



British Library Growing Knowledge exhibition evaluation

Key findings

A CIBER Report: July 2011



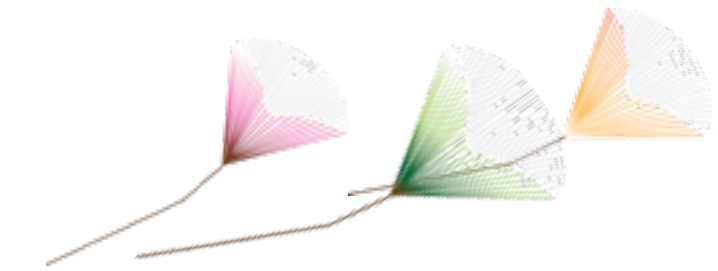
This report is a summary of an evaluation of the British Library ‘Growing Knowledge’ exhibition, funded by the BL and JISC which examines current and future digital research and implications for service provision by research libraries.

Acknowledgements

This research was conducted by CIBER: David Nicholas, Peter Williams, Ian Rowlands, and David Clark.

CIBER wish to thank all of the research interviewees, who gave freely of their time and offered very useful and interesting insights that enabled us to gather the data for the findings presented in this report.

The Growing Knowledge exhibition



Growing Knowledge (GK) (12 Oct 2010-16 July 2011) was an exhibition organised and hosted by the British Library (BL), designed to showcase new information technologies and stimulate debate about the future of research and the role of the research library. It was aimed at academic, business/creative industry and ‘citizen’ researchers. The exhibition was located in a large room just off the main foyer, and was designed to look spacious and futuristic.

The key feature of the room was four workstations or ‘pods’, each containing 25 different projects or resources highlighting innovative approaches to collecting and presenting a variety of content across a range of disciplines. Much of this report examines content on four workstations or ‘pods’ situated within the physical exhibition. For the purposes of this report, these are described as:

- *Tools*: which enable researchers to disseminate research findings, collaborate and access information. They include Twitter, Mendeley and Evernote.
- *Projects*: which are either examples of research projects from various academic institutions and initiatives from the BL itself. Examples of the former are the projects ‘Galaxy Zoo’ and ‘Data Mining With Criminal Intent’. BL projects include the recently launched Management and Business Studies Portal.
- *Resources*: which is simply a name for all the tools and projects hosted on the pods.

Apart from a minority of resources (e.g. the BL Video Search application) restricted by copyright, resources were also made available on the exhibition website: <http://www.growingknowledge.bl.uk/Projects.aspx>.

The pods were situated on specially designed large curved desks. One wall contained screens showing videos about the exhibition.

The physical exhibition also showcased hardware (standalone specialist apparatus) in addition to the pods. This included:

- Sony 3D ‘Ray Modeller’ screen projecting a 3D image on a cylindrical ‘walk-around’ screen, which was replaced during the exhibition by a similar display lent by the Petrie Museum;
- Microsoft Surface Touch Table, which allows researchers to work together with the digital copy, passing additional content to each other around all four sides.



The Sony 3D Ray Modeller

Aims



The aims of the study were to:

Determine which are the optimum tools and other resources that comprise the exhibition.

To address this, user views about the various resources/hardware were examined, noting in particular how these could not only be used as they are, but repurposed for working with different types of data and different disciplines.

Explore what other tools and other resources may be appropriate for digitally-enhanced scholarship at the BL.

In this regard we asked users what digital resources they used, both to undertake the types of data manipulation and analysis showcased in the exhibition, and also for other purposes.

Stimulate debate on the future role of national libraries, with particular regard to their function in academic, professional and citizen research.

In addition to asking users how they saw the role of the BL generally, we asked how the Library could best meet the individual research needs of interviewees.

Evaluate the exhibition in terms of its physical design, and establish what users require when physically visiting a library

This was undertaken partly in our surveys, but explored in more depth with interviewees.

Determine what users require digitally from the BL when wishing to use it remotely for research.

Interviews yielded most information on this topic.

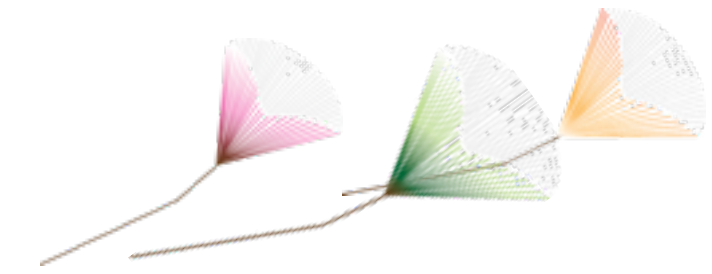
Determine the extent to which the BL had fulfilled its aims for the exhibition.

We looked at our results overall in addressing this.



The Microsoft touch surface table

Executive summary (1)



Growing Knowledge (GK) was designed to showcase new technologies and stimulate debate about the future of research and the role of the research library. The exhibition contained four workstations hosting 25 different resources highlighting innovative approaches to collecting and presenting information across disciplines. The physical exhibition also showcased innovative hardware such as the Sony 3D 'Ray Modeller'. This projected a 3D image on a cylindrical 'walk-around' screen; and the Microsoft Surface Touch ('collaborative') Table, which allowed researchers to work together with digital assets displayed on a touch-screen. Nearly all the resources are available at an exhibition website.



The context: Use of digital technologies

We obtained a general picture of current use of digital resources by researchers to provide the essential context for the GK evaluation. Interview data show a great variety, but only a minority use any which they declared to be innovative or unusual. Survey findings showed a relatively low usage of emerging digital technologies such as crowdsourcing, visualisation and audio search.

Most respondents, however, (82.3%) are using at least one category of social media, and the most popular are collaborative authoring (69.8%). However, little use of social media is being made to collect primary research data or to recruit research participants.

A minority of interviewees felt that they would benefit from using additional resources, but time constraints prevented them from learning (whilst acknowledging that a small time investment could lead to more efficient working in the future)

Overall impression of the exhibition

Visitors were generally positive about the exhibition (and there were 45,924 visitors to an essentially niche exhibition - testament to its popularity). The over-riding view being that it was an impressive digital research showcase, although concerns were expressed that it lacked focus. GK should have been focusing on just one of the large number of areas covered.

Executive summary (2)



Experiences of visitors to the tools and resources at GK

Key findings: Hardware

The exhibition contained a number of exhibits and features that were only accessible to physical visitors. These were explored in-depth with interviewees. Main findings were:

Touch Surface Table: The educational value was recognised far more than its potential use in research.

The Sony 'Ray Modeller' 3D application: again, positive comments tended to be around the possibilities for teaching.

The Petrie 3D display: Benefits included remote access to artefacts that might not be possible to view physically which was greatly appreciated.

The 'Light touch' device: Visitors liked the fact that this could be used as a data projector; as a focus of discussion, and where keyboards and screens might get damaged.

Multiple-screen arrangement: The two-screen arrangement was greeted positively by all those who experimented with it.

Key findings: Pod resources

The resources on the pods at GK were grouped by function. The following are findings regarding visitor experiences and views about them:

Information seeking

Researchers want search functionality that goes beyond text – the audio and video search services were extremely well-received, saving hours of work otherwise spent manually searching through audio or video files.

Also of great value is the ability to search seamlessly digital assets on one's personal computer or remotely.

Organising information resources

These (e.g. Mendeley and Zotero) received praise for:

- Enabling the organisation of research papers on one's own machine;
- Having a facility, where users can see what others with similar research interests are reading and receive automatic recommendations;
- Synchronisation with other reference management software (e.g, references imported to End Note etc. will appear in a Mendeley list);
- Allowing access from multiple computers.

Collaborative tools

Many possibilities were suggested as a result of being exposed to techniques showcased in GK as to how collaborative resources (Nature Network, which provides a platform for scientists to work together) could be used to undertake primary research (rather than simply report it or discover others' research), although currently this is not being done by more than a small minority of researchers.

Executive summary (3)



Data manipulation

Researchers found many ways in which resources such as the 'Map Rectifier' could be re-purposed, including in various disciplines and contexts, suggesting that digital resources hold wide appeal.

Formal scholarly communication

The Journal of Visual Experiments (JoVE) used video to relate the intricacies of life science research. The juxtaposition of text and video was considered to give a much more complete picture of a research activity than either medium on its own, and interviewees felt that it would be a valuable teaching aid.

Key findings: Popularity and impact of the exhibition

The exhibition had a major impact. An average of 40% of survey respondents said they might use techniques learned at the exhibition in the future, including exploiting the Touch Surface Table, crowdsourcing, Facebook and image manipulation software. Its popularity is evidenced by the 45,924 visitors

Key findings: Research library requirements

The most essential features of a physical library were wi-fi access and space to work. The digital assets most valued were advanced searching, reference management tools and text analysis.

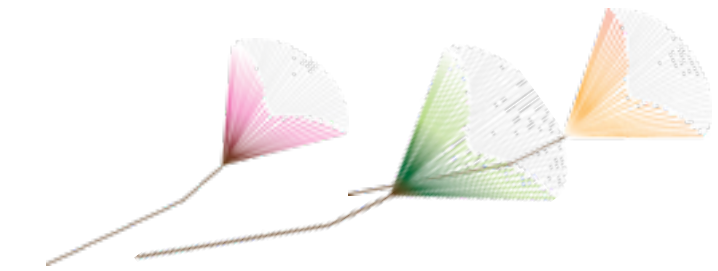
Recommendations

We recommend that the library:

- Offer greater provision for remote library access, but retain hardcopy wherever possible;
- Facilitate the integration of various datasets/assets into one seamless resource centre;
- Collaborate with other libraries to achieve interoperability of collections and interfaces;
- Play a crucial role in supporting the cycle of research activity;
- Be the custodian of research datasets and play a major part in the organisation and maintenance of supplementary journal material;
- Aggregate and facilitates access to social media data by indexing, cataloguing, organising and providing access to materials, and formulating and issuing guidelines to users;
- Develop a more comprehensive training role: The electronic availability of information – in various forms – and the appearance of a multitude of mobile and other IT devices gives the BL great opportunities to facilitate information retrieval and document management;
- Engage in more outreach activities: such as putting content outside of the (electronic) confines of the library, such as on Flickr Commons.

The context for Growing Knowledge:

Use of digital technologies



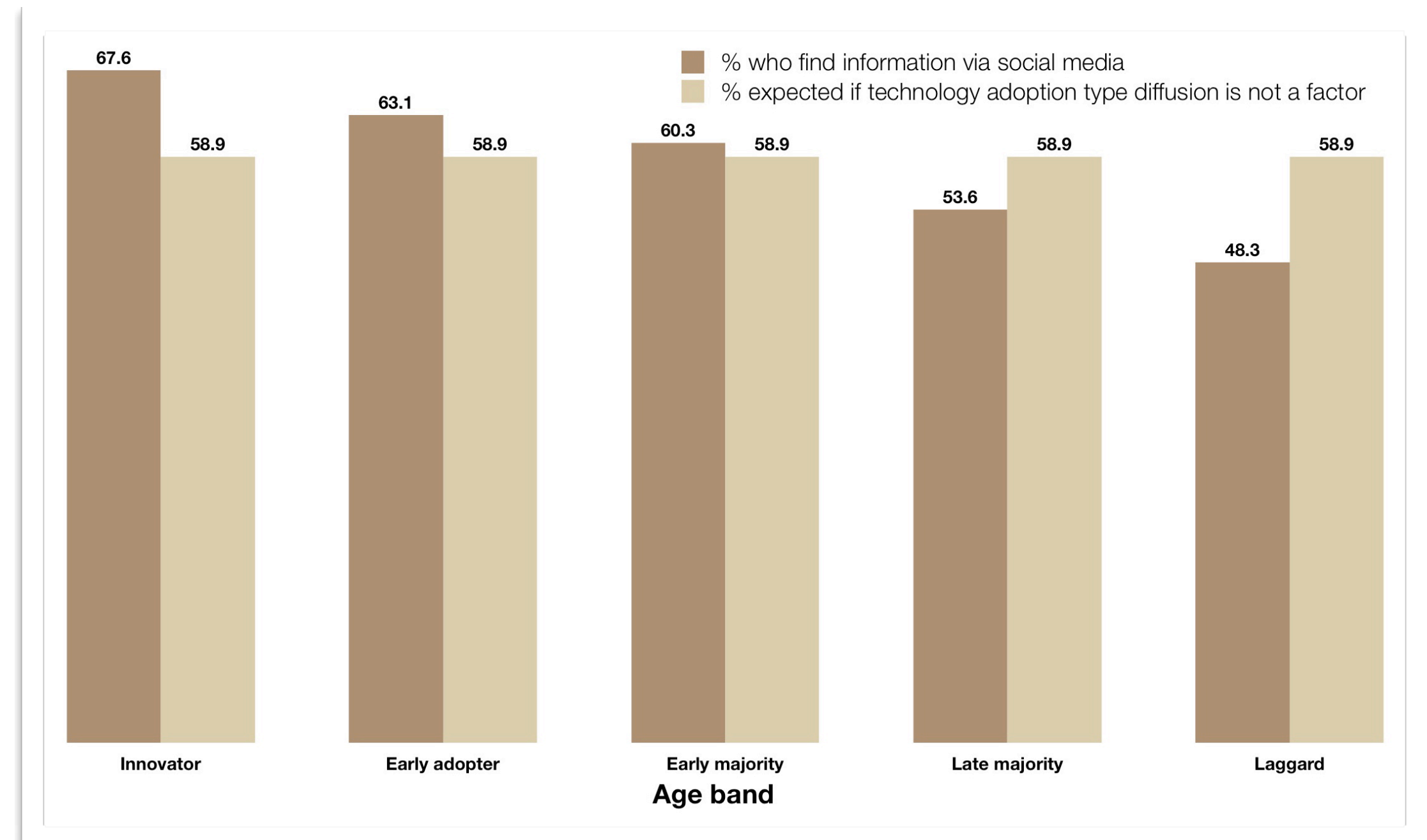
One of the aims of the study was to obtain a general picture of the use of digital resources by researchers. This was to provide the essential context for the GK evaluation and to inform the BL of what resources other than those showcased in the exhibition might be required by researchers.

Interview data show a great variety of different tools and other resources being used, but only a minority use any which they declared to be innovative or unusual.

A minority of interviewees felt that they would benefit from using alternative or additional resources, but spoke about time constraints that prevented them from learning - even whilst recognising that a relatively small time investment could lead to quicker and more efficient working in the future.

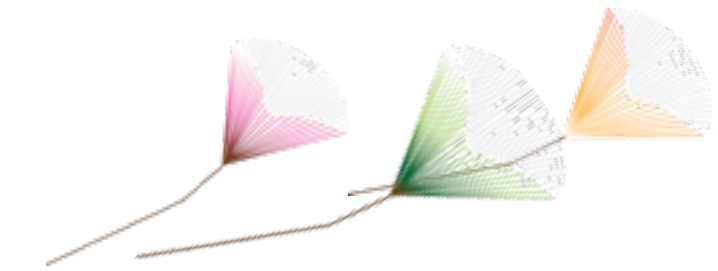
Most respondents (82.3%) are using at least one social media tool at some point in the research life cycle (social media being technologies that allow for the sharing of user-generated material). The most popular used is collaborative authoring (69.8%). They are using these mainly to find information (58.2%) and to communicate and discuss ideas (43.2%). These practices are significantly higher than expected by chance among the 25-34 year old group (though not among those younger than this). Interview data confirms these activities and suggests that little use of social media is being made to collect primary (such as crowdsourced) research data or to recruit research participants;

In terms of the diffusion of innovation, results suggested that innovators are significantly more likely to turn to social media and early adopters and early majority respondents are also more likely than expected to do so, although their cases are not so statistically significant.



General survey respondent percentages who find information using social media, by technology adoption type (n=1334)

Results: Overall GK experience



Online and physical visitors were both generally positive about the exhibition (as visitor numbers exceeding 45,000 testifies!). Visitors felt that the library ‘seems to be very aware of its role as a facilitator of research’ and ‘has clearly invested in the exhibition’. The overall impression for most people was that the exhibition was an impressive showcase of digital research.

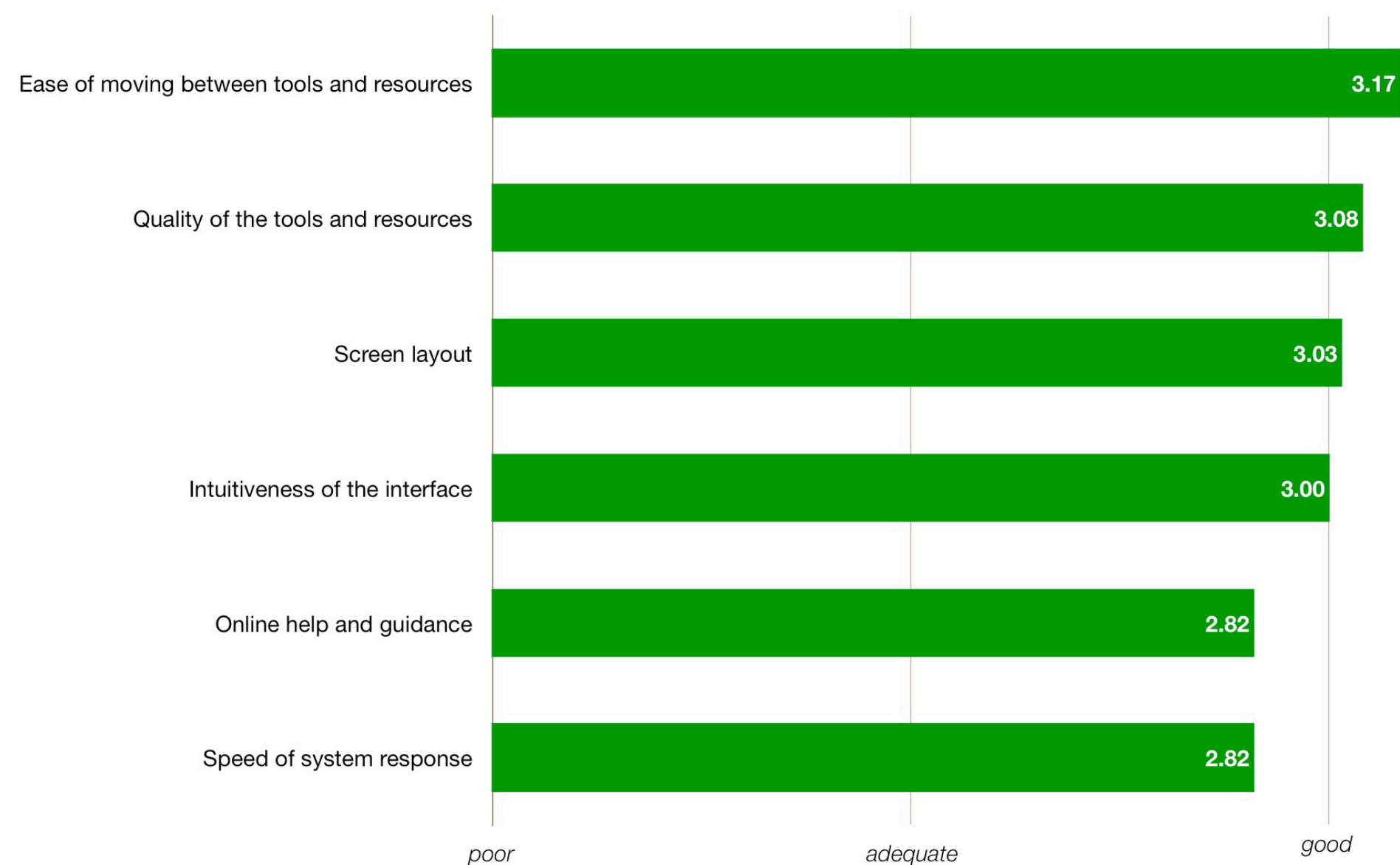
The most highly rated aspect was the ease of moving between the tools (Twitter, CiteULike, Zotero, etc.) and the other resources (projects such as Timescapes Archives, Jane Austen’s Manuscripts). Further, the quality of such tools and resources were rated as ‘good’ or ‘excellent’ by more than 78% of respondents. Only ‘speed of system response’ was rated as ‘poor’ by more than 10%.

More than 60% of respondents found the exhibition ‘innovative’ or ‘very innovative’. For interviewees, physically present, the 3D applications were the most innovative exhibits, but – on the other hand - only a small minority of interviewees saw any further research application for them.

Also less positive, there were comments, from people of all disciplines, to the effect that the exhibition ‘doesn’t seem to have much of a focus’, or was ‘too broad’. This was because it ‘tried to do too much’. According to the latter view, GK should have been focusing on just one of the large number of areas covered.

Questions were raised about the criteria for the selection of resources; particularly their narrow specificity. A minority felt that the content did not reflect their own disciplines or needs. This was particularly the case with interviewees from the business category.

The physical space was largely praised. Many found it ‘roomy’ or ‘large’, and people praised the ‘curvy’ surfaces, ‘stylish’ or ‘comfortable’ sofa and working space.



*Growing Knowledge survey respondents' impressions of the digital exhibition
Mean ratings where 1 = 'Of no importance' and 4='excellent' (n=110)*

Results: The exhibition hardware

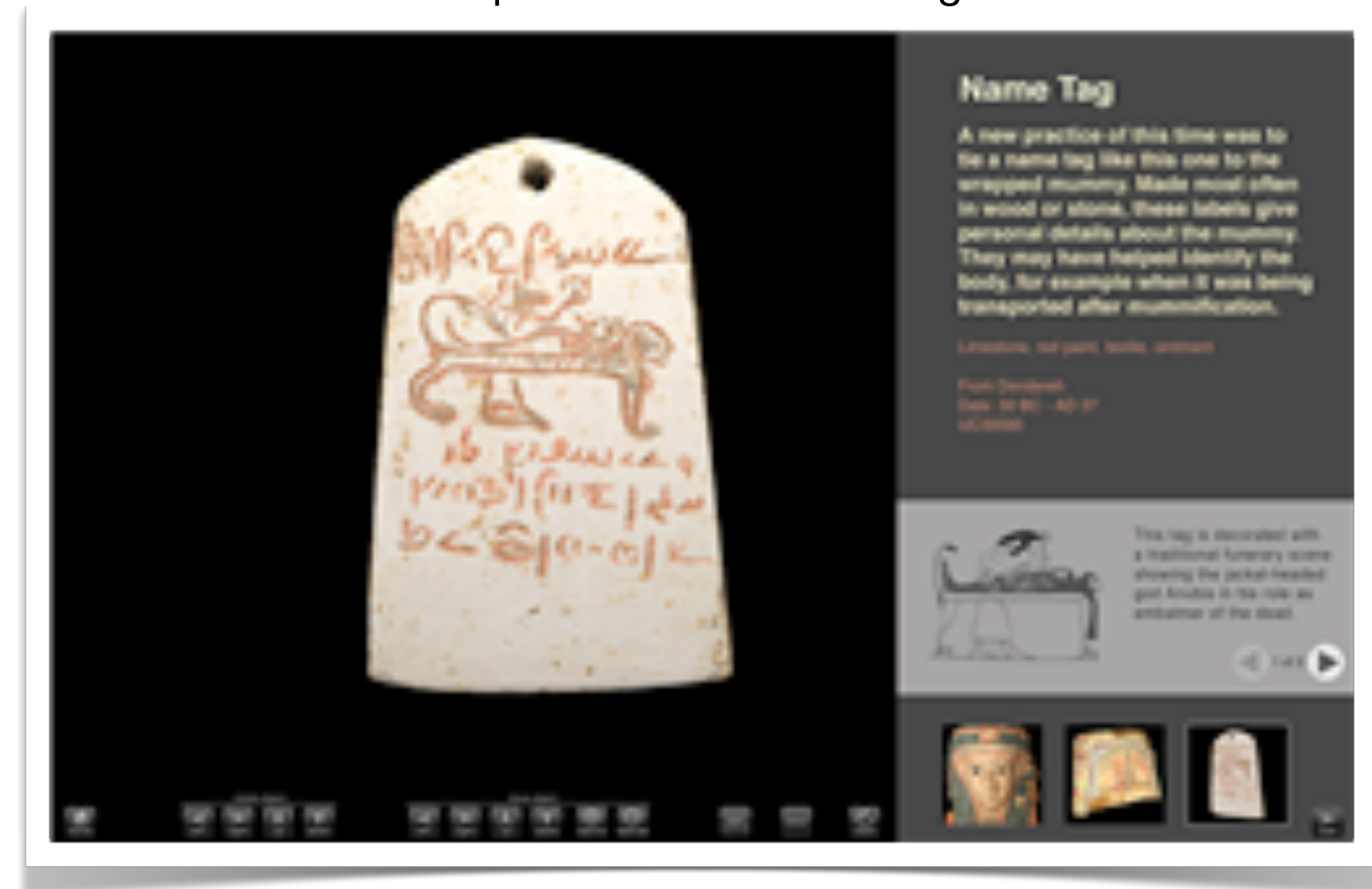


The exhibition contained a number of exhibits only accessible to physical visitors, and, as such, explored in-depth with interviewees. Main findings were:

- *Touch Surface Table*: The educational value was recognised far more than its potential use in research, although individuals mentioned its possible exploitation in the organisation and visualisation of documents and potential for collaboration;
- *The Sony 'Ray Modeller' 3D application*: Positive comments tended to be around the possibilities for teaching. Only one interviewee saw the application purely in research terms. She said that it could possibly be used to depict datasets in three dimensions;
- *The Petrie 3D display*: Several benefits were elicited, such as remote access to artefacts that might not be possible to view physically; the facility to manipulate the object to view different angles and zoom in was considered potentially better than viewing the real object. However, people felt that it is impossible to replicate the exact colours or assize of the object;
- *The 'Light touch' device*: Three main themes emerged. These were its use as an easy alternative to a data projector; as a focus of discussion, and where keyboards and screens might get damaged – such as in a chemistry laboratory. Its small volume and battery power facility led to the suggestion that it could be used in a mobile capacity;

- *Multiple-screen arrangement*: The most positive comments about these various set-ups related to the two-screen arrangement, which was greeted positively by all those who experimented with it.

A general point is that the hardware was seen as innovative by visitors, and greatly stimulated ideas about how they could be repurposed for individual needs and exploited in both teaching and research.



Petrie Museum 3D display interface

Results: Information searching



Some GK resources were designed to better facilitate information seeking and retrieval, of both text and other media. Included in GK were:

- British Library Search our Catalogue;
- British Library Video Server.

Key messages

- **Researchers want search functionality that goes beyond text** – the audio and video search services (where the search result is the point within a media file where the search term is spoken, rather than simply the media file itself) were extremely well-received, saving hours of work otherwise spent manually searching through audio or video files;
- **Easy access to audio/video on searched topics has many pedagogical as well as research benefits**, such as being able to accumulate video clips on a particular topic of curriculum interest without needing to view entire videos to find it;
- **Of great value for researchers is the ability to search seamlessly digital assets on one's personal computer, on server space and full-text databases.** There seems to be an increasingly blurred distinction between what is held locally, remotely and potentially (the latter being resources available to which one has access rights, such as full-text journal articles);



- **Graphically presented search results**, showing links semantic or thematic between documents **were considered too complex** requiring excessive learning on the part of the searcher and a prohibitive amount of indexing and other work to set-up and maintain such a service.

Results: Organising information resources



These resources are principally referencing and document management tools, but with additional functionality. Example of applications included in GK:

- Mendeley (<http://www.mendeley.com/>);
- Zotero (<http://www.zotero.org/>).

Key messages

What researchers liked about these was to:

- **Enable the organisation of research papers on one's own machine:** Interviewees had multiple versions of the same article on their computers, in different locations and under different filenames. There were instances where researchers searched on bibliographic databases for items they knew they already had, as it was easier to access them online from a host organisation;
- **Have an 'Amazon-style' recommendation facility**, where users can see what others with similar research interests are reading and also receive automatic recommendations;
- **Generate bibliographies and indexes from documents as they are being written** (by citing from papers in one's personal database): The advantages here were time-saving over manual entry and accuracy;
- **Synchronise** with other reference management software, such that references uploaded into End Note, for instance, automatically appear in Mendeley or Reference Manager;
- Allow **access from multiple computers at different locations** and enable synchronised document versions;
- **Collaborate between researchers**, a topic to which this report now turns.

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First name

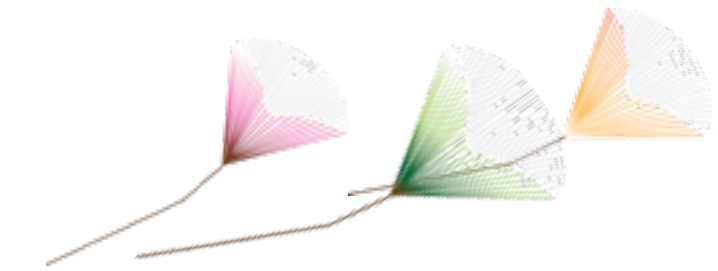
Last name

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Results: Collaborative software



In addition to the organisational software such as Mendeley, described above (which facilitate collaboration whilst ‘majoring’ on the organisation of resources), other tools showcased at GK specifically facilitated collaboration either between researchers - via blogs, communities of practice etc. - or with actual or potential research subjects or participants enabling a far larger sample size. Included in GK were:

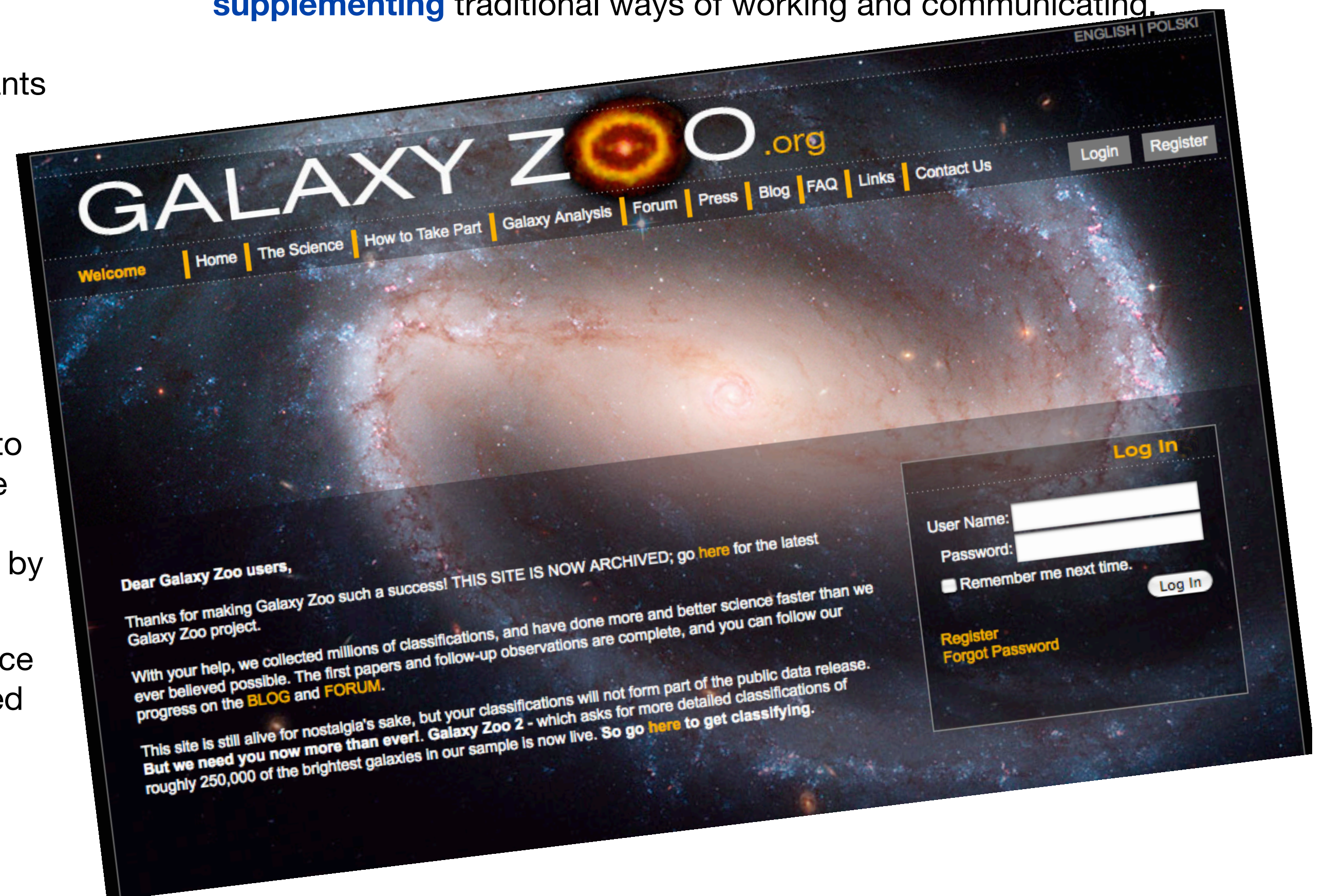
- Galaxy Zoo (<http://www.galaxyzoo.org/>);
- Nature Network (<http://network.nature.com/workbench>).

These are part of the suite of services that can be described as ‘social media’.

Key messages

- **Many possibilities were suggested**, as a result of being exposed to techniques showcased in GK as to how collaborative tools could be used to undertake primary research (rather than simply report it or discover others’ research), although currently this is not being done by more than a small minority of researchers;
- **The potential of crowd-sourcing techniques was recognised** once visitors had seen them in action, not simply in the area demonstrated but repurposed for various disciplines and themes;

- **Social networking** is used in various ways to communicate between colleagues, but appears to be **augmenting rather than supplementing** traditional ways of working and communicating.



Results: Data manipulation



These tools are used to facilitate the manipulation of images - by adjusting the light, rotating, zooming etc. Example of applications included in GK:

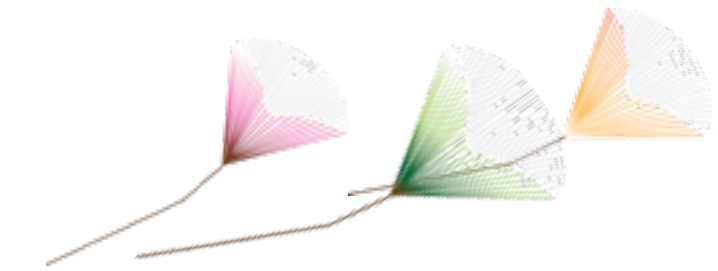
- Polynomial Texture Mapping (<http://materialobjects.com/ptm/viewer.html>);
- The New York map rectification tool (<http://maps.nypl.org/warper>).

Key messages

- The techniques showcased were all new to interviewees. However, as with the crowd-sourcing application (Galaxy Zoo) experienced, **people who examined these found many ways in which they could be repurposed for other research**, such as in identifying photographic processes and aiding photographic conservation;
- It was also felt that this technique might be possible in examining historical scripts to determine the method of writing. In some cases, it is actually difficult to tell whether a typeface has been written or printed;
- **Even the specialised New York map rectification tool gave inspiration to researchers.** One interviewee felt this tool could help in work he is doing on the history of musical instruments. The designs for various instruments through history could be overlaid on to each other to show design progression.



Results: Innovations in formal research dissemination



GK showcased new ways of presenting scholarly research results in a formal journal article context. This was by using video to capture and transmit the intricacies of life science research. Example of applications included in GK:

- Journal of Visualised Experiments (JoVE) (<http://www.jove.com/>)

Key messages

- Even though none of the people who accessed this resource worked in the specific area of chemical biology covered by it, the attraction that **one can understand a technique better by seeing it than by reading about it** was universally agreed, especially in the case of complex and delicate operations that form part of life-science research;
- **The juxtaposition of text and video was also considered to give a much more complete picture of a research activity or finding than either medium on its own.** Not surprisingly, the potential for exploitation in a teaching context was a major theme, where embedding the videos into presentations to demonstrate techniques or organ movements etc. was seen as an excellent method of imparting information;
- Hints of possible problems were elicited, however:
 - ▶ First, **the difficulty of quoting from information presented orally was flagged.**
 - ▶ Second, the sizes of video files were large, and this raised issues about **long term archiving and curation.**

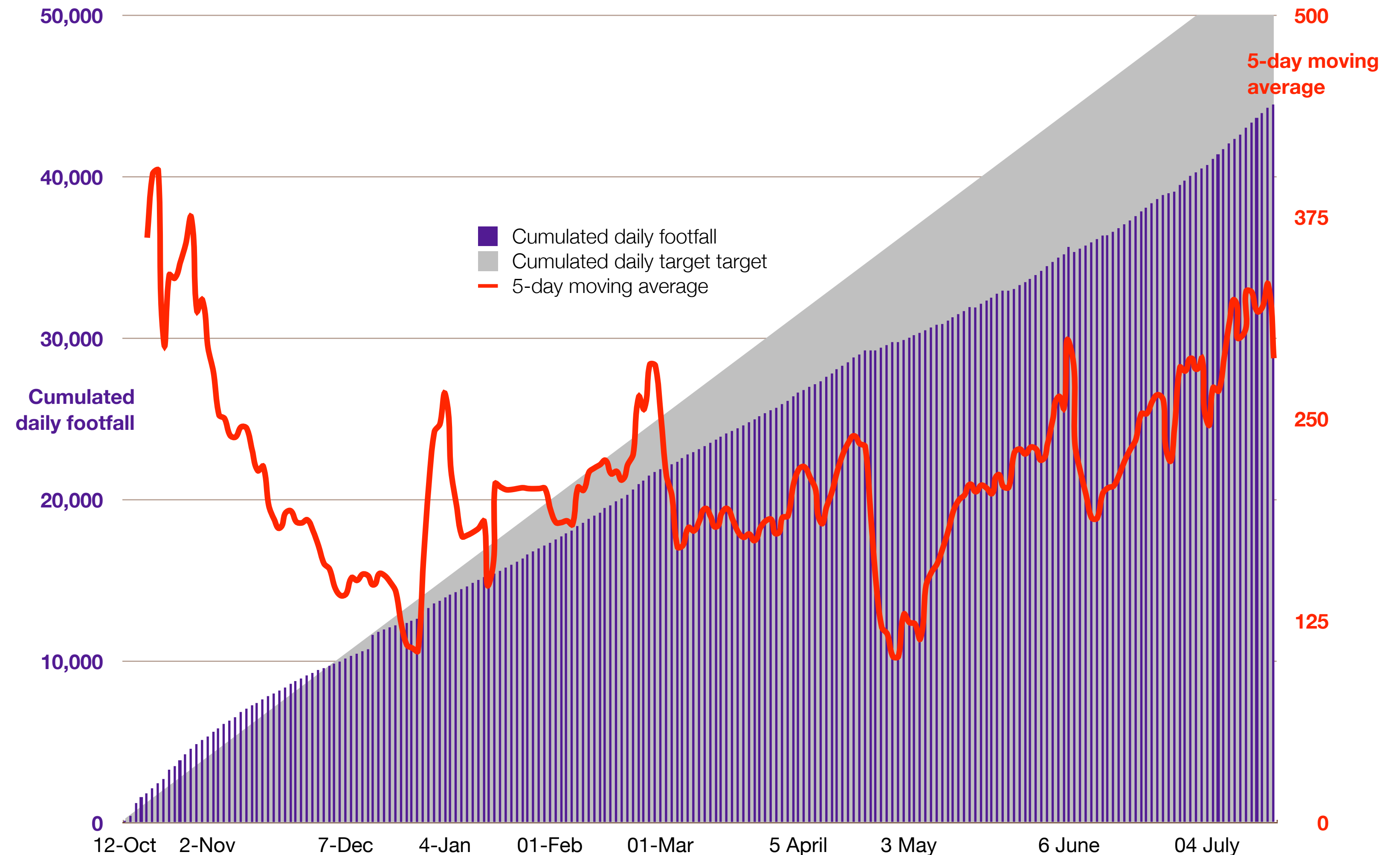
- ▶ Following from this was the issue of continuing individual access to multimedia journal articles. It was argued that articles may not be permanently accessible on the journals' websites; or **personal circumstances may mean that one no longer has access rights.** Although this could apply to any journal, unlike with text-based documents, it was not possible to save these files locally, so personal acquisition of and permanent access to such material is not possible.

The screenshot shows the JoVE website interface. At the top, there's a search bar with the text 'Click Here to Search' and a 'Search' button. Below the search bar is a navigation menu with links for 'Home', 'Browse', 'For Authors', and 'Subscribe'. The main content area displays a list of articles. The first article is 'Extraction of High Molecular Weight DNA from Microbial Mats' by Benjamin S. Bey, Erin B. Fichot, and R. Sean Norman. It includes a video thumbnail and a brief description: 'We provide an improved protocol for extracting high molecular weight DNA from hypersaline microbial mats. Microbial cells are separated from the mat matrix prior to DNA extraction and purification. This enhances the concentrations, quality, and size of the DNA. The protocol may be used for other refractory samples.' Below this, there's another article titled 'Live Cell Calcium Imaging Combined with siRNA Mediated Gene Silencing Identifies Ca²⁺ Leak Channels in the ER Membrane and their Regulatory Mechanisms'. On the right side, there's a 'July's Highlights' section with a 'Click here to see July's Highlights' button and a 'Subscribe to Newsletter' button. Social media sharing options for Twitter and Facebook are also visible.

Results: Popularity of the exhibition (footfall)

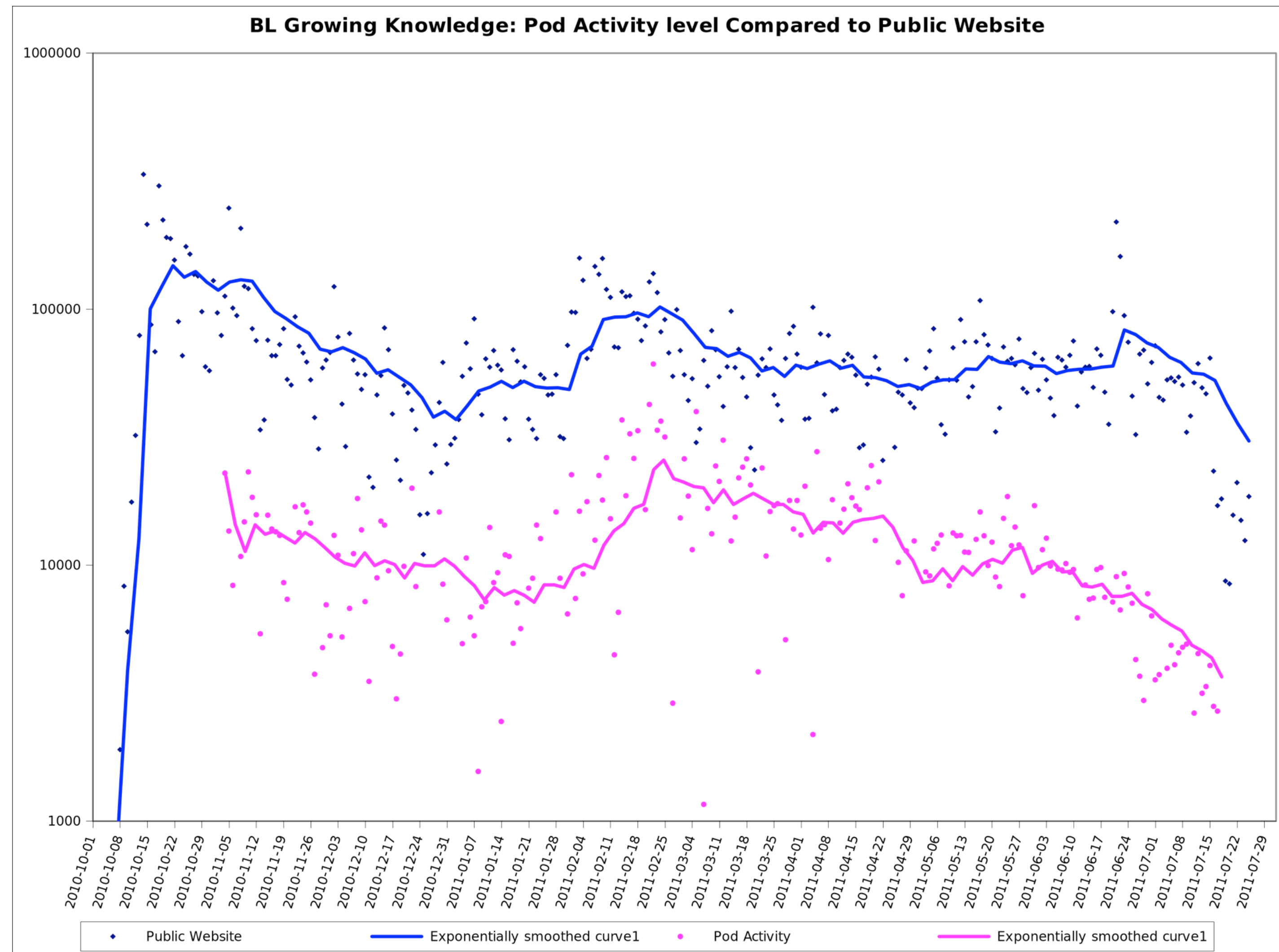
'Footfall' at the physical exhibition, as measured by tripping a light beam, is shown here graphically. The five day moving average (red line) indicates that attendance has been variable, but that following a slump in May (partly attributable to seasonal holidays) figures held up, despite the relative longevity of the exhibition. Indeed, it was even increasing until just before the final days. The exhibition was visited by 45,924 people.

GK reached a wide and representative audience Most did not have a British Library 'reader' pass, showing that exhibition reached a wider audience than its core users. Also, nearly 45% of visitors were over 45 and nearly 25% over 55 showing that the technological nature of the exhibition is not discouraging older people.



Results: Popularity of the exhibition (online behaviour)

This is a graphical representation of pod and public website user activity. It measures this in terms of the number of features selected, including text descriptions, tours, as well as the resources. This can be compared with an equivalent measure of activity for the public website. The general pattern is of a decline over the winter months, and a return to high activity in the spring. There is generally a close correlation between web-site and exhibition activity.



Results: Impact of the exhibition



The exhibition had a major impact. An average of over 10% of GK survey respondents said that they are using different digital tools and other resources as a result of attending it, and an average of 40% said they might do so in the future.

The greatest impact were the **projects demonstrating new ways of visualising complex data** (such as JoVE, described on page 15), which 12.7% reported using as a result of the exhibition. Twelve point six percent said they now used **audio search** now. As this is not available outside the physical space, the implication is that **people are attending for a 2nd or 3rd time to avail themselves of it**. Almost 50% said they might use it in the future.

Techniques such as crowdsourcing had a major impact too, even if not quite as much as some of the other techniques. Only 13.4% had used this before, and interview data suggests the majority of researchers did not even know about the technique before being exposed to it. However, 7.6% of survey respondents report using it as a result of the exhibition, and a further **32.8% said they might use it in the future**.

More widely, researchers were able to see beyond the disciplinary boundaries of the projects highlighted and envision using various techniques demonstrated to enhance their own research. Examples were:

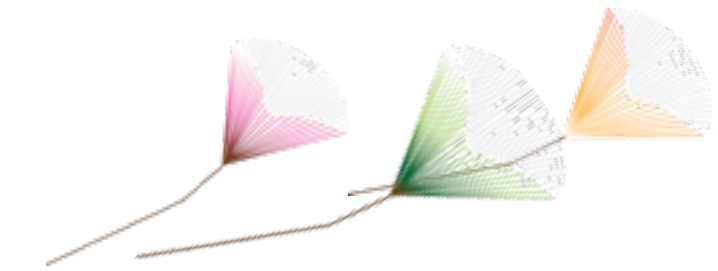
- **Facebook** could be used to connect research participants with each other and to the study team;

- **Galaxy Zoo** - crowdsourcing could be used to **acquire personal historic documents of use to social historians**, which are residing in people's lofts or cupboards; determine the nature of archeological finds; finding the most appropriate icons to represent 'friends', 'employment' etc. on websites for people with learning disabilities;
- The **Touch Surface Table** could be used to undertake data manipulation and visualisation (the example was of 'handling' molecules rather than by typing-in coordinates);
- **NY Map rectifier** could be used to e.g. plot shop/supplier addresses to visualise the spread of photography and gain a greater understanding of how it developed as a hobby.

	Already using before GK	Using now as a result of GK	Might use in future	Don't know / of no interest	Total
Advanced or filtered searching	50.0	11.7	26.7	11.7	100.0
Collaborative authoring tools	32.2	9.1	38.0	20.7	100.0
Text analysis or text mining	24.4	9.8	46.3	19.5	100.0
Audio search	8.4	12.6	49.6	29.4	100.0
Crowdsourcing	13.4	7.6	32.8	46.2	100.0
Semantic Web technology	13.4	10.9	41.2	34.5	100.0
Reference management	33.9	9.1	36.4	20.7	100.0
Aids to visualising complex data	20.3	12.7	44.9	22.0	100.0

Growing Knowledge survey respondents' use of digital technology, row percentages (n=127)

Results: What researchers want from a physical library



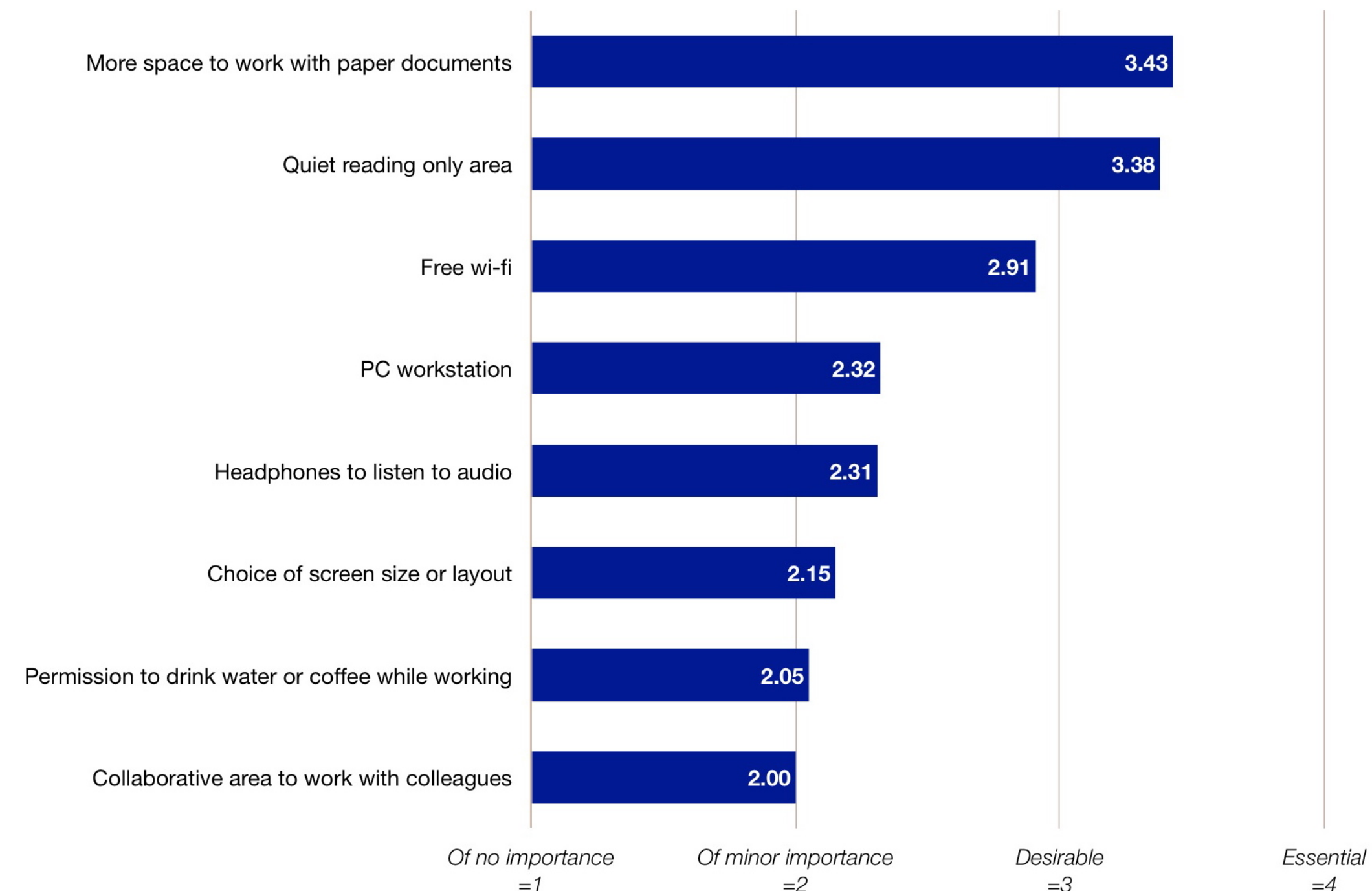
Survey respondents were asked to rate how essential certain facilities were in a 'physical' library. Results appear in the graphic below (mean ratings, 1=of no importance and 4=essential).

As can be seen, the most essential features were wi-fi access, space to work and a quiet 'reading only' area. Wi-fi access is rated as 'essential' by far more respondents than is a PC workstation (terminal), suggesting that patrons are happy to bring their own hardware into the library.

Interviewees tended to agree with survey findings, with wi-fi being the most expressed need. Comments from interviewees, however, support the view that a library workstation is desirable more because it was assumed to provide a greater access to resources than one's own computer, rather than because it provided necessary hardware in itself.

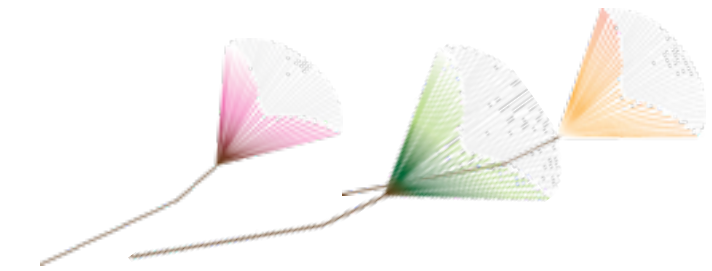
Survey respondents were asked what additional facilities they would like in a research library. The majority of suggestions concerned practical services such as access to scanners, printers or policies such as a designated quiet area (or generally a stricter code) or extended opening hours. A number of people mentioned allowing the use of digital cameras to photograph document pages etc.

For most researchers, remote access to resources and facilities was more important than physically visiting a library. One requirement that was reported by interviewees and focus group participants to a greater extent than by the questionnaire respondents was the need for formal meeting rooms to facilitate collaborative working.



*Growing Knowledge survey respondents' requirements for a physical library
Mean ratings where 1 = 'Of no importance' and 4='excellent' (n=110)*

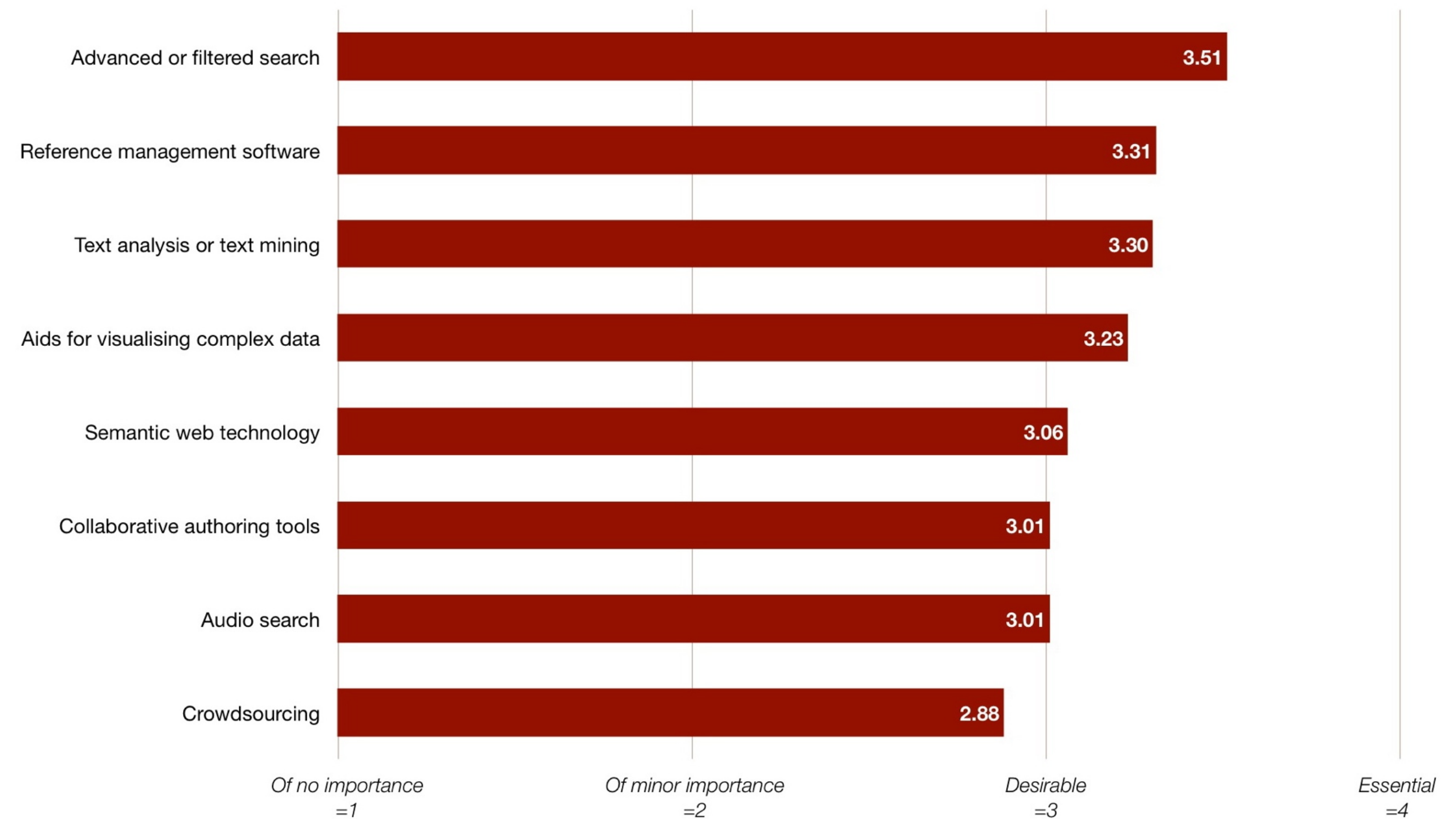
Results: What researchers want from a digital library



Survey respondents were given a list of resources a digital library might provide and asked to state how essential they are for them. Results are depicted in the graphic opposite (where figures are mean ratings, 1=of no importance and 4=essential):

All of the resources itemised were considered 'essential' or 'desirable'. The digital tool most valued here is advanced or filtered searching. Both advanced and filtered searching is available on a number of platforms used by researchers, including generic services such as Google Scholar and more subject/discipline such as Web of Science or JSTOR, and researchers may see these facilities as 'standard'. Reference management tools and text analysis were the second and third most mentioned requirements.

The need for reference management support was strongly reinforced by interviewees, with Mendeley being particularly highly regarded. Interviewees accessing the audio (and video) search facilities on the pods also felt that these were, in the words of one interviewee 'must-haves' for a research library.



*Growing Knowledge survey respondents' requirements for a digital exhibition
Mean ratings where 1 = 'Of no importance' and 4='excellent' (n=110)*

Recommendations for the future of research libraries



Our research leads us to recommend:

- **Greater provision for remote library access:** This, of course, requires greater digitisation of resources including documents and non-text assets. Access could be controlled by a 'Google Books' or 'DeepDyve' solution where copyright issues are involved;
- **Retaining hardcopy:** digitisation should not mean discarding the original hardcopy. Much information cannot be reproduced electronically;
- **The integration of disparate resources:** There was a strong need to integrate various datasets, information and other assets into one seamless database or resource centre and to have access synchronised across different hardware and platforms. A Mendeley-style catalogue interface could do this. The BL could integrate multi-media resources by incorporating the audio and video search functionality such that it is possible for people to have immediate access to topics of interest rather than the 'serial access' required when only the title/keywords of an audio or video file is indexed;
- **Collaboration with other research and national libraries:** The BL needs to let go of the idea of being 'the ultimate public library' and consider its role as a portal to external as well as internal holdings and collaborate with other libraries to achieve interoperability of collections and interfaces;
- **Engaged research support:** The BL could play a crucial role in supporting the cycle of research activity: targeting possible funders, preparing and submitting a proposal, desk research, gathering data, publication and other dissemination or publicising of results;
- **The custodian of research datasets:** Online versions of journal articles now often include links to supplementary material. We recommend that the BL play a major part in the organisation and maintenance of these resources;
- **The aggregator and guardian of social media data:** The phenomenon of social media gives the BL an excellent opportunity to enhance its reputation in indexing, cataloguing, organising and providing access to materials. It could also provide guidelines to users regarding the inclusion criteria, provenance etc.;
- **A more comprehensive training role:** The electronic availability of information – in various forms – and the appearance of a multitude of mobile and other IT devices - gives the BL greater opportunities than ever in a role in facilitating information retrieval and document organisation and management;
- **Greater external engagement:** In addition to offering more 'TED'-style talks and other public engagement, outreach could also be extended to putting content outside of the (electronic) confines of the library, such as on Flickr Commons.

Research design



A wide range of qualitative and quantitative methodologies were used to collect the rich and triangulated data that we needed, as follows:

Interviews (Oct 2010 – April 2011): 108 participants

Participants were interviewed individually whilst exploring the resources. Issues included participants' use of social media in a research context; their views of the resources; the extent to which, and how, these could be re-purposed and exploited for their own research; and what they want and need from a research library in the future. Interviews lasted between 15 and 45 minutes depending on the availability of the interviewee and the flow of the discussion.

Observation (Oct 2010 – April 2011): 100+ participants

Participant observation was undertaken between interviews when visitors were experimenting with the resources. Observation was generally undertaken before the interviews which then commenced with questions about their online behaviour.

Growing Knowledge survey (Oct 2010 – Mar 2011)

This sought information specifically from only physical and online visitors. It asked similar questions to those undertaken in interviews and thus went some way to quantifying the latter.

General survey (April 2011 – June 2011)

The original survey was redesigned with some questions specific to the exhibition being removed, in an attempt to attract researchers

who had not necessarily attended the exhibition. Both surveys were posted on the BL website.

Deep log analysis (Oct 2010 – June 2011)

This was to assess the degree to which the digital resources are used, and projects accessed. It was possible to use log data to cluster user behaviour to see, for example, which particular groups of resources individuals looked at. Logs were taken from the sites linked to GK and from the pods.

Focus groups (April – May 2011)

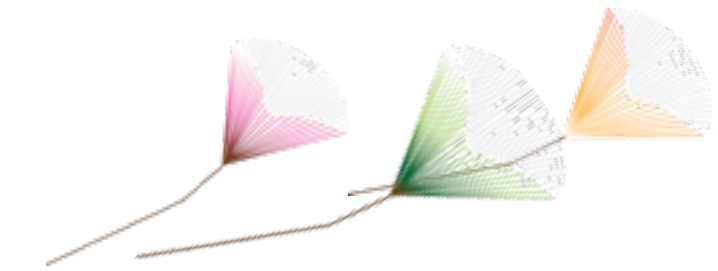
These looked at the future role of the BL and other research libraries in the digital age. This topic was put into the context of the exhibition. Four sessions were carried out as follows:

- Science, Technology and Medicine
- Creative Industries, Business
- Social Science
- Arts and Humanities

Registered user numbers and demographics (Oct 2010 – January 2011)

This information was acquired when users registered. From the registered users it was possible to determine how many visitors experimented with resources on the pods.

Appendix: Pod resources (1)



The NYPL Map Rectifier

This is a tool for digitally aligning ('rectifying') historical maps from the NYPL's collections to match today's precise maps. Visitors can browse already rectified maps or assist the NYPL by aligning a map. You can tour the site or learn how to rectify a map yourself.

BL Virtual Research Environment: the Crimean War

Research is not limited to single collections or repositories, but should take place across all kinds of sources, wherever they are held. This BL tool explores ways of pulling material related to particular themes from a range of institutions and in all formats. A suite of tools is included, allowing researchers to investigate the history of the Crimean War in greater detail.

BL Video Server

The next generation of researcher will make use of all kinds of media, including video within an integrated environment. The BL Video Server will become a delivery service for all kinds of moving image content. This prototype concentrates on UK television news output, with innovative subtitle searching developed for the BL by Cambridge Imaging Systems.

London Lives

Data can become even more useful if it can be connected to other data and labelled, or 'marked up.' London Lives, a historical resource for the period 1690-1800, provides access to 240,000 records from eight archives. Names, places, occupations and dates have been marked up using a combination of manual and automated techniques, including natural language processing.

AlzSwan

The volume of scientific literature is growing at a rapid pace, unmatched by our ability to synthesise all this new information. AlzSWAN is a demonstration of how semantic web technologies offer the opportunity to ease that burden. SWAN (Semantic Application in Neuromedicine), powers the AlzSWAN, allowing the Alzheimer's research community to test scientific hypotheses and help lead to new treatments.

UK Web Archive

In less than a generation, the web has become the primary source of information across the world. But despite its importance, its content is often ephemeral. The UK Web Archive seeks to preserve UK web content, and meet the challenge of searching vast amounts of data

The Codex Sinaiticus

This is one of the earliest known Bibles, dating from the fourth century. Digital photography of the geographically distributed leaves of Codex Sinaiticus is central to the Project's virtual reunification of the manuscript. Careful imaging of the original leaves provides a life-like view of the pages, thus allowing, for the first time, worldwide access to the manuscript. The text has also been transcribed and encoded.

Audio Search

Making searching audio and video as easy as text is a difficult problem for computers. This tool uses the Microsoft Audio Video Indexing System developed by Microsoft Research. It converts speech into text for digitised audio and video files from the BL, allowing researchers to find what they are looking for without hours of searching. It is not 100% accurate, so the system uses automatic vocabulary adaptation, acoustic adaptation and language grammar to improve the accuracy of recognised words (American spellings). Even with these techniques, not all words will be recognised so you may encounter some inaccuracies.

Data Mining with Criminal Intent

This project will create an intellectual exemplar for the role of data mining in an important historical discipline – the history of crime – and illustrate how the tools of digital humanities can be used to wrest new knowledge from one of the largest humanities data sets currently available: the Old Bailey Online.

BL Research Information Centre

RIC is a Virtual Research Environment, which will make organising and conducting your research projects easier. RIC provides a web-accessible suite of tools and resources to support all aspects of the research lifecycle. It will help the researcher pull together all required resources rather than having to access each one separately. RIC is still in development, but will be a constantly evolving platform that can be tailored to specific disciplines and research needs

Data.gov.uk

Responding to the challenge to 'make public data public'. Data.gov.uk is a directory for data collected by government on issues that affect all of our lives, including housing, transport, health and education. Data.gov.uk also provides a forum for the re-use of this data, and sharing of new tools and applications. Look up local planning information, track government spending, or find out where to hire a bicycle in London.

BL Search our Catalogues (beta)

Online catalogues are moving away from the old model of virtual 'card catalogues'. The next generation of library catalogues allows more intelligent searching, and offers access to datasets, web sites and journal articles. The catalogue is also a community of knowledge. You can share notes, tags or save items to your own bookshelf.

International Dunhuang Project

IDP is a ground-breaking international collaboration to make information and images of all manuscripts, paintings, textiles and artefacts from Dunhuang and archaeological sites of the Eastern Silk Road available on the Internet and to encourage their use through educational and research programmes. Over 250,000 images of manuscripts, paintings, textiles and artefacts along with catalogues, translations, historical photographs, site plans and much more are already freely available to all on IDP's multilingual website, hosted by our members in Britain, Germany, Russia, China, Japan, France and Korea.

Appendix: Pod resources (2)



Polynomial Texture Mapping

New methods in imaging help to reveal objects or texts in a new light, often literally. Polynomial Texture Mapping takes numerous images of objects with light raking from different angles. The resulting composite file allows the object to be seen as though a torch is being shone from different angles, highlighting its three-dimensional characteristics and offering new insights for scholarship and the conservation of heritage materials.

eDance Toolkit

Performance research and new technologies are often complementary. The eDance project explored a variety of ways of recording, reworking, and annotating performances. Many of the tools developed also have broader applications, from recording the decisions taken in a research process, charting movements in three dimensions, and virtual participation.

JOVE (Journal of Visualized Experiments)

The way in which scientific research is communicated is changing. Methods papers (describing how to perform new or refined experiments) are items ripe for transforming their traditional static scholarly article format into a more demonstrative and visual one. The Journal of Visual Experiments (JoVE) presents research methods in video format, allowing the intricacies of new methods to be demonstrated far more effectively than is possible in text. To see what we're trying to say, see some JoVE articles for yourself.

Nature Network

Collaboration is core to research in science, technology and medicine. Online social media should therefore present great opportunities for researchers to obtain a wider audience of potential collaborators than ever before. Nature Network shows how only a single platform is needed for scientists to connect, discuss and disseminate information to communities of researchers they may not have otherwise encountered

Galaxy Zoo

The web can harness the brain power of thousands, or even millions, of internet users, meaning that questions that were too expensive or too difficult can now begin to be solved by 'crowdsourcing' projects. Galaxy Zoo asks volunteers to participate in the research process, helping to identify galaxies and contributing to discussion. Such techniques have also been used to help solve biomedical problems and are helping to identify ancient texts.

Allen Institute for Brain Science

The power of the web to provide access, integration and navigation of data is demonstrated by the Allen Brain Atlas resources. The Allen Institute for Brain Science works at the interface of biology and technology to produce these datasets, which are provided freely online for all researchers. Image-based anatomic and genomic data are integrated, along with innovative search and visualisation tools, to map gene expression across neural anatomy. This allows us to understand brain function and development in ways that would be impossible using unstructured and segregated datasets.

Ensembl

Ensembl is a joint project between EMBL - EBI and the Wellcome Trust Sanger Institute to develop a software system which produces and maintains automatic annotation on selected eukaryotic genomes.

Mendeley

This is a free reference manager for your desktop and the web that can help you organise your research, collaborate with others online, and discover the latest research as it is published.

Timescapes

A major study of how personal and family relationships change over time. Projects use in-depth interviews, photographs and other visual data, to document people as they grow up, form friendships, have children and grow older. An important part of the study is the creation of an electronic archive and catalogue to enable researchers to re-use the qualitative data gathered by the projects. The project is sponsored by the ESRC and the University of Leeds.

BL Management and Business Studies (MBS) Portal

Busy managers and researchers want quick and easy access to the latest management research, so the BL has developed a new website that meets this need. Download research and good practice from leading UK universities, think tanks, government and consulting firms, and access the BL's vast collections of print and digital information in one powerful search.

Jane Austen's Fiction Manuscripts

Digital facsimiles offer the possibility of studying rare or unique manuscripts wherever researchers have Internet access. Digital humanists have also worked on creating standards and ways of 'marking up' critical editions of texts, adding data about the writer, annotations, amendments and erasures as well as other information about the text. Jane Austen Fiction Manuscripts is a fine recent example that aims to virtually reunify and transcribe Austen's holograph works, many of which are in a fragile condition.

Prosopography of Anglo Saxon England (PASE)

Digital tools allow connections between peoples, groups and places to become apparent. The PASE project combines a large number of sources, including charters and maps, and allows anyone to find out more about the history, people and places of Anglo-Saxon England.

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Further information



Further information about the exhibition can be found at: www.growingknowledge.bl.uk/

The full version of this report will be posted shortly on the CIBER website at: <http://ciber-research.eu/>

CIBER research

CIBER research is a policy-led, consumer-driven, interdisciplinary and independent research group. It seeks to inform by countering idle speculation, PowerPoint puff and uninformed opinion with the evidence and facts. CIBER research makes a difference.

CIBER are research artisans, skilled in all necessary crafts—analysis, evaluation, presentation, communication and engagement. CIBER produces bespoke research.

CIBER's particular expertise lies in making sense of how very large numbers of people behave and consume in the digital environment. To this end we map, monitor and evaluate digital information systems, platforms, services and roll-outs using robust, advanced and innovative research methods, in particular deep log analysis, bibliometrics and digital surveying. We believe we are on a different page from our competitors as we understand the digital transition, disintermediation and the policy, economic and social implications.

CIBER research tells how the world we knew is being shattered and reassembled by the digital transition. Through our research we will reveal the new directions opening for your business. In the knowledge vacuum most industries, institutions and companies do not even know which questions to address. Or ask and keep asking the same wrong questions and getting nowhere. In the knowledge vacuum there is a huge risk of industries and

CIBER...
The core team...
Current & future projects...
some progress reports...
Dave Nicholas' publications...
From April 2011 we are:

CIBER Research Ltd.
1 Westwood Farmhouse
Greenham
Newbury
RG14 7RU
tel: +44 01635 42719
eMail: Office@CIBER-research.eu.

MeteoGroup
Weather Newbury
Fri, 08.07.11
Rather cloudy,
Hea...
SSW
31 km/h
max. 18°C
min. 11°C
Live radar