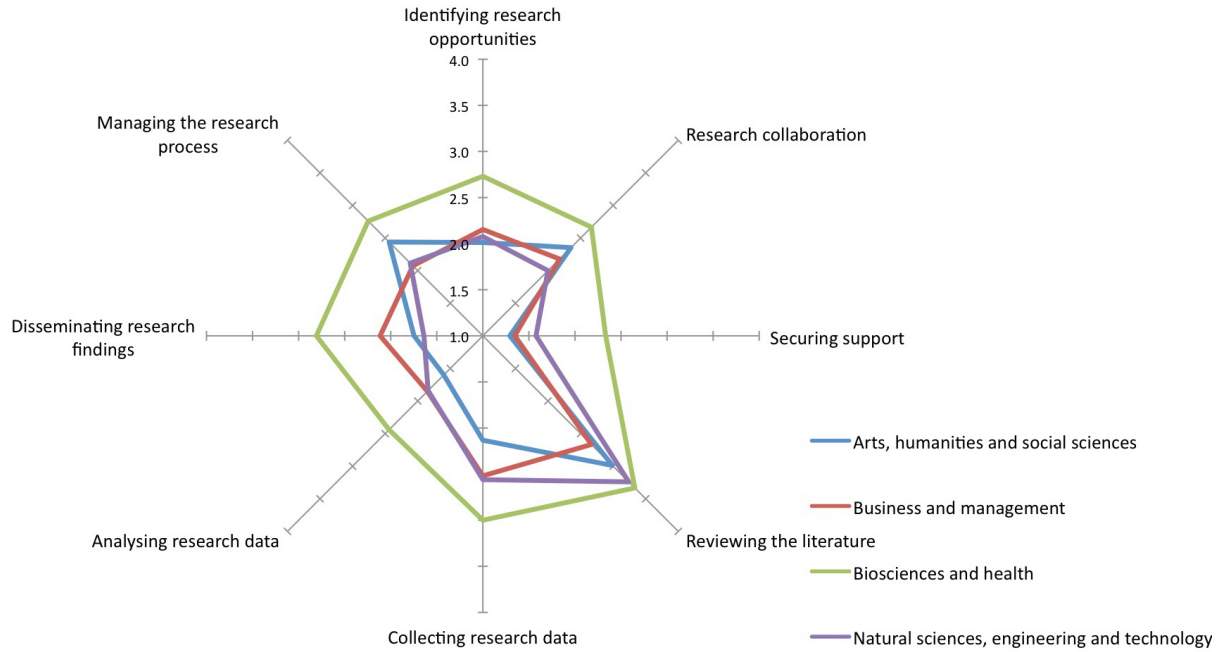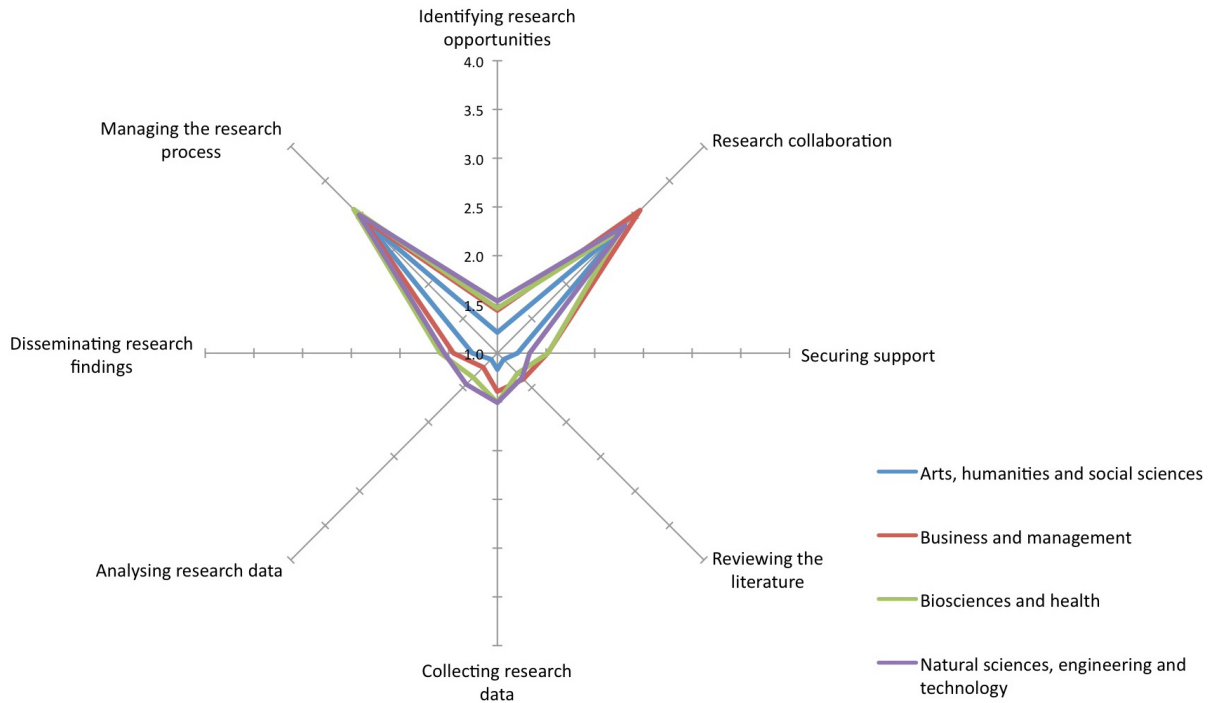Arts, humanities and social sciences

Business and management

Biosciences and health

Natural sciences, engineering and technology

Social media and research workflow

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 23) 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? We will explore this question further in the focus groups.

Figure 23: 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 24 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 24: Drivers of social media use in research
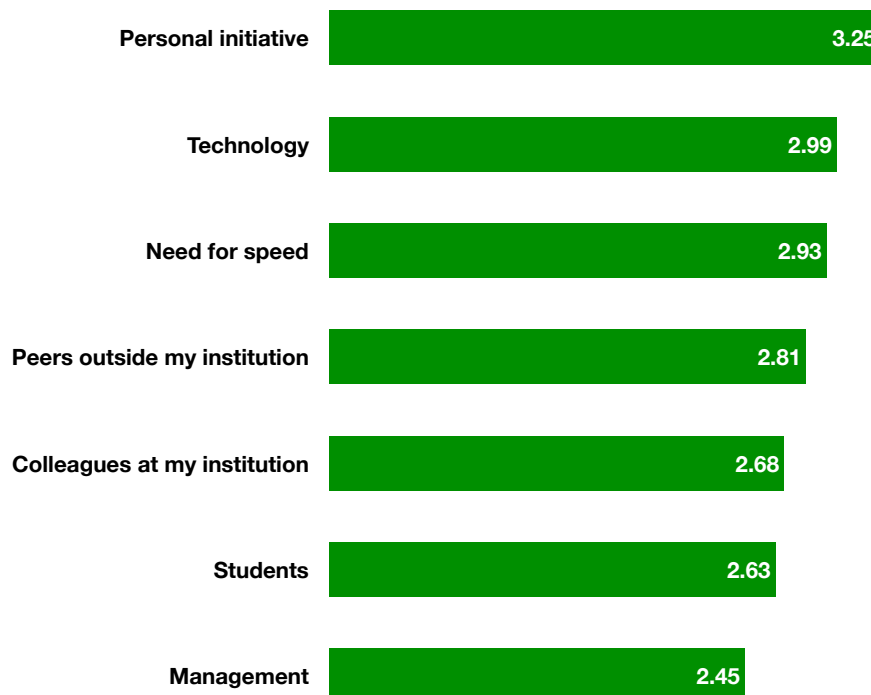*Mean preference scores where 0=not at all influential and 4=extremely influential*

Driver	Score
Personal initiative	3.25
Technology	2.99
Need for speed	2.93
Peers outside my institution	2.81
Colleagues at my institution	2.68
Students	2.63
Management	2.45

Figure 25 is a more complex classification tree than we have seen so far. Here we are running a series of `driver' questions against users and non-users of social media in a research context and letting the software identify the key relationships.

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.

Social media and research workflow

Several other `driver' questions were asked, but they are not statistically significant predictors of social media use. These were: pressures from students, colleagues at my own institution, and from management.

Figure 25: Drivers of social media use in research
Classification tree and chi-squared statistics

Use social media tools in research

Node 0		
Category	%	n
■ No	18.7	307
■ Yes	81.3	1337
Total	100.0	1644

Q45D. Web 2.0 drivers: peers outside my institution
Adj. P-value=0.000, Chi-square=35. 234, df=2

<= Quite influential

Node 1		
Category	%	n
■ No	25.8	145
■ Yes	74.2	417
Total	34.2	562

(Quite influential, Very influential]

Node 2		
Category	%	n
■ No	17.5	111
■ Yes	82.5	525
Total	38.7	636

> Very influential

Node 3		
Category	%	n
■ No	11.4	51
■ Yes	88.6	395
Total	27.1	446

Q45A. Web 2.0 drivers: personal initiative
Adj. P-value=0.000, Chi-square=16. 219, df=1

<= Quite influential

Node 4		
Category	%	n
■ No	37.6	62
■ Yes	62.4	103
Total	10.0	165

> Quite influential

Node 5		
Category	%	n
■ No	20.9	83
■ Yes	79.1	314
Total	24.1	397

Q45F. Web 2.0 drivers: the demands for greater speed
Adj. P-value=0.046, Chi-square=7. 105, df=1

<= Very influential

Node 6		
Category	%	n
■ No	24.1	70
■ Yes	75.9	221
Total	17.7	291

> Very influential

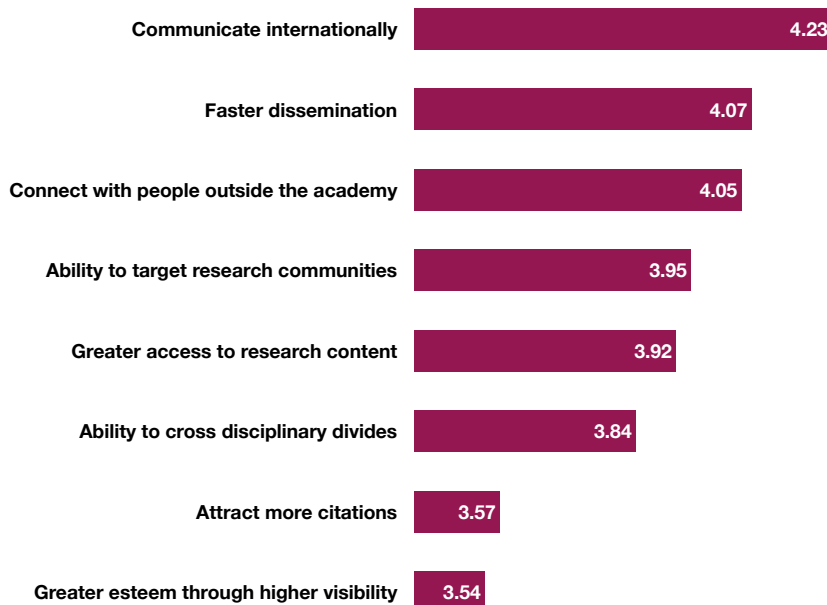| Node 7		
Category	%	n
■ No	12.3	13
■ Yes	87.7	93
Total	6.4	106

Social media and research workflow
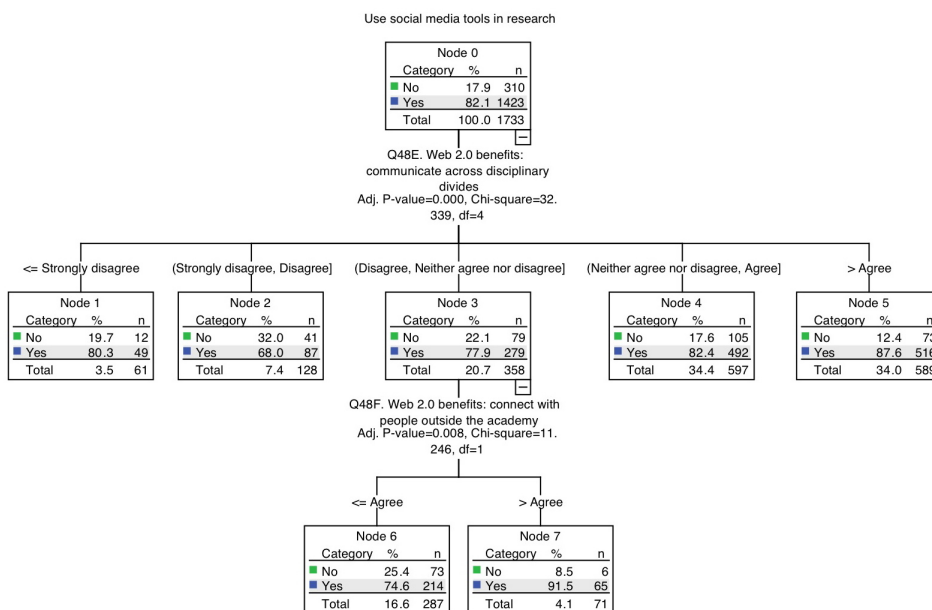
Perceived benefits

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

Benefit	Score
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 27) strongly suggests that the ability to cross disciplinary divides, is the killer application, followed by the ability to reach out across geographical limitations.

Figure 27: Perceived benefits of social media use in research
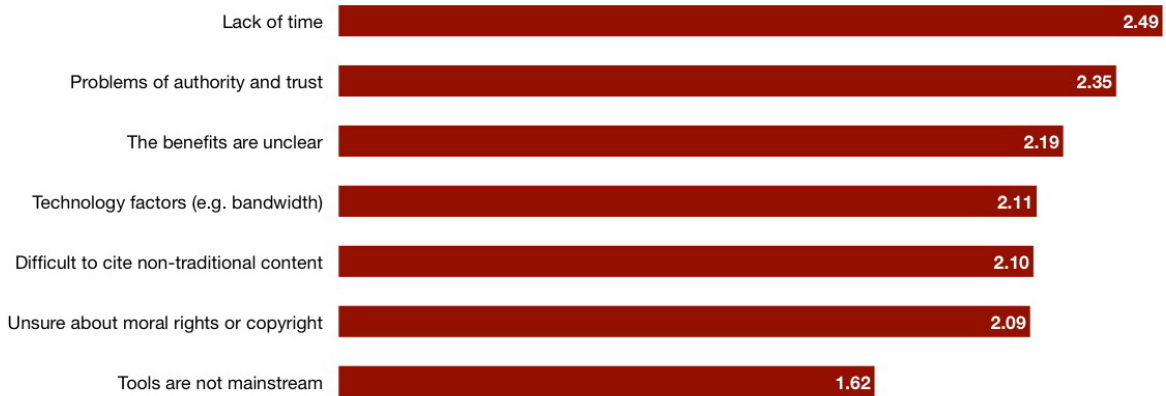*Classification tree and chi-squared statistics*

Social media and research workflow

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.

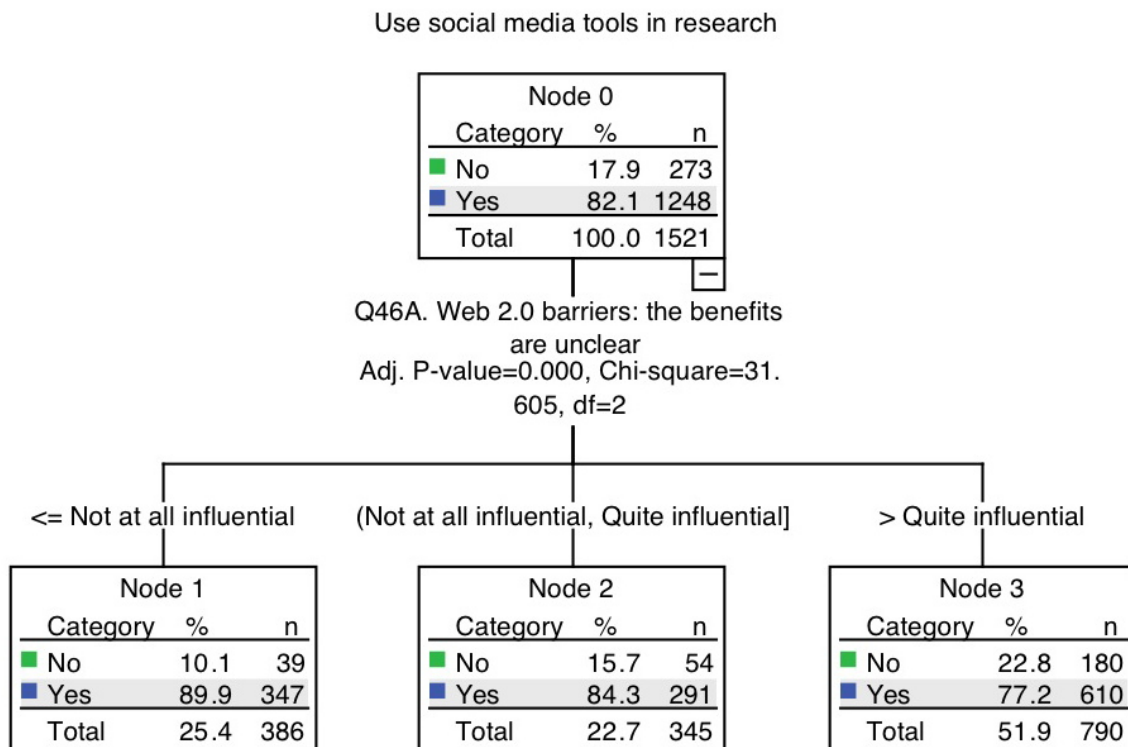Figure 28: Barriers to social media in research
Mean preference scores where 0=not at all influential and 4=extremely influential

Barrier	Score
Lack of time	2.49
Problems of authority and trust	2.35
The benefits are unclear	2.19
Technology factors (e.g. bandwidth)	2.11
Difficult to cite non-traditional content	2.10
Unsure about moral rights or copyright	2.09
Tools are not mainstream	1.62

The most important barrier, in terms of actual use, is a lack of clarity over the precise benefits that might accrue to the researcher (Figure 29). 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.

Figure 29: Barriers to social media in research
Classification tree and chi-squared statistics

Use social media tools in research

Node 0

Category	%	n
■ No	17.9	273
■ Yes	82.1	1248
Total	100.0	1521

Q46A. Web 2.0 barriers: the benefits are unclear
Adj. P-value=0.000, Chi-square=31.605, df=2

<= Not at all influential

Node 1

Category	%	n
■ No	10.1	39
■ Yes	89.9	347
Total	25.4	386

(Not at all influential, Quite influential]

Node 2

Category	%	n
■ No	15.7	54
■ Yes	84.3	291
Total	22.7	345

> Quite influential

Node 3

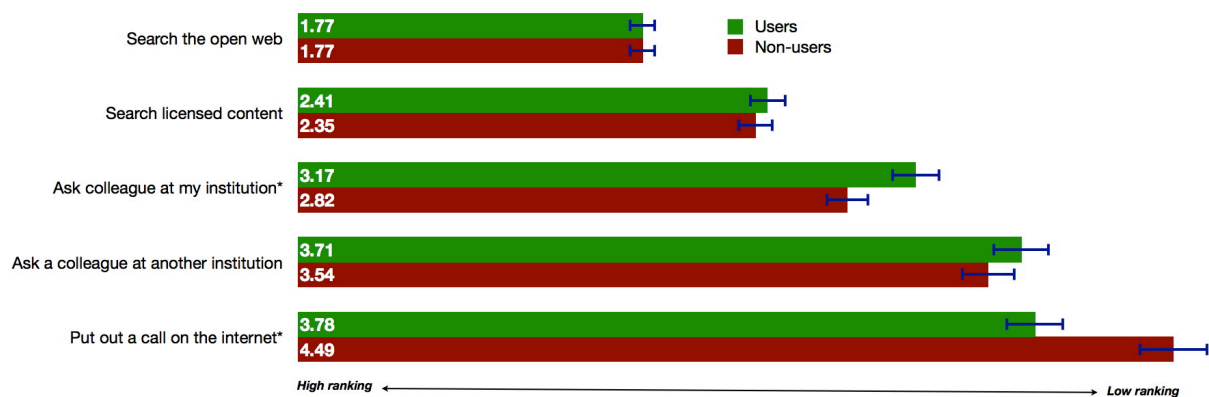| Category	%	n
■ No	22.8	180
■ Yes	77.2	610
Total	51.9	790

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 30). 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.
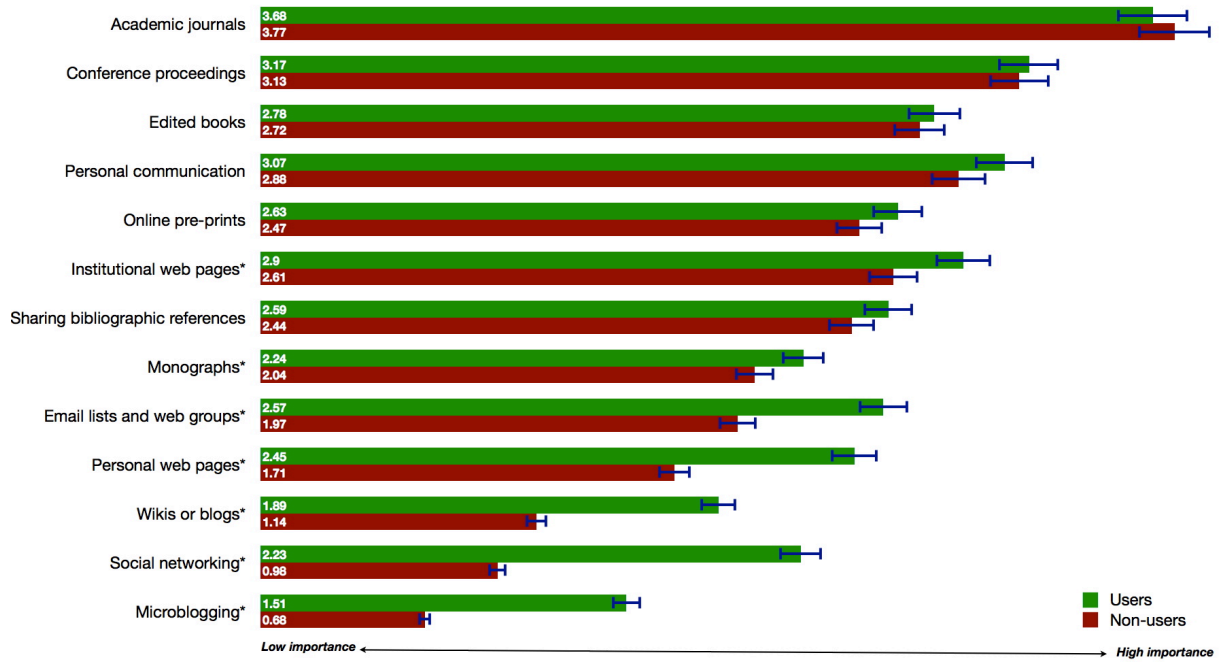
Figure 30: Scholarly information discovery preferences: social media users and non-users
Preferences expressed on a scale where 1=Most favoured and 5=Least favoured

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 31). 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.
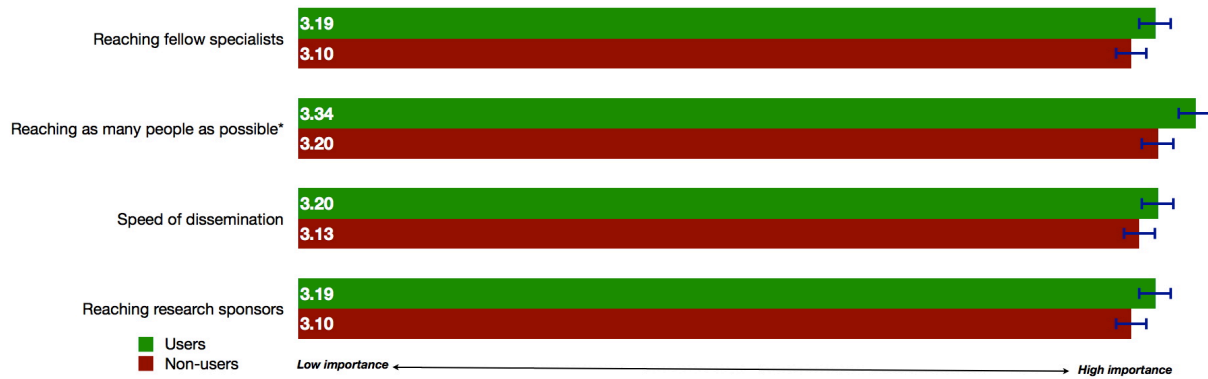
Social media and research workflow

Figure 31: 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

Channel	Users	Non-users
Academic journals	3.68	3.77
Conference proceedings	3.17	3.13
Edited books	2.78	2.72
Personal communication	3.07	2.88
Online pre-prints	2.63	2.47
Institutional web pages*	2.9	2.61
Sharing bibliographic references	2.59	2.44
Monographs*	2.24	2.04
Email lists and web groups*	2.57	1.97
Personal web pages*	2.45	1.71
Wikis or blogs*	1.89	1.14
Social networking*	2.23	0.98
Microblogging*	1.51	0.68

Low importance ← → High importance

We can also see, in Figure 32, that there is no difference in the intention behind research dissemination. Social media users and the contrast group are singing from the same hymn sheet here, everyone aiming to reach a number of different audiences and quickly.

Figure 32: Intentions associated with dissemination: social media users and non-users
Preferences expressed on a scale where 1=Not at all important and 4=Extremely important

Intention	Users	Non-users
Reaching fellow specialists	3.19	3.10
Reaching as many people as possible*	3.34	3.20
Speed of dissemination	3.20	3.13
Reaching research sponsors	3.19	3.10

Low importance ← → High importance

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

	Greater use of multimedia	RSS as standard	Content readable on all platforms	Multilingual capabilities	Links to data
Under 25	2.88	3.92	2.32	3.64	2.11
26-35	3.06	3.59	2.11	3.78	2.28
36-45	3.11	3.60	2.02	3.78	2.32
46-55	3.17	3.67	1.98	3.77	2.26
56-65	3.19	3.75	1.84	3.60	2.32
Over 65	3.36	3.81	1.96	3.58	2.32
All ages	**3.12**	**3.65**	**2.02**	**3.74**	**2.29**

There is much variation by subject with regard to the strength of these recommendations (Table 6). Pharmacologists are particularly keen on data linkage, as are environmental scientists when it comes to greater inter-operability across platforms.

Table 6: Recommendations for publishers by subject
Preferences expressed on a scale where 1=Highest priority and 5=Lowest priority

	Greater use of multimedia	RSS as standard	Content readable on all platforms	Multilingual capabilities	Links to data
Arts and humanities	3.13	3.76	1.96	3.55	2.35
Biological sciences	3.01	3.75	2.34	3.56	2.25
Business and management	3.13	3.57	2.09	3.80	2.26
Chemistry	3.24	3.21	1.90	3.80	2.19
Earth sciences	3.26	3.53	1.88	3.72	2.00
Environmental sciences	3.08	3.94	1.81	3.65	2.53
Health sciences	2.98	3.72	2.08	3.80	2.27
Life sciences	3.02	4.06	1.96	3.66	2.14
Materials science	3.10	3.85	2.23	3.35	2.25
Maths and computing	3.28	3.54	2.01	4.04	2.07
Neuroscience	2.92	3.82	1.82	3.75	2.43
Pharmacology	2.93	4.00	2.19	4.14	1.80
Physics	3.46	3.44	1.86	3.88	2.07
Social sciences	3.22	3.56	1.90	3.74	2.37
All subjects	**3.12**	**3.65**	**2.02**	**3.74**	**2.29**

Social media and research workflow

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 non-traditional 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

	Index all library full text	Social network interface to catalogue	Socially tag the library catalogue	Catalogue non-traditional materials	Preserve non-traditional materials
Under 25	1.92	3.18	2.99	3.25	3.59
26-35	1.94	3.07	3.08	3.28	3.53
36-45	2.01	3.13	3.04	3.30	3.45
46-55	1.90	3.13	3.11	3.24	3.59
56-65	1.82	3.16	3.25	3.08	3.46
Over 65	1.89	3.11	3.58	3.06	3.52
All ages	**1.93**	**3.12**	**3.12**	**3.24**	**3.51**

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

	Index all library full text	Social network interface to catalogue	Socially tag the library catalogue*	Catalogue non-traditional materials	Preserve non-traditional materials
Arts and humanities	1.83	3.34	3.29	3.11	3.39
Biological sciences	1.92	3.13	3.31	3.16	3.41
Business and management	1.94	3.02	2.94	3.32	3.69
Chemistry	1.97	2.97	3.06	3.09	3.63
Earth sciences	1.87	3.06	3.19	3.28	3.31
Environmental sciences	2.00	3.11	3.08	3.44	3.34
Health sciences	1.82	3.15	3.29	3.21	3.49
Life sciences	1.81	3.31	3.33	3.08	3.40
Materials science	2.20	3.08	3.22	3.21	3.23
Maths and computing	2.12	3.02	3.15	3.27	3.46
Neuroscience	1.88	3.12	3.48	2.98	3.47
Pharmacology	2.06	3.00	3.21	2.73	3.79
Physics	1.64	3.84	3.08	2.72	3.37
Social sciences	1.98	3.08	2.95	3.32	3.52
Total	**1.93**	**3.12**	**3.12**	**3.24**	**3.51**

Research design and survey demographics

The questionnaire was developed in close association with Emerald Group Publishing Ltd and was extensively piloted before its release as an online survey using Survey Monkey Professional.

We are grateful to Emerald, 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.

It is difficult to be precise about the effective response rate to this survey. Mailing lists differ in quality and inevitably contain emails of people who have retired or moved on. Many invitations are blocked by spam and other filters and never reach their intended audience, and we were unable to de-duplicate the mailing lists used (since the invitations were sent out by the participating organizations and there was no means of compiling a single list).

Almost 100,000 invitations were sent out and 4,012 people took part in the survey (including some librarians, publishers and university administrators, whose views are not included in this report). Thus, 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 typical of the industry average for large-scale online surveys. The tone of the email invitation was deliberately calculated to attract those with an interest in social media: as we noted early in this report, we wanted to establish as large a pool of data as possible on actual use.

For all these reasons, the survey sample is, in research jargon, a non-probabilistic convenience sample. The findings cannot be generalized to all researchers, mostly especially not to non-users of social media. Nonetheless, the sample is a large one, with representation from 215 different countries (Figure 33). It is also broadly representative of the wider research community in terms of the weight of responses by broad subject discipline and type of institution.

Figure 33: Survey responses by country
Relative numbers of responses indicated by density of shading