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Knowledge sharing and change across networks within the context of climate change adaptation

Andrew Clappison, Pete Cranston, Megan Lloyd-Laney and John Rowley

Networks are dependent on both human and non-human (e.g. geographical and technological) actors. They are underpinned and shaped by context, culture of practice, and relationships of power between different individuals. These influence not only shape networks, but the actors across it. Networks are defined by their 'organisation', their 'rules' and level of 'interdependence' of the actors along them. The *social* interactions between actors are a key function in the process of knowledge sharing and the nature of these relationships. If these relationships are unstable or incentives for engagement are removed networks can easily dissolve. Communities play an important role in 'brokering' knowledge on climate change adaptation, by developing their own approaches to coping with climate variability that work with local contexts, rather than simply applying knowledge developed elsewhere. Intermediaries or knowledge brokers have a key role to play across knowledge networks in understanding these different contexts. In this sense, it always remains crucial that information is tailored specifically to different audience needs. Evidence suggests that 'directed' networks do not always take account of real and articulated needs of individuals. This can restrict knowledge exchange, and have a negative effect on participation across the network. Knowledge sharing tools and methods play a critical role in ensuring knowledge travels across networks. But as with other processes, the tools used should always be framed by its context, and perceived barriers. Information and communication technologies (ICTs) are an increasingly important tool for knowledge sharing, with great potential, for facilitation. They can enhance communication, the quality of interaction between actors across networks, which can in turn help its development and effectiveness. Nevertheless, if these technologies are inappropriate or out of context, instead of facilitating interaction, they can be a great impediment to everyday relationships and network practices. A body of theory and practice has emerged over the past 10 years on the interaction between online tools and networking. The most effective knowledge sharing networks use a multiplicity of tools, responding to their users and the social dynamic of the community. Change and action is much more likely in such instances, although no one network or the relationships that sustain it are the same.

Keywords knowledge sharing, communities, networks, literature review, climate change, ICTs, KM4Dev

Introduction

This paper draws on a detailed literature review[1] and aims to bring together thinking on knowledge sharing across online networks[2] to help understand and acknowledge what might be deemed effective knowledge sharing in the area of climate change adaptation. Networks are not knowledge sharing tools in their own right, but are formed around different kinds of relationships (both formal and informal), different processes, and tools.

There is a need to understand that effective knowledge sharing is not always easy to achieve, nor does it always lead to 'immediate change'. This review focuses on networks through the question 'what makes for an effective knowledge sharing network?' This question is of course context specific and is dependent on us understanding that knowledge networks are influenced by the 'spaces' they occupy, the actors involved, and the type of knowledge they aim to share. This review seeks to address this issue by offering a series of insights and case studies that can be used to reflect upon how these examples might play out within the context of climate change adaptation networks. We also explore in this paper theories of learning and the diffusion of innovation which can contribute to our understanding of the relationship between knowledge sharing and change. Finally, we explore some issues relating to the use of online tools for knowledge sharing and communication in networks.

The context: climate change adaptation as a 'wicked' problem

Climate change adaptation is a 'wicked' problem that does not have a one off solution (Australian Public Service Commission, 2007; Lonsdale et al., 2010). Many different perspectives and different forms of knowledge are required to tackle climate change adaptation and to find a way forward. A wicked problem can be defined by the following characteristics:

- Wicked problems are difficult to clearly define
- Wicked problems have many interdependencies and are often multi-causal
- Attempts to address wicked problems often lead to unforeseen consequences
- Wicked problems are often not stable
- Wicked problems usually have no clear solution
- Wicked problems are socially complex
- Wicked problems hardly ever sit conveniently within the responsibility of any one organisation
- Wicked problems involve changing behaviour
- Some wicked problems are characterised by chronic policy failure. (Australian Public Service Commission, 2007)

As with all the other issues to do with climate change, how we conceptualise *adaptation* is constantly changing, with new forms of knowledge constantly being developed. Evidence-informed research operates on a timescale dictated by the research process, which is dependent on hypothesis testing and review. Climate change adaptation requires highly contextualised evidence and recommendations, the kind of which 'pure' scientific research

alone fails to provide. This makes delivering knowledge across this kind of network in a timely fashion very difficult (Jones et al., 2009: 3).

Climate Change Adaptation is a complex issue that is prone to rapid change. In this review we didn't explore complexity *per se* although engaging with our equally rapidly evolving understanding of complexity is an essential element in a comprehensive approach to climate change adaptation, ensuring the discussion moves from simply considering complicated issues and engages with complexity, as illustrated in Snowden's *Cynefin* framework (Snowden, 2000) in Figure 1.

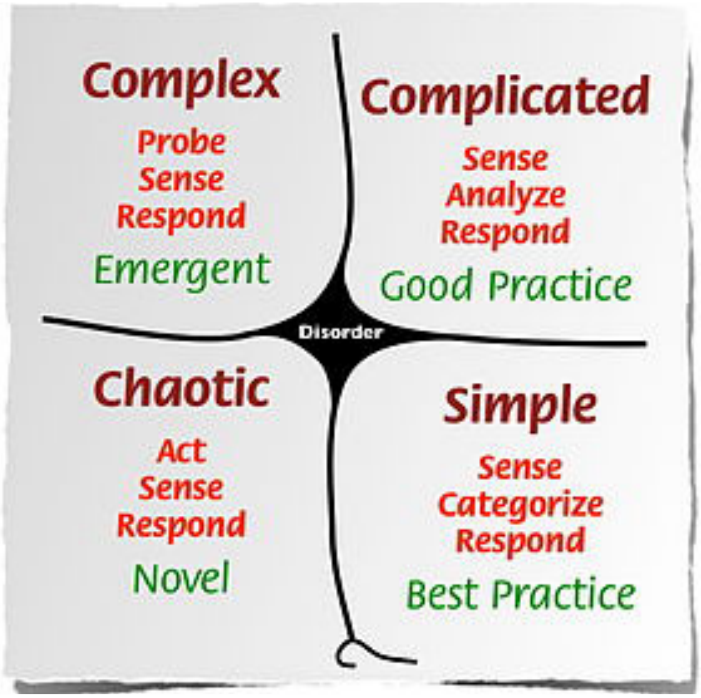

Figure 1: Snowden's *Cynefin* framework (Source: Wikipedia[3])

Complex issues such as this require focused dialogue and exchange that incorporates knowledge from various perspectives (Snowden, 2000; Lonsdale et al, 2010). To this end, local knowledge plays a key role in contextualising science-based knowledge. This means that effective climate change adaptation networks are enhanced through structures that promote inclusivity and participation to reflect and incorporate diverse opinions, and deliberative processes between different stakeholders are increasingly being cited as a means to effective research uptake (Lonsdale et al, 2010: 3).

Communities often have to develop their own approaches to coping with climate variability that work with the environment they are in. It is important to use and build upon this knowledge, rather than simply applying knowledge developed through other contexts and in different environmental realities. The tendency of simply 'transferring' Western scientific knowledge should be left entrenched in the past (Lonsdale et al, 2010: 3). Likewise, networks should not be developed without, at the very least, considering how this network will be populated and how it will address the needs of these people. Effective climate change adaptation networks must be linked through social relations and shared challenges.

The Climate Learning Ladder, a tool that, 'is the result of the reflexive learning process that occurred while developing innovative appraisal methods in the Alxa League of Inner Mongolia, China, and in the Guadiana river basin in the European Union' places local knowledge focused processes in a framework where 'climate adaptation can be understood as a multi-step social process in which individuals and organizations need to learn how to:

1. manage different framings of the issues at stake while raising awareness of climate risks and opportunities,
2. understand different motives for, and generate adequate incentives or sanctions to ensure, action,
3. develop feasible options and resources for individual and collective transformation and collaboration and
4. institutionalize new rights, responsibilities and feedback learning processes for climate adaptation in the long term' (Tàbara et al., 2010: 3)

As, the authors argue, 'Building capacities to cope with climate change requires going beyond simply providing more knowledge on climate impacts to policy makers" (Tàbara et al., 2010: 3). They present a hypothetical ladder in a chain of conditions that the authors propose are crucial for adaptive climate capacity building. The four steps (see Figure 2) taken represent a series of different research questions and policy arenas that need to be considered in order to reflect on how to successfully develop such climate learning capacities in the long term. Effective climate change adaptation networks are enhanced through structures that promote inclusivity and participation to reflect and incorporate a diversity of knowledge.

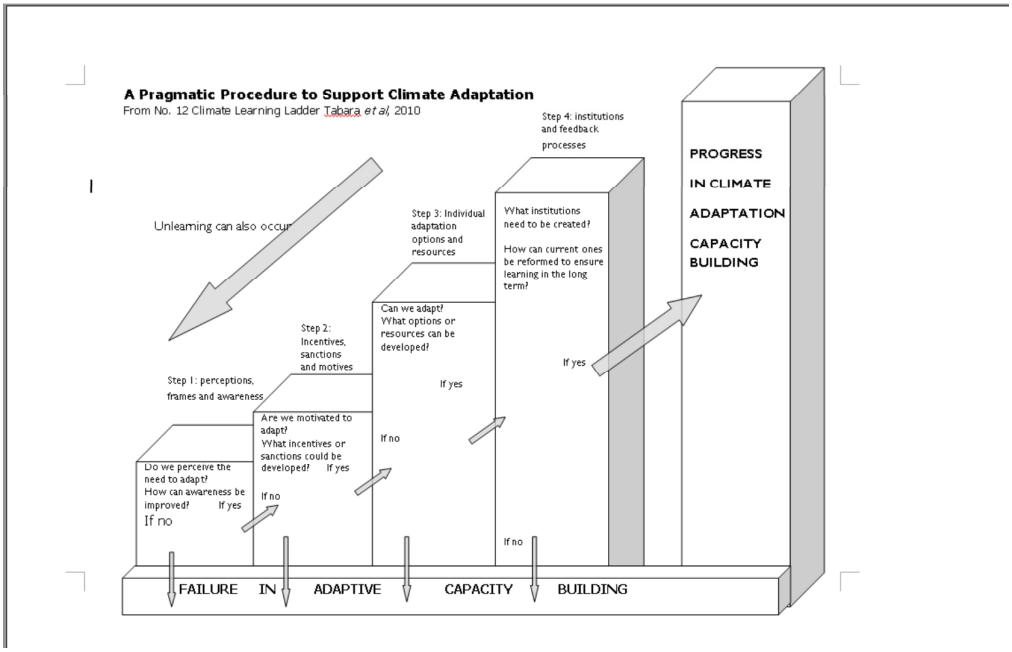

Figure 2: The climate learning ladder (Source: Tàbara et al., 2010: 5)

Networks and knowledge sharing: providing a change function?

The possession of knowledge does not of course automatically lead to behavioural and attitudinal change. Change or a focus on action is dependent on the dynamics of the actors involved (Nilson and Swartling, 2009: 3). In this regard, we should be wary of networks that prescribe particular mechanisms and approaches to knowledge sharing and acquisition, without taking into account contextual factors and the character of the actors involved.

Effective knowledge sharing is shaped by a range of influences covering culture, content, process and technology, and takes time to implement (Accenture, 2002; Jones et al., 2009: 3). Cementing relationships that facilitate effective knowledge sharing take time and they are governed by a whole host of different influences. Networks don't exist unless relations are repeatedly performed, and this means strategies need to be implemented to ensure different elements of the network are held in place, and the network continues as a whole (Latour, 2005). Networks simply dissolve if relations break down, and if incentives for actors to continue to participate are not in place.

In a classic article reviewing the field of planned change, Chin and Benne (1984) outlined three meta-approaches to the implementation of change in social and organizational contexts (whereby change is framed as an organizational process). These meta-theories of change (rational empirical, normative re-educative, and power coercive) are still much cited today. Each of these meta-strategies approaches the planning and implementation of change from different philosophical and practice-based sets of assumptions.

Chin and Benne's rational-empirical strategy builds on the fundamental assumption that people are rational. The implication is that, once presented with information that demonstrates that a particular change is in their self-interests, they will accept the change as a means of achieving that interest. The underlying assumption of this approach is that if the arguments and the rational data are presented in an effective manner, the group will support the change because rationally it supports their self-interests. The key component of the rational-empirical approach to change is information.

Normative-re-educative approaches to change differ markedly from this rational-empirical approach. It is based on the premise that individuals (and human systems) are necessarily active in their search for need satisfaction and self-fulfilment and that change is largely values-based as opposed to rational in nature. Change is motivated, according to this approach, when the individuals identify some level of dissatisfaction with the status quo based on fundamental value clashes. The key task of those who follow this approach to change is not to find the right information to guide a rational change process but to find a proper and effective relationship between the values of the system (and its members) and the values of the organizational environment. The search is guided by active experimentation and the direct involvement of as many members of the system as possible. A primary assumption of this approach is that intelligence is social rather than rational.

The power-coercive strategy emphasizes a different approach and different elements of the power process. In general, this approach to change emphasises the use of political and economic sanctions as the principle strategy to bringing about change, although the use of moral power also historically forms a key element of the strategy (Chin and Benne, 1985).

These change strategies have been criticised by Daniels and DeWine (1991) for not effectively confronting issues of discourse and meaning as the focal points of intervention. They describe an alternative interpretive approach that focuses on communication as a precursor to change. However, other studies, such as Miles et al (2002), which looked at this 'classic theory' in the context of innovation in Chinese and Canadian public services, demonstrate its continued relevance and global application.

In relation to networks the normative-re-educative approach with its focus on the social seems to mirror the reality of changes that come about as a consequence of such networks, and this is something we look at in the next section. There are elements within other approaches that can be related to *network failure* in some contexts. For instance, the rational approach-empirical approach could well be seen as the underpinning rational behind some networks, but without 'the social' element the potential for knowledge acquisition and change remains stunted. Overall, these models are useful to identify, theoretically, where different approaches to change might be centred within the development sector. The critique by Daniels and DeWine is well placed, and one could well argue the potential for change across a social and 'communication literate' network holds much greater potential.

Putting the social into the network

John Seely Brown and Paul Duguid use the metaphor of a pebble creating a ripple on a lake to describe how 'the social' provides the resources for their members to learn:

> *The importance of disturbance or change makes it almost inevitable that we focus on these. We notice the ripple and take the lake for granted. Yet clearly the lake shapes the ripple more than the ripple shapes the lake. Against a different background, the pebble would register a different change or perhaps, […], make no difference at all.* (Seely Brown and Duguid, 2002: 137)

Social groups are seen to provide a powerful force that shapes the way learning takes place against the background of the lake, different social groups have their own identity and this influences what its members learn (Seely Brown and Duguid, 2002: 137-138). This reinforces the view that 'change' does not simply come about through a process of knowledge sharing. This echoes Stacey's position that, '(i)ndividuals cannot learn in isolation' (Stacey, 2003). Stacey sees learning as, 'the emerging shifts in the patterning of human communicative interaction and power relating' (Stacey, 2003).

In his analysis of IPCC processes, Siebenhuner frames social learning as 'a collectivity's mechanism to gather knowledge and implement solutions to a relevant problem' (Siebenhuner, 2006: 2). His emphasis on the importance of the IPCC being a channel for the validation and dissemination of 'knowledge' that could be seen as 'credible, salient and legitimate' is relevant to networks working with climate change adaptation as is his assertion of the importance in change processes of small, highly connected networks; 'functioning communication systems'; and 'mechanisms for reflection' to support the emergence of social learning processes.

Seely Brown and Duguid (2002:) outline that the identities of different social groups reinforces a set of practices that allow people to form social network around them. Across these networks, knowledge relating to these practices can travel rapidly and be assimilated with greater ease. However, members of those groups with a similar identity tend to be separated from groups that share different practices. The different information these groups hold is not what divides them. In fact, it is possible that they use the same information. What marks out these groups are their attitudes and dispositions towards that information (Seely Brown and Duguid, 2002: 141). These social groups are often distinguished as 'networks of practice' and 'communities of practice'[4]. The former, can be identified through a common denominator (i.e. their practice or occupation), and although they have practice and knowledge in common, most of the members tend to be unknown to one another and their linkages are indirect (i.e. through newsletters, websites and email groups). Communities of practice, on the other hand, focus on sub-section of these larger networks.

> *These subsections stand in contrast to the network as a whole in several ways. They are relatively tight-knit groups of people who each know each other and work together directly. They are usually face-to-face communities that continually negotiate with, communicate with, and coordinate with each other directly in the course of work* (Seely Brown and Duguid, 2002: 143).

As we have stressed above, effective networks are by their very nature 'social', and this works to ensure that network relations are repeatedly performed, as set out in the previous section.

Approaches to knowledge networks and community practice are analysed by Camacho (2009). Camacho looks at three case studies from the water and sanitation sector. She notes that face-to-face interactions are crucial for the development and dissemination of new knowledge. Workshops and meetings are important here, because 'people have the opportunity to share creative insights in informal and formal settings and find personal synergies with each other' (Camacho, 2009: 269). Face-to-face interactions are also identified as a means to create a culture of trust, whereby new approaches and information can be seen to come from a trustworthy source.

Intermediaries as knowledge brokers

Intermediaries or knowledge brokers have a key role to play across knowledge networks, and overcoming the weakness of the science-policy interface, through facilitating communication, translating information and mediation. It is crucial that information is tailored specifically to different audience needs, while also taking care in considering operating language, objectives, timeframe, contacts and mediums of communication (Jones et al., 2009: 5). However, simply keeping track of different forms of emerging knowledge can be a great challenge, which can also be a barrier to providing audiences with appropriate knowledge. This is a heightened challenge in the area climate change adaptation because of the speed at which knowledge is emerging, and the contradictions that derive from having such an active knowledge base (Shaxon and Gwyn, 2010: 2).

It is also important to understand that knowledge brokers must be able to play multiple roles across networks to reflect network complexity and structure (Shaxon and Gwyn, 2010: 2). Knowledge brokers should not be seen as the means by which knowledge travels from A to B to C and back again, but instead should look to lubricate the flow of knowledge between actors across a network.

A recent report by UN Food and Agriculture Organisation (FAO) reviewing their Thematic Knowledge Networks highlighted the tension between 'facilitating' and 'directing' networks. The report noted that efforts to direct networks 'do not build on a real articulated need. For these reasons they do not lead to knowledge exchange and learning among members' (FAO, 2009: 4). The report goes one step further than this by stating that 'there are a number of informal knowledge networking initiatives at FAO which seem to be doing very well because they remain informal.' Directed networks failed to take account of real and articulated need of individuals, which is seen to result in the full or partial failure of networks that encourage people to collaborate and learn together (FAO, 2009: 8). If there are no incentives for actors to be involved in the network, if their needs are not articulated through it, the network breaks down because relations are no longer repeatedly' performed' to sustain the network.

Tools for and barriers to effective knowledge sharing

Knowledge sharing tools and methods play a critical role in ensuring knowledge travels along the network in an effective way. The types of tools used across a network should always be framed by its context, and perceived barriers. The following barriers to sharing knowledge across Africa were identified by the Africa Adapt network. The analysis can be extended to other parts of the world and these kinds of barriers need to be considered when assessing the suitability of tools for different audiences:

- poor connectedness – physical infrastructure
- inadequate communications strategies and often, poor communicators
- cultural constraints such as myriad languages, beliefs and mindsets,
- lack of value attached to local knowledge,
- lack of appreciation of the knowledge assets that Africa possesses
- poor quality information from external sources that is often inappropriate to the local situation, hard to unpack and make usable for the benefit of vulnerable communities
- lack of appreciation of the value of knowledge sharing i.e. the need to share, lack of funds to fuel local research,
- insufficient training in research methods, low institutional capacity,
- lack of time and appreciation of policy and decision makers of the potential of knowledge sharing for better planning. (Phase II proposal, Africa Adapt, 2010).

Internet based technologies are now important development tools and knowledge sharing devices (White, 2010). Online networks and communities can achieve the following:

- provide access to more and potentially diverse peer practitioners
- connect people across time and geography, which is particularly important for practitioners working in isolated circumstances;

- provide a means to capture the interactions and refine then for outputs; and
- connect individual communities into wider networks of practices for spreading and sharing knowledge.

The internet provides great promise as a knowledge sharing tool, and as a way of bridging boundaries of time and space. However, it is widely recognised that Africa and African based organisations have not yet fully utilised its potential (van Doodewaard, 2006: 41).

This situation is linked to three factors: (1) development organisations in Africa often work with target groups that do not have the infrastructure, means, capacity, and facilities to exploit the internet, (2) the ability of development organisations to monitor the use of on-line knowledge sharing tools is often relatively low, and (3) the use of the internet as a knowledge sharing resource is framed by cultural and social principles by people and organisations from the North, and these are often at odds with those social realities in Africa (van Doodewaard, 2006). The Internet remains far removed from the daily reality of many people across Africa, and this is a major issue for networks like AfricaAdapt.

Technology must be user centred if it is to sustain effective knowledge sharing across networks. It must allow actors to engage freely and easily, but this alone is not enough of an incentive for actors to engage. Incentives can vary from the opportunity to communicate with peers to influencing policy makers and practice. However, if there is consistently a low level of participation using ICTs, there is every chance that the network will stop working effectively. Knowledge brokers must be prepared to keep the conversation going and to constantly keep actors 'hooked' into the network. Trustworthy information and knowledge translation services are a good way of ensuring network members stay engaged. '[T]he online environment is simply the starting point for sharing knowledge offline' (van Doodewaard, 2006:42). Put another way 'networking is 2% about technology and 98% about management of relationships' (Creech and Willard, 2001). Information systems are social systems and are dependent on a high level of investment into the people they were designed for. In terms of the efficiency and effectiveness of information systems, people are equally, if not more important, than the systems themselves (Volkow, 1998).

There is sometimes debate in the knowledge sharing (KS) and knowledge management (KM) fields around the tension or relationship between models of KS that emphasise the importance of codified or reified knowledge objects, on the one hand, and on the other, the exchanges between people in collaboration and learning[5]. What is of importance in the context of this paper is that both networks and online platforms can be positioned in terms of which focus they facilitate (see Figure 4).

For example, the primary purpose of the DFID Research for Development (R4D) site (see Figure 3) is to provide and promote the latest information about research funded by DFID. Accordingly the site centres on a database, and there is also a lot of functionality that aims to enable this content to travel, which means providing functions that connect people to the content – such as the share buttons at the bottom - and, to a limited extent, people to people[6]. At a position in the opposite corner of the typology are the Oxfam GB (OGB) campaign platforms (see Figure 5).

Figure 3: Screenshot of the R4D portal[7]

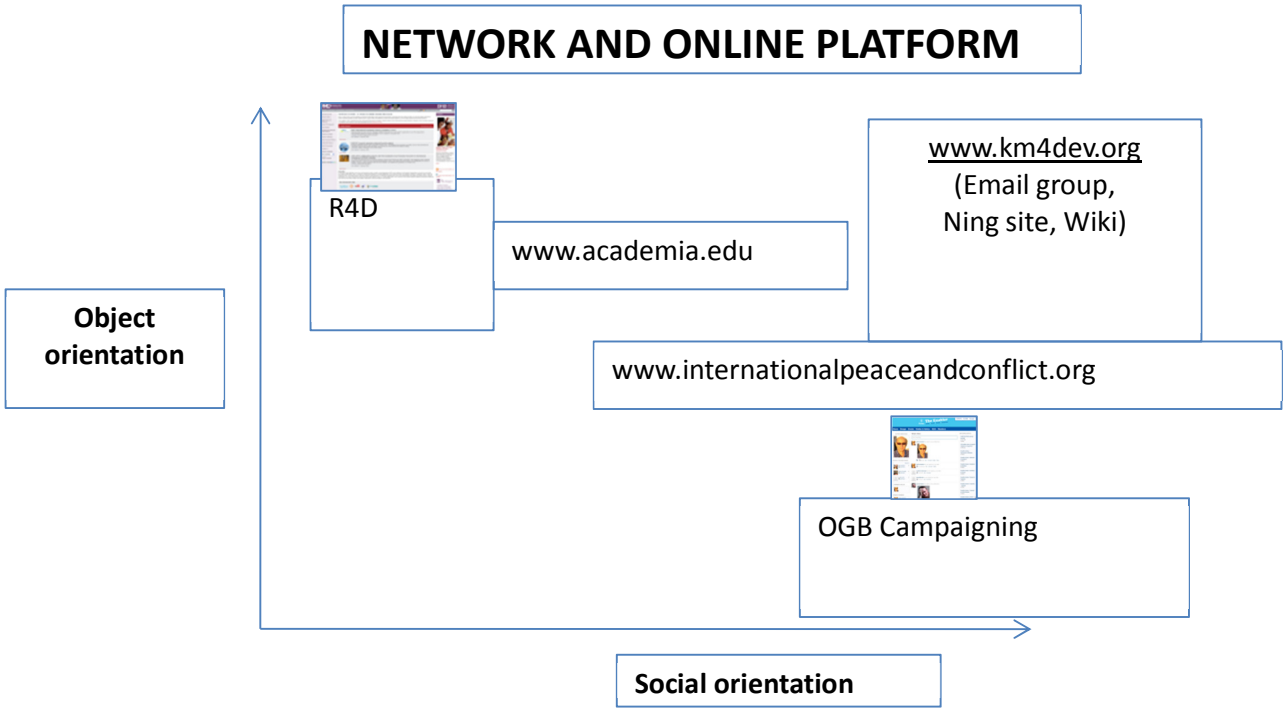

Figure 4: Analytical framework (Pete Cranston)

Content exchange and social networking

'The Enabler' (see Figure 5) models what has become the standard for social networking focused sites. There is little content but a lot of functionality that enables the user to publish her profile, view and connect with others, to undertake collective action and receive news about similar campaigns and groups. The exponential growth of online social networks, and the corresponding increasing importance of functionality that provides social functions, has stimulated the emergence of other platforms that embody different interpretations of the

balance between an object or social focus. For example, one element in the architecture of www.academia.edu (see Figure 6) is based on published papers. Joining the site triggers an online search for published papers in the applicant's name which, if found, are linked to the user – with confirmation dialogues - during the application process. This generates a personal profile immediately populated with the knowledge objects associated with the member, along with other more typical personal information. The site provides typical social functions tailored to the audience, enabling people to identify each other by publication, university or research interest and, crucially, to connect with other – using the 'follow' convention and send messages.

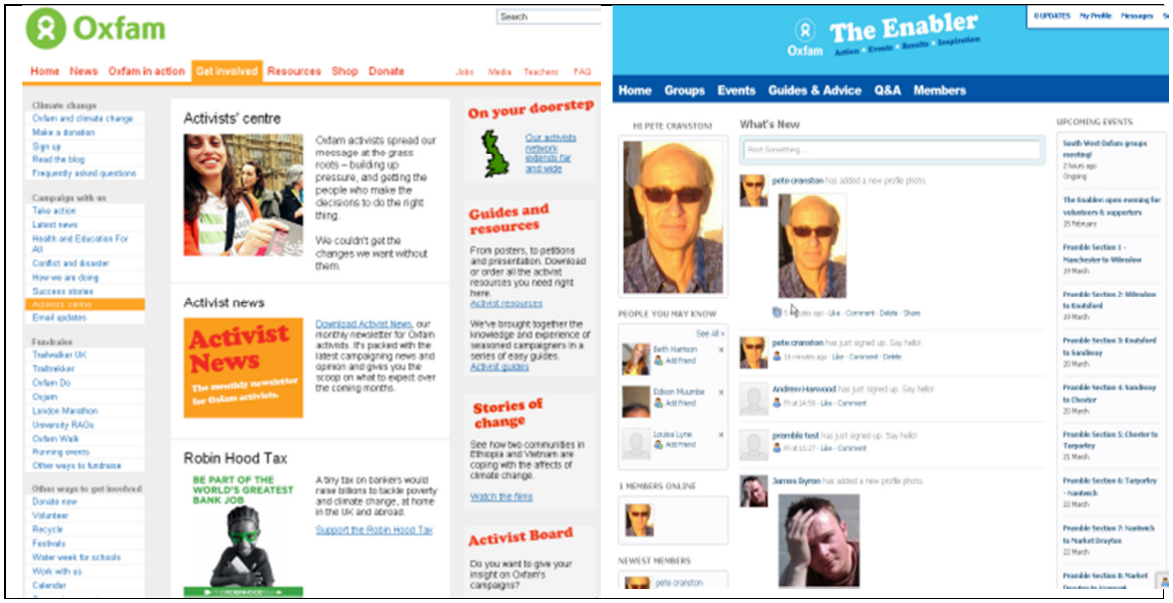

Figure 5: Home page for OGB campaigning content (left) and the prototype of a purpose-built campaign social networking site, 'The Enabler'[8] (right)

In contrast, the Peace and Collaborative Development Network site www.internationalpeaceandconflict.org (Figure 6) is designed primarily as a community of practice platform. It uses the *Ning*[9] social network builder and its growth was slow when it started in 2007. However, the appointment of a coordinator in early 2008, who actively moderated and published content, saw an immediate rise in activity and membership, to its current number of 18,250. As with all *Ning* sites the community moderator and the members have access to full array of social network functions popularised by Facebook and other social networking sites, centring on friends and groups but including blogs, videos, photos, events, forums and document stores.

Content as currency

It is interesting to consider the Knowledge Management for Development (KM4Dev) network www.km4dev.org in this context. Mapped on the matrix, KM4Dev is positioned in the top right quadrant. It began as a community of practice[10] and over time has grown into a network with many sub communities of interest. As a group of people, the network organises or is active in a range of face2face meetings, including an annual event while many members work together in overlapping projects and organisations. KM4Dev began with two workshops

in 2000, which led to a mailing group km4dev-l@dgroups.org that is still the primary channel of communication for the global membership of around 1500. It is supported by a wide range of digital tools, including a Ning site, and a wiki as well as content featured on interlinked other sites such as Flickr, Google documents, YouTube, Twitter and Facebook. Content is important: the wiki played a key role in the development of the network, as people collaborated to summarise discussions on the email list, add references and other documents etc. Recently a group of organisations funded the development of a more structured, easily accessible version www.kstoolkit.org. However, the social functions of the meetings were an essential component in cementing relationships and the loose governance structure. The later incorporation of the Ning site as well as many KM4Dev members' activity and conversations in Twitter, Facebook and LinkedIn have enriched and strengthened those links, as well as providing another space for conversations about the issues which interest and concern the members. Content of all kinds (including documents, photos, reports, reports, tweets, status updates, blog posts, wiki contributions) is the currency of the network while the social functions, both digital and physical, provide the market place for exchange.

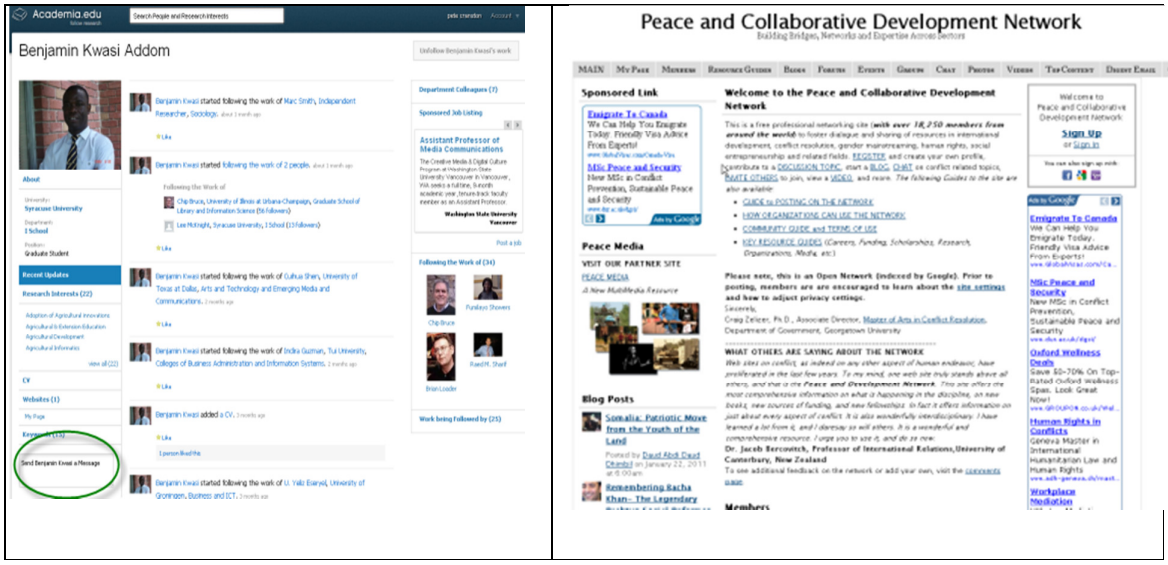

Figure 6: Screenshots of the Academia.edu (left) and the Peace and Collaborative Development Network (right)

Conclusions

Each of these networks facilitates the flow of knowledge in different ways to reflect its own function and its networks or communities of practice. The value of the mapping is that it provides some insight into the relationship between the use of different online tools and KS functions. The KM4Dev example is illustrative of how an open approach to using different tools can support and extend social dynamics within such communities of practice. The blend of face-to-face and online interaction that sustains that dynamic also illustrates the importance of not being led by technology.

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[1] This paper is based on a literature review by Andrew Clappison, Pete Cranston, John Rowley and Megan Lloyd-Laney completed as part of an evaluation of the AfricaAdapt Network.
2 Online networks will be simply termed 'networks' throughout this paper.
3 http://en.wikipedia.org/wiki/Cynefin
4 Etienne Wenger is recognised as one of the earliest to establish the theoretical basis for the concept of communities of practice. A summary of his work can be found in Cummings and van Zee (2005) Communities of practice and networks: reviewing two perspectives on social learning. *Knowledge Management for Development Journal* (1)1: 10-24).
5 See A. Acuna (2010) Knowledge management for development communities: balancing in the thin divide between tacit and codified knowledge. *Knowledge Management for Development Journal* 6(1): 4-20.
6 Through the exposure of research fellows on the site, for example,
7 This is a screenshot of the original site which has now been integrated into the DFID site, and has lost a lot of the sharing capabilities in the process http://r4d.dfid.gov.uk/
8 The Enabler is not accessible any more from the Oxfam GB website
9 www.ning.com
10 Various sources for the history, including the first issue of the *Knowledge Management for Development Journal.*