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"We muddle our way through": shared and distributed expertise in digital engagement with research

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Abstract The use and availability of digital media is changing researchers' roles and simultaneously providing a route for a more engaging relationship with stakeholders throughout the research process. Although the digital realm has a profound influence on people's day-to-day lives, some researchers have not yet professionally embraced digital technologies. This paper arises from one aspect of a project exploring how university research and professional practices are evolving as researchers engage with stakeholders via digital media to create, share and represent knowledge together. Using researchers from the Open University (U.K.) as a case study, this paper reviews the extent to which they are developing multiple identities and functions in their engaged research through digital media.

Introduction The Internet has radically transformed how people seek, use, archive, curate and transmit information [Björk et al., 2010]. Although the pattern of change among researchers is uneven [Scanlon, 2012], digital technologies are transforming at least some one-way, top-down communication into multi-way conversations and collaborations [Shan et al., 2014; Holliman and Curtis, 2015] and reframing relationships among producers, creators, communities and consumers [Koltay, 2011; Holliman, 2011; Morris, 2011]. The convergence of multiple viewpoints, user-generated content and collaborative modification means that (at their best) digital technologies connect people with similar interests, enhance interactions and expand the boundaries of engagement.

This transformation requires researchers (and stakeholders and publics) to adapt their day-to-day practices and behaviours. In this study, our initial focus on how researchers are managing changes in their scholarship in relation to engaged research[1] led us to examine two further research questions.

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[1]The Open University recently approved a definition of engaged research, stating that: '[it] encompasses the different ways that researchers meaningfully interact with various stakeholders over any or all stages of a research process, from issue formulation, the production or co-creation of new knowledge, to knowledge evaluation and dissemination' [Holliman and Holti, 2014].

1. How have digital tools and technologies and information ecosystems affected researchers' relationships with their academic peers?

2. How have digital tools and technologies changed researchers' relationships with non-academic stakeholders and their roles in knowledge-generation and exchange?

Researchers' identity and digital engagement practices

"Technology does not just do things for us, but to us, changing the way we view ourselves" [Turkle, 2011, p. 28]. Engaged researchers must both broker engagement between different domains and actively construct engaged research through their experiences and collaborations. Operating effectively in different domains involves more than learning how to use technologies and what to do in different communities. It also requires the — sometimes painful — negotiation and re-formation of an academic identity [Watermeyer, 2015; Goffman, 1981]. The process of reconciliation is deeper than simply making choices about practices or beliefs; it also involves a potentially non-harmonious construction of self that integrates one's behaviour, beliefs, knowledge and skills across communities of practice with different cultures [Wenger, 1999]. This can cause cognitive dissonance, where we are caught between what we want to do and what we feel we should do [Adams, 2013]. This is compounded by the ever-changing social acceptability of engaged research, with evidence suggesting a limited uptake of engaged practices [Jensen and Holliman, 2016; TNS BRMB, 2015].

Issues of identity are further complicated because the definitions and strategies of engagement depend greatly on time, culture and the attitudes of the societies in which they are practised, as discourse and understanding evolve [Bauer, 2009]. The twenty-first century has seen a turn to dialogue [Phillips, 2011], to engagement as "a two-way process, involving interacting and listening" [NCCPE, 2013]. In return, researchers typically acknowledge engagement as a moral duty [TNS BRMB, 2015]. Faced with the need to enact policy in contentious and difficult fields, governments have also committed to public engagement [McCallie et al., 2009].

Digital media are sometimes seen as a ubiquitous means to sustain engagement with stakeholders. Although the term 'digital media' is disputed by theorists [Sheridan and Rowsell, 2010], their lexicon is embedded in daily life [Holliman and Curtis, 2015]. Radio programmes invite listeners' tweets, online editions of newspapers include comment sections [Holliman, 2011], families engage via social networks and computer-mediated communication [Duggan et al., 2015], organisations gather opinion through social media [Valtysson, 2013; Koltay, 2011; OFCOM, 2008], charities poll donors on their research priorities [Cancer Research UK, 2014] and public debate takes place in online forums [QLD Govt., 2014; whitehouse.gov, 2014].

In using digital media, researchers are thus responding to prevailing social norms [Fausto et al., 2012; Weller, 2011]. However, although their use is growing [Duggan and Smith, 2013], some continue to regard blogs, wikis and other web tools as a waste of time [Esposito, 2013]. This wider context prompts debates around issues such as: does time spent on the creation of digital content and engaging via digital media have purpose and value? Can the use of digital media legitimately be

regarded as work and a core activity for researchers? Alternatively, and more significantly for the purposes of culture change (which was the overarching focus of our research), to what extent *should* digital media be regarded as a routine research activity?

Digital media and the information ecosystem

Digital media occupy many niches in the ecology of daily life. Like invasive species entering a new landscape, some species of digital media rapidly become successful, others flourish briefly then fade away, and others slowly become stable members of the ecosystem of communication and engagement. Since the mid-2000s, the growth in the number of people using digital media has been consistent; some 73% of online adults now use social media, for example [Duggan and Smith, 2013].

But digital engagement is about more than the number of people using technologies as routes for engagement; it also makes possible, and is made meaningful, by its break with traditional research and scholarship practices. The use of digital information and communication technologies to research, teach and collaborate [Pearce et al., 2010] is but one aspect of engaged scholarship. Burton [2009] suggests that digital scholars make their processes digitally visible and open to criticism throughout the research process; in effect representing both open *and* engaged scholarship; Petray [2011] argues, in the context of activism, that web tools should enhance, rather than replace older, offline modes. Like any community, academics will only change their practices when they see an advantage in doing so or can adapt new tools to meet their needs [Borgman, 2007]. If they are to benefit both the academy and society, using web tools entails acceptance of a culture of open values and ideologies, and embracing new ways of working [Weller, 2011].

Researchers use many tools and mechanisms to communicate and engage [Pearce, 2010]. Some, such as email or file-sharing systems, are digital versions of older tools that have changed the landscape to the extent they have become embedded and normal; it is increasingly difficult for many of us to remember how we worked before the Internet, socialised as we are in a world in which communication is effortless and seamless [Trench, 2008]. Digital media "extend opportunities for interpersonal information-seeking" [Borgman, 2007, p. 57], allowing users to collaboratively construct knowledge and bind their communities. Moreover, users twine multiple technologies and therefore multiple affordances[2] [Gangestad, 2007]. Schultz and Jungherr [2010] observed research activists using multiple routes to facilitate people's involvement and Valtysson [2013] described multiple publics using multiple social media in the collaborative re-writing of the Icelandic Constitution.[3]

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[2]Affordance: The characteristics of a device, medium or object that "afford" value. (For example, a personal digital assistant, with its display screen and pointing device affords pointing, touching and looking at icons on the screen.) Affordances describe potential for action, but that potential depends on the perception of the user [after Laurillard, 2004].

[3]Not all experiments in collaboration are either straightforward or successful. Holliman [2011] documented examples of a collaboratively-authored newspaper editorial that had to be removed from the newspaper's online edition. In the same paper, he discussed some of the challenges in engaging with controversial or contested research topics in digital spaces; if, then when and how should organisers of online debates moderate (anti-) social media?

Research blogs, for example, have become popular as a route for the rapid dissemination of information [Heap and Minocha, 2012], sitting "neatly with official discourses of appropriate academic behaviour and performance" [Mewburn and Thomson, 2013, p. 1115] and occupying a place among established writing forms such as peer-reviewed academic papers, articles and research diaries [Heap and Minocha, 2012].[4] Blogs can be a powerful tool for communication and dissemination, highlighting serious academic research and allowing non-academic readers to reach cutting-edge writing and first-person commentary [Fausto et al., 2012] but they can only be a tool for engagement if researchers and stakeholders decide to contribute. Much remains to be understood about how the contributor's level of education, sexual orientation, institutional affiliations and disciplinary expertise affect discussion and debate within blogs [Shema, Bar-Ilan and Thelwall, 2012]. Digital mechanisms are perceived as having few vetting procedures to help readers evaluate the quality of their content [Batts, Anthis and Smith, 2008]. This stigmatises social media, despite their ability to profoundly change communication in and about research [Wilcox, 2012].

The integration of multiple tools sustains affordances, widens dissemination and gathers feedback from diverse communities [Ferguson, Clough and Hosein, 2010]. Engagement within new and evolving spaces means that boundaries frequently have to be re-negotiated. Researchers in transdisciplinary projects have identified stumbling blocks in professional collaborations, such as differences in epistemology, inconsistencies in 'common' terminology, question formulation, output mechanisms, ethical agreements and communication style [Grand, 2012; Monteiro and Keating, 2009]. Creating and organising deliberative spaces, peers' and managers' support, and developing strategies to manage collaborations are important elements in the production of information by interdisciplinary teams. However, few researchers or stakeholders work solely in one medium; they engage in hybrid spaces. Such multiple affordances require both researchers and stakeholders to develop new skills to find and refine information, moderate online conversations and judge quality [Holliman, 2010].

Models and affordances

Communication, whether with peers or stakeholders, is a mainspring of research activity. Bucchi [2004] visualised communication as a funnel through which successful ideas can move from the realms of the intra-specialist, to inter-specialist, pedagogical and popular. Irwin [2008], framed communication in a more complex way, to include forms of engagement. In his framing, first-order (deficit-filling, one-way, top-down), second-order (two-way, bottom-up, dialogic) and third-order (multiply-framed, contextual, contended) communication and engagement modes wrangle and overlap. Both Bucchi's and Irwin's models can co-exist in an engaged research project, posing problems for how to facilitate the sharing of knowledge and mediate perceptions of expertise among communities of users; different communities have different languages, forms of expertise and norms of practice, which can lead to poor communication, struggles over expertise and imbalances in shared understanding [Holliman, 2011; Adams, Blandford and Lunt, 2005].

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[4]We witnessed the acceptance of blogging as an academic activity during this action research project, where we used evidence gleaned from academic researchers to develop a business case with service providers across the university, including IT and Communications, to secure funding for a stable, institutionally-branded blogging platform.

Like all media, digital tools not only communicate messages, they frame and mediate them. Digital media can be viewed as boundary objects, interfacing between domains and social structures [Star and Griesemer, 1989] and allowing users to move between communities and contexts, expanding their knowledge as they shift frame. These bridging properties of boundary objects suggest that they can be both enablers of and barriers to understanding. Using digital tools as vessels to transport knowledge across boundaries implies those boundaries will become porous and indistinct, as users employ them both as communication tools (for example to read about research topics) and engagement tools (for example to contribute data or commentary). These multiple purposes can obscure affordances; what a designer perceives as clear, objective and accurate may be understood by a novice user in very different ways [Laurillard et al., 2000]. To apply Irwin's [2008] model, the multiply-framed, contextual, contended technologies of digital media offer affordances for engagement yet also the possibility of differences in comprehension.

Digital media also allow researchers to move across boundaries and act in different public spaces; to become "boundary creatures [who] inhabit more than one world" [McGinnis, 1998, p. 61]. However, the dynamic, contended and precarious nature of digital engagement can leave participants vulnerable to being considered "monstrous deviants" from the norm [Haraway, 1992]. Lave and Wenger [1991] similarly emphasised the contended legitimacy and trust of boundary creatures. Introducing new ideas or practices can marginalise existing practitioners or reduce their brokers' legitimacy, making their attempts to parley between communities seem clumsy or rude. Burt [2005], using the perspective of social capital, argued that brokers accrue benefits from their position: they can appear creative, insightful and possessed of a genius born of the import-export of ideas. This is more of a boundary-spanning role, although it could be considered that a researcher resides at or within the boundary and steps into different communities when required.

The role-blurring is further complicated as more communities engage in the research process and develop a research identity. This development often involves dissonance and disequilibrium, as identity reconstruction can dramatically affect organisational and socio-cultural objectives [Alvesson and Willmott, 2001]. This can make engagement a fearful exercise for some researchers [Davies, 2008]; a fear compounded when they step into the digital world. In this world, researchers can feel overwhelmed, lacking the familiar handholds of conventional practice [Bik and Goldstein, 2013]. Digital engagement can be perceived as being beyond the 'day job', needing time, support and infrastructure that may not exist or is inaccessible [Regenberg, 2010]. Facing time pressures in the day job, researchers feel guilty or criticised for taking time to write blogs, comment on online papers or engage via social media [Grand, 2012; Crotty, 2010]. Furthermore, the speed of exchange over digital media, its pace, tone and sometimes very personal nature, "can be intimidating — and can sometimes feel like an attack" [Mandavilli, 2011, p. 286]. However, others believe engagement offers benefits, both for those who undertake it and those with whom they interact. These gains can be instrumental, as when researchers acknowledge the personal benefits of communicating their work to publics [Burns, O'Connor and Stocklmayer, 2003]; normative, important as an activity in itself [PSP, 2006]; or economic, when engaged research enables "innovations that perform better in complex, real-world conditions, or may be more socially, economically, and environmentally viable" [Marris and Rose, 2010, p. 1].

Opening up research

Access to reliable and credible academic knowledge, allied with the skills and competencies to assess, analyse and respond to it, underpins traditional university-based scholarship and pluralistic forms of engagement [Holliman, 2011]. Digital technologies have shattered the public sphere; it is no longer a physical space to which people go, but multiple virtual spaces that come to them and whose importance lies in the nature of the communication and engagement that emerges. Cheap, rapid and simple methods of dissemination have changed the communities that can — or wish to — have access to the outputs of research. Universities and similar institutions are well placed to mediate a more open public dialogue by addressing their communities in the diverse ways those communities demand: as individuals, as citizens, as publics or as representatives of society [Lunt and Livingstone, 2013].

The research we discuss in this paper used the U.K. Open University (OU) as a case study to discuss how we contributed to the changing relationship of researchers, stakeholders, publics and digitally-mediated engagement through an action research approach. The initiative (as a member of the country-wide Catalysts for Public Engagement with Research [RCUK, 2015; RCUK, 2016]) aimed to extend the 'ecology of openness' that underpins our routine practices in teaching and learning [Wilks and Pearce, 2011] to inform all aspects of how researchers engage publics, communities and other stakeholders with research at different points in the research process [Blackman, 2013], so that engaged research could become embedded within the organisational culture and the practices of its researchers.

Method

The findings we present here derive from interviews conducted with fifteen researchers from the Open University. Digital engagement is an emerging method, with diverse practices; interviews allowed this diversity to be explored within the wider context of engagement. The interviews were semi-structured, using flexible, open-ended questions to allow the conversation to flow with interviewees' responses and thus allow rich data to emerge. Nevertheless, to allow reliable data comparison, the interview questions remained broadly consistent [Strauss and Corbin, 1990].

Interviewee selection

The interviewees were selected using a strategy adapted from Denzin and Lincoln's [1994] descriptive decision matrix method for selecting case studies. The criteria used to populate the matrix were that projects (all Open University projects) should be externally funded above £50,000 and either be active or within one year of completion. This produced a list of 73 projects, for which certain organisational data were gathered: university faculty/institute, funder(s), collaborators (if any) and project start and end dates. Using the projects' websites or internal intranet pages (where they existed), we reviewed the projects to assess the existing levels of digital engagement, considering factors such as the public accessibility and visibility of the website/intranet page, its content (for example, an up-to-date record of activity, videos, a project blog, publications, etc.) and any evidence of 'traditional' engagement (for example, schools' lectures).

From the original list, we identified a sample of 15 projects that contained (i) examples from all faculties in proportion to the number of projects in each faculty; (ii) projects from a range of funders (all the U.K. publicly-funded research councils, key charitable trusts, the EU and industrial funders were represented); (iii) projects considered to demonstrate high, medium and low levels of digital engagement; and (iv) projects at the beginning, middle and end of their life. Finally, within the sample of 15 projects, we approached people from a range of academic grades, including PhD students, research associates, research fellows, lecturers, senior lecturers and professors, to secure reasonably widely representative views. We interviewed seven women and eight men.

Analysis

The interview data were primarily analysed by one researcher, using Nvivo10, but the categories, alongside a sub-set of data, were discussed and agreed among the team. Conducting the interviews and personally producing the transcripts enabled the researcher to become thoroughly conversant with the data, so that analysis and the emergence of ideas began very early, even before formal analysis [Gibbs, 2007]. The formal analysis followed an inductive approach [Holliman, 2005]; the coding frame was both informed by previous research and developed incrementally as new interview data were analysed. Once the interviews were completed, the researcher re-read and re-analysed the entire data set, to enhance consistency and ensure that all the interviews were reliably coded under the same frame [Denzin and Lincoln, 1994].

Ethics

The research protocol was approved by the Open University's Human Research Ethics Committee. Interviewees read and signed a consent form before the interview; the major condition of consent being that responses would be made anonymous and identifying information (for example sex or research field) would neither be disclosed nor referred to in any way. Interviewees were supplied with an information sheet with details of how to contact the researcher for further information or in the event that they wished to withdraw their data. As soon as possible after the interview the transcripts were shared with the interviewees, to allow them to check and point out errors, whether arising from inaudible recording, transcription errors or other causes [Lather, 2007].

Findings

In this section we will discuss our findings on how digital tools are changing researchers' relationships with their peers (Research Question 1) and non-academic stakeholders (Research Question 2).

Characterising the digitally-engaged researcher

Part of our rationale in conducting this research was to identify ways to make visible to researchers the advantages and disadvantages of using digital media to engage and to develop interventions that would enable them to make informed

decisions about these ways of working as part of a wider set of strategies for engaged research.

Unsurprisingly, we found that researchers drew on a range of tools and techniques in their digital engagement. Ubiquitous, publicly-available digital tools, such as email, websites, blogging, Twitter[TM], Facebook[TM], YouTube[TM], Skype[TM] and broadcasting/podcasting were frequently mentioned. File-sharing among colleagues, via tools such as Google[TM] Drive or Dropbox[TM], was extremely common. Other tools, including wikis, LinkedIn[TM], Instagram[TM], Tumblr[TM], e-books, iTunesU[®], Scoop.It[TM], MOOCs,[5] virtual laboratory tools and the OU's institutional repository were mentioned more rarely. There was no leading digital medium for engaged research; multiple media were deployed, depending on the nature of the research and the stakeholders engaged.

As we noted above, the adoption of new modes of working punctures existing boundaries and obliges researchers to re-assess their identity as researchers. Differing personal qualities, professional interests and community culture mean that researchers are likely to sit along a spectrum of identities. From our data, we identified three Weberian 'ideal types' [Kim, 2012; Bealey and Johnson, 1999] of digitally-engaged researchers, which we used to enable comparisons and determine similarities and differences among researchers. In describing our ideal types (see Table 1), we do not ascribe merit or intend to imply one type is better than another; nevertheless, we believe the descriptions we offer have a value as a heuristic base for discussion. It is also important to highlight that these three types are not fixed but more a Goffmanesque presentation of self for different situations [Goffman, 1981]. More pragmatically, we can deploy these ideal types through interventions with researchers, inviting them to characterise themselves, and their colleagues if they work in teams, within the typology, and from that identification, reflect on how they can most effectively design and instantiate their engagement.

The highly-wired

This is a strongly digitally-engaged researcher, whose online persona is fleshed-out, well-rounded and developed. To use a familiar term, they are 'early adopters', both of technologies and their use in engaged research. The highly-wired are likely to be committed to openness in their personal research practice and to the challenges that follow in terms of when and how to be open through the research cycle. Openness is core to their researcher identity and informs their approaches to engagement and collaboration with stakeholders. The highly-wired researcher can be characterised as an open and engaged scholar, adapting multiple digital tools for discovery, integration, application and teaching, and embodying the principles and practices of a scholarship of engagement [Boyer, 1996; Boyer, 1990]. The highly-wired engager is competent in using multiple tools to enhance and develop their work: not merely the conventional, such as blogs, but also the unusual and pertinent:

> . . . we've done screencasts, we've done animations, we've recorded someone singing a song; that kind of thing (Researcher 1)

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[5]Scoop.It[TM] (http://www.scoop.it/) is a tool for creating online 'magazines'; MOOCs are Massive Online Open Courses — for example FutureLearn (https://www.futurelearn.com).

Table 1. Features of digital engagement 'types'.

Type	Online persona	Engagement	Digital tool use	Digital practice
'highly-wired'	Well-developed	Highly collaborative; works with multiple stakeholders	Multiple tools Strategic Sustains partnerships	Originally personal but extended to projects
'dabbler'	At an early stage of development; patchy or unfocussed; spread across multiple tools	Mixed; partial; collaborative; cooperative; multi-disciplinary within academic contexts	Some experience with multiple tools Strategic use at early stage Draws on colleagues' skills	Originates in project demands but extends to personal
'unconvinced'	Non-existent or meeting minimal institutional demands	Minimal; discipline-focused within academia	Uses communication tools e.g. email	Low level or non-existent

The highly-wired scholar uses digital tools to facilitate forms of upstream and downstream engagement, shaping and framing the direction of their research, and who is involved with it, as it progresses. For the highly-wired researcher, digital engagement generates evidence that exposes new ideas and allows researchers to "enact conversations that become important parts of exploring hypotheses" (Researcher 5). Highly-wiredness can be a personal practice, arise within a project or be deployed as part of an overall strategy. For example, Researcher 9 was charged with the responsibility of leading digital engagement in a project (newsletters, Facebook[TM], Twitter[TM], YouTube[TM], etc.). However, the pressure to increase the social impact of the research meant she extended the project's use of digital media to sustain partnerships with other communities, including non-academic groups.

The dabbler

The dabbler is aware of the potential of being digitally engaged but has yet to fully embrace or explore either digital tools or engaged research in practice; although they describe it as the "right thing to do" to "bring things into the public domain" (Researcher 4), albeit possibly instrumentally tied to obtaining funding for their research. Digital engagement may be part of their remit but they may have concerns about their competence with digital tools, or question the value of engaged research. They are aware of the increased workload that digital engagement might impose, struggling to see clear justifications for following digital rather than well-established academic routes to publication. Likely to be at an early stage in their digital engagement, dabblers try multiple different tools and strategies and draw on the skills of their colleagues for mutual support:

> *Very much within the team, we've been learning how to do it from other people. In turn, we've also learned from others.* (Researcher 5)

While dabblers can use different tools, their everyday practice is likely to focus on using a particular tool to meet a specific need, intermittently, and depending on time and resources. Researcher 12, for example, had made effective use of her project website to advertise a post-doctoral position and PhD studentship — albeit she thought the web pages were "quite childish-looking" — but pressure of work meant she failed to update the website subsequently. She wanted to, but felt she had neither the time nor skills to do it effectively.

Dabblers are unlikely to be leaders in innovation but they are an important component of a team approach to open and engaged scholarship, collaborating with highly-wired colleagues to enhance and expose their engagement, re-tweeting, writing occasional blog posts, updating websites and so on, incidentally enhancing their skills and experience.

Some dabblers felt they were required to use digital media to tick off a list — "we need to do social media on this project" — regardless of how little impact they made on the outside world. This illustrates the need for coherent and informed strategies for digital engagement; allowing "researchers [to] invest their time strategically, picking and choosing the technologies that best meet their needs and doing just one thing well" (Researcher 13).

The unconvinced

In an earlier era, the 'unconvinced researcher' might well have inhabited an ivory tower; they remain unpersuaded of the value of engagement, whether digital or conventional. For them, engagement either offers diminishing returns or is not seen as a valuable extension of their routine practices:

> [what matters] *is the research itself, or teaching, or contributions to management* (Researcher 2)

The unconvinced are likely to describe barriers to engagement, such as cost, lack of training, access, resistance, other priorities and — frequently — time:

> *There can be diminishing returns. If people just can't do it, there are just diminishing returns.* (Researcher 10)

> *You can spend a lot of time putting up your profile, developing these professional networks and then they may* [no longer] *be the flavour of the month. So it's a risky business; I'd rather encourage these kind of things within networks that are more established.* (Researcher 2)

For the unconvinced, digital engagement is neither a priority at work, nor part of their core researcher identity. Traditional methods of academic publication and routes to promotion are the metric of success for this ideal type. We acknowledge that the unconvinced may have entirely legitimate reasons for not engaging: their research culture may not value engagement and to engage could therefore be detrimental to a career; they may struggle to identify stakeholders with whom to

engage; or they may have competing priorities that favour other outputs over digital engagement.

In terms of our interventions with unconvinced researchers, we focussed on identifying current use of digital media, their value, consideration of multi-disciplinary ways of working and how digital tools might facilitate effective engagement across disciplines within academia, as a way to highlight the value of other forms of knowledge. We sought to identify whether researchers have (or could have) stakeholders who would want to engage with research; some areas of fundamental research struggle to identify publics. If no connections can be envisaged, advising researchers not to engage is logical.

Changing researchers' working relationships: muddling through

As noted above, we seek to imply no hierarchy in our type descriptions; in the real world, communities hold mixtures of types. This was a strong pattern in the data, showing existing and aspiring digital engagers operating within communities of practice:

> [Name] *and I muddled our way through; it wasn't actually that difficult. I'm a bit of a novice at social media, I've always kept my head down out of fear of the workload that it could generate, but it is part of my remit in this job, I've got to engage with it so I'm very glad that* [Name] *is much more* au fait *with that side of things than I am. He can help me out!* (Researcher 3)

'Muddling through' creates communities of mixed types that are flexible and responsive to different times and needs. Our project aimed to support researchers occupying different niches; our findings helped us develop interventions to support the practices of engaged research,[6] showcase and celebrate excellence,[7] publicise the work of highly-wired researchers beyond their immediate communities, demonstrate that digital engagement offers a legitimate career path, introduce new promotion profiles to illustrate the types of evidence required to demonstrate excellence[8] [THES, 2015] and identify and support 'dabblers' and even the 'unconvinced', either directly or by connecting them with colleagues at different levels of experience. Strategically, we aimed to raise the profile of open and engaged scholarship, so that unconvinced researchers in positions of authority — Deans, Heads of Departments, etc. — while not necessarily wishing to engage themselves, could nevertheless recognise the value of supporting researchers' investment in engagement and so, in turn, researchers could see value in investing their time, energy and scholarship.

One route was to map examples of 'muddling communities' to chart the development of supportive interventions. Our data show examples of muddled

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[6]'Snakes and ladders of social media: the tour' http://www.open.ac.uk/blogs/per/?p=5265; 'Attributes of digital engagers' http://www.open.ac.uk/blogs/per/?p=5288; accessed March 2016.

[7]'Research into openness in learning and research tops the bill in OU competition'; http://www.open.ac.uk/research/main/news/research-openness-learning-and-research-tops-bill-ou-competition; accessed March 2016.

[8]Open University Promotion Profiles: http://www.open.ac.uk/foi/main/policies-and-procedures/academic-promotions; accessed March 2016.

communities in which researchers offered mutual support. In one, the community helped a new colleague become competent with unfamiliar tools and techniques. Others included a group of researchers who pooled their experiences and expertise to learn from each other, and one in which a young researcher encountered mixed responses from colleagues; some "interested but inactive" (Researcher 11) but others keen to actively increase the project's digital presence. To share expertise, this researcher worked with a colleague to galvanise the team into creating digital content (such as blog posts) by running workshops based on their personal skills and experiences.

Sharing expertise is entirely consistent with traditional scholarly praxis: scholars invest time and effort in creating a collegial working environment and in learning to use preferred tools to research, analyse and manage data, and publish. In turn, they teach their students to use the same tools [Borgman, 2007] and indeed, students can teach scholars about new tools and practices. The usefulness of informal practice is shown by a small number of researchers who questioned the value of formal training: when one has colleagues who are "quite conversant with digital media [. . .] training could be a waste of time" (Researcher 1).

Open research for all: supporting change in open, engaged and digital scholarship

While digital tools and the capabilities to use them can undoubtedly support interaction, true engagement requires the nurturing of a culture, and that nurturing requires the participation of re-imagined research communities (including relevant academic and non-academic stakeholders). Weller [2011] suggested that digital scholarship goes beyond technologies for research and collaboration to include acceptance of open values, ideologies and new ways of working. We argue that this needs to be extended further, to include acceptance of the value(s) of engagement and new, distributed, ways of encouraging participation in research [Holliman et al., 2015]. Participatory cultures require access (i.e. low barriers to engagement), acceptability (e.g. support for shared creation), and awareness of participants' skills and contributions, particularly as the presence of experienced participants develops competency in new members [Sheridan and Rowsell, 2010; Jenkins, 2006]. Our data show that researchers recognised that some colleagues had skills that others did not and that these skills could be shared informally. However, the knowledge of who knew what, or did what, tended to be informal and "pretty diffuse" (Researcher 6), rather than formalised as responsibilities. We noticed profile-sharing, that researchers were aware that some colleagues were more immersed in digital practice than others; knowing who to turn to meant researchers could call on other's skills not only in terms of practicalities, of how to use tools, but also in more subtle, strategic ways about how to use them effectively. For example, a researcher tweeted a link to a publication but simultaneously asked a colleague with many followers on his personal account to re-tweet the link, for greater reach.

Despite its everyday utility, researchers acknowledged that the 'muddled', community-of-practice, approach had its difficulties. For example, whenever engaging is a diffuse, free-floating task that is everyone's responsibility, it can easily become no one's. Some people shouldered a greater share of the load because they were perceived to have the necessary skill; others found themselves "fire-fighting" (Researcher 6), lacking time and resources to make the best use of new

opportunities. Even in projects with a digital media strategy, and allocated responsibilities, activity levels varied; personal pages on project websites might be updated reasonably often but pages that should ideally have reflected 'live' project status, such as news, blogs, discussions and so on, remained static. For some researchers, practice was sufficient to sustain their community; others felt community development required a more sympathetic institutional culture. Furthermore, there are risks in informally investing in a small number of people with idiosyncratic skill sets, on whom others come to rely: when those people leave, key expertise leaves with them, putting the project or institution at risk.

Scholarship and teaching at the Open University has always involved technologies of one sort or another, so for many interviewees, engagement through digital technologies was simply another facet of this culture — "just the way the OU works" — of innovation in communication. Several researchers said that for them, teaching was thus "a kind of public engagement" (Researcher 1), and that a digitally-mediated scholarship of engagement could extend their students a new opportunity; combining teaching and engaged research as a means to offer students a "handful of experience of research" (Researcher 10), for example by participating in data collection, online experiments, or learning about their tutors' research.[9] Researcher 15 suggested digital technologies offer a way to extend teaching beyond the university's students, making OU research "accessible to the whole wide world, as a public engagement tool".

Like many U.K. universities and research institutions, the Open University has committed itself to embedding engaged research within the culture of its research and the practices of researchers at all levels [Holliman et al., 2015]. The university's culture of technology use made it pertinent to explore researchers' perceptions of the levels of institutional support for digital engagement. In fact, perceptions were varied and highly individual. Some researchers believed there was a "great deal of encouragement [. . .] support and tools, departmental blogs and so on" (Researcher 3), whereas others "wouldn't say that encouragement was very strong" (Researcher 13) or felt they were not "encouraged enough" (Researcher 2). And while researchers had their motives for engagement, the institution likewise had its; one researcher received "very positive feedback" (Researcher 9) about digital activity but also believed it was in the university's interests to ensure projects were widely publicised. Our project used data such as these to bring together strands of perception and strategy to substantiate the value of engaged research across the university [Grand et al., 2015].

The tools of digital engagement do not always fit easily into the existing structures of research and research communication. Using digital tools gives researchers — and members of other communities — the freedom to engage quickly, instantly and freely via a variety of channels. Compared to conventional routes (peer-reviewed publications, for example) information emerging via digital media can be raw, unpolished, provisional and uncertain. Our data show this unfinished form made some researchers nervous and led them to seek ways to control the quality of the output, taking a top-down approach to controlling information flow into new

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[9]The Open University has incorporated data collection in its teaching since the 1970s; see for example [Cook, Mani and Varley, 1986], which continues in initiatives such as the Open Science Laboratory [Minocha and Burden, 2013] and *Participation Now* [Mahony and Stephansen, (2014); Mahony, 2013].

digital media. The mores of control have evolved from centuries of practice; they were unlikely to be prescribed and more likely to be "unsaid, unwritten rules [arising] out of respect" for a research leader with whom "the buck stops" (Researcher 15). Of course, these changes must be seen in the light of wider developments in higher education. Notwithstanding ongoing criticism [e.g. Watermeyer, 2016], the current context for research in the U.K. and elsewhere is now characterised by a greater emphasis on the social and economic impacts of research. These changes are likely to increase the instrumental case for mainstreaming engaged research, whether mediated digitally or otherwise.

Conclusions

In this paper we have documented findings from an interview study involving a structured sample of fifteen researchers from across the Open University and discussed some of our interventions; offering a snapshot of practices within one institution. We addressed two broad research questions: how have digital tools and technologies and information ecosystems affected researchers' relationships with their academic peers, and how have digital tools and technologies changed researchers' relationships with non-academic stakeholders and their roles in knowledge-generation and exchange? Our findings show that although there is limited evidence of systematic changes in practice in terms of researchers' use of digital tools to support engagement and work remains to be done in supporting researchers to make such changes, the increasing expectation of digital engagement is provoking researchers to re-assess their identity as researchers, creating mixed ecosystems of 'highly-wired', 'dabblers' and the 'unconvinced' from which are emerging flexible patterns of mutual support that can respond to varying demands on and the needs of researchers and their projects. The research we present in this paper contributes to a wider culture change project at a U.K. university [Holliman et al., 2015]; findings that have informed university strategy and supported practice. Our findings also have wider relevance; they deepen our collective understanding of how open and engaged research benefit, change or affect academics and non-academic stakeholders more broadly across the higher education sector. We argue that undertaking digital engagement with research should be a legitimate activity for researchers: put simply, it should be recognised in the same way as other routine research tasks: submitting grant proposals, collecting and analysing data, and writing and presenting research papers. It follows that engaged research activities should be organised and accounted for within strategic and operational plans, that support mechanisms and training should be in place (for example see Footnote 6), and that procedures for reward and recognition should acknowledge those who demonstrate excellence in these forms. At the same time we understand that not all researchers will welcome this more strategic approach: some prefer to remain free from what they perceive to be institutional meddling in their muddling.

We believe our research both assesses and contributes to the evolution of the use of digital media in research, creating new research ecosystems and changing engagement practices. To achieve sustained changes in culture and practice we need to know the scope of our colleagues' skills, and to appreciate, use and nurture them. The digital media ecosystem [Holliman, 2011] supports the creation of dynamic, self-organised, shifting networks of individuals and therefore the emergence of new, volatile communities. Research, and engagement with research, are emergent, dynamic and uncertain processes; multiply-framed, highly

contextual and permanently contended [Irwin, 2008]. People move from role to role, from community to community, as needs arise, expertise grows or — particularly in an informal, muddled culture — a key member of the network exerts an influence [Armano, 2006].

Healthy ecosystems require a rich mix of species that can feed off, and feed, one another. We do not suggest that being 'highly-wired' is the local optimum of the digital ecosystem, nor that all researchers should seek this role; it is more useful to develop a pluralistic culture that appreciates the value of differences in digital capabilities. The cultures of different projects or research groups may mean one type dominates but all are likely to be present. No one type should or could be regarded as inherently 'better' than another; indeed, as noted above, it is entirely possible for researchers to move from one to another, or to exist as multiple types simultaneously, depending on context and culture. As an example, since our research was completed we have continued to support researchers as they explore how digital tools and engagement can connect with their research. In these interventions, we have encountered researchers who have moved away from highly-wired practices, due to time constraints and reassessment of their research priorities.

Engaging using digital media enables academics to construct flexible online academic personae from multiple social tools [Heap and Minocha, 2012]. This is not in itself a new phenomenon; identity is not a fixed commodity that can be traded up or down. People inhabit multiple social worlds [Lave and Wenger, 1991; Goffman, 1969] and even within the single world of research are required to be investigator, designer, developer, presenter, author, reviewer, editor, consultant and more [Bolden et al., 2012]. However, there is a key facilitating role for institutional culture here: an 'unconvinced' leader could potentially stifle even the most 'highly-wired' researcher, the 'highly-wired' need the critique of the 'unconvinced' to keep their feet on the ground, the 'dabblers' benefit from 'highly-wired' encouragement, partnerships of 'dabblers' and the 'highly-wired' support innovation and flexibility, and the 'unconvinced' may be sparked by the outcomes of 'dabblers'' engagement.

Our findings highlight that as researchers we may not only epitomise one ideal type as part of an identity but also take on multiple identities in response to different situations and points in the research process. Identity is thus a muddled interaction of perspectives within those worlds. Physical, temporal and social psychological contexts can seriously affect identities and their development: I'm at work so I'm a researcher; I'm at home so I'm a parent; I'm at the match so I'm a football supporter.

Within the research frame, various contextual factors may have an impact on how we reveal the different versions of our digital types. At some points it may be acceptable to become highly-wired and openly engage with others in our research. At another, we may decide to step back to dabbling, perhaps to pursue a career goal, or when we find ourselves in a new community with a different ethos. In some types of research we may become unconvinced if we find it unacceptable (or unethical) to be digitally engaged with specific stakeholders. Adams [2013] provides examples of how research within healthcare, prison, industrial and educational contexts can produce an emotional clash between the academic concepts of sharing, intellectual freedom and creativity and the concepts of

institutional identity represented through notions of accountability, confidentiality and institutional knowledge.

Digital engagement offers a range of channels through which we undertake roles and reinforce our identities. The increasing ubiquity of digital media means people's identities, lives and roles in the research process cannot be clearly separated. This affects how participants in research relate to each other. The world of digital engagement accommodates many communities, with considerable overlaps: community groups, researchers, institutions, charities, non-governmental organisations and more. The boundaries are blurred: "no single literacy [is] appropriate for all people or for one person over all their lifetime" [Koltay, 2011, p. 219]. Members of one group can readily cross into another, or simultaneously occupy different roles within different communities; one person can be researcher, contributor, user, teacher, learner and more within a single space and time [Holliman and Curtis, 2015]. The key is to allow these different roles and contributions to engaged research to be acknowledged in a way that is meaningful to the contributor and shows it to be valued by the institution on a par with other forms of scholarship [Boyer, 1996].

When reviewing the role of tools in digital engagement with and by citizens, we should understand that they have the potential to change people's roles in research projects. To paraphrase Boyer [1990, p. 47], scholarship is constantly in a process of re-consideration: rising to new challenges helps researchers avoid the "hazards of disengagement [and] isolation from disciplinary developments"; the expertise and experience that researchers bring to novel situations supports the development of integrated and appropriate scholarship. Engaged researchers can be translational boundary objects, supporting the negotiation of changing meaning and roles, if the culture is nurtured and the guidance required to negotiate the change is provided. This is particularly relevant for researchers in transdisciplinary projects, who must transcend differences in epistemology, mechanisms and style, which could either be enhanced or exacerbated by the free exchange inherent in digital culture. The openness and engagement made possible by digital tools can support the evolution of roles, allowing members of different communities to develop a critical awareness of the process and context of research. The tools of digital engagement could become a "new trust technology", to the benefit of all participants [Grand et al., 2012] but only if participants sufficiently trust the processes involved. Creating informal networks, sharing expertise communally, is not necessarily a benign experience; it takes courage to occupy a new niche, and boundary-crossers lay themselves open to being considered "horrific and monstrous" [Adams, Fitzgerald and Priestnall, 2013].

As we uncovered, not everyone wants to change their role. This is not surprising: some researchers remain critical of the value of engagement, others would rather stay within the secure boundaries of structured domains and others rather keep their engagement outside institutional boundaries. The efficient and flexible use of digital engagement, within a 'muddling culture', can enable engaged researchers to move among, and therefore have an impact on, different communities. In this study, researchers showed that they are developing 'muddled' communities and communalising their expertise in digital engagement; a response both to the informal, social nature of digital tools and to the shifting, tentative and dynamic nature of engagement via digital media.

'Muddling through' has attendant risks, which could change the meaning of what it is to be an engaged researcher. Informal, muddled networks value flexibility, contribution and the socialisation of research. For some, this risks confusion in institutional structures and cultures and loss of control, esteem and privilege, as outputs become more dynamic, uncertain and shared, rather than personal intellectual and social capital. Nevertheless, nurturing a 'muddling-through' culture to support digital engagement offers individuals the flexibility to change behaviours according to context, and organisations the flexibility to adapt to new circumstances.

This study has examined researchers' conceptualisations, understandings and practices of digital engagement. Next, we intend to establish how researchers are taking these concepts forward and enacting their engagement with communities and citizens through digital means.

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