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Socially innovative research networks: A roadmap for SInet

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Keywords
Socially, innovative, research, networks, roadmap, for, SInet

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CHAPTER 1

Socially Innovative Research Networks: A Roadmap for SInet

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Keywords
network, network-centric, social technologies, social innovation

Abstract
The Social Innovation Network (SInet) was established for cross-disciplinary research on social innovation to “create better futures for people”. SInet is itself socially innovative since a network is a relatively unfamiliar configuration for a university-wide research unit. A network provides an identity to a research collective that is real, having status and support, but which is fundamentally different to an institute. In a network, connections and flows of knowledge tend to be horizontal not vertical. A network is flexible, reconfigurable, responsive to change and less formal, and has the potential for lower administrative overheads. As knowledge workers, university researchers perform best in an organisation that supports an open culture where knowledge workers are left alone to work, with sufficient support and resources. Their performance is maximised by capitalising on their strengths and knowledge rather than trying to force them into moulds.

This paper compares the attributes of a research network to a more traditional hierarchical institute. It asks and answers the questions: what is a research network; why have one for intra-institutional research; and how can it be created, sustained and its value determined? Three theories will be used to (a) provide the reasons and justification for network-centric configurations, (b) make sense of the network-centric paradigm and its characteristics, and (c) understand how to act in a network-centric workplace arrangement. Not everyone is comfortable working in a self-directed network-centric configuration, so will SInet work, and if so, how?

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Introduction
The Social Innovation Network (SInet) was established at the University of Wollongong to create an appropriate structure for cross-disciplinary research endeavours that fall under the banner of ‘social innovation’. The broad aim of SInet researchers is to “create better futures for people”\footnote{http://www.uow.edu.au/research/networks/SInet/index.html} and a network was considered to be an appropriate structure to coordinate the activities of individuals and groups. This paper recognises that a network is a relatively unfamiliar configuration for a formal university research unit and so SInet is itself socially innovative. An objective of SInet should be to take advantage of network characteristics, such
as openness, diversity and adaptability, are needed for meaningful discoveries and innovation in the current complex environment.

By their very nature, networked arrangements – also referred to as network-centric configurations – are suitable for confronting complex dynamic situations, as networks tend to be flexible, self-generated, reconfigurable and responsive entities (Crawford et al. 2009). Although researchers have always made use of informal networks, these have naturally tended to be discipline-based and cross-institutional as, within institutions, disciplines are normally located within a formal organisational structure. Intra-institutional research networks, when they do exist, are usually informal, serendipitous and cross-disciplinary as shown by research on the informal ways of organising (see Groat 1997).

This paper uses literature on theory and research into networks to provide answers to questions such as: what is a research network; why have one for intra-institutional research; and how can it be created, sustained and its value determined? Comparisons will be made between the potential value of a research network and a more traditional hierarchical research institute. The claim is made that a network provides an identity to a research collective that is real, has status and can attract support, but which is fundamentally different to an institute, requiring a different governance philosophy and operating with lower administrative overheads. Not everyone familiar with traditional research structures is comfortable with network arrangements, so can they work, and if so, how?

**Networked organisations and network-centric configurations**

Networks are a well-understood arrangement of interconnected things or people. This is probably because they are easy to visualise with shapes for nodes and lines to interconnect them. Human networks have long been associated with communication, social interaction and community activities. In the 1980s, the networking of computers raised the profile of human networks, as people in the workplace became connected through shared files and data, email, intranets and groupware. Then the network of networks, the Internet, came along, making these interconnections global and providing a platform for a growing set of innovative networked applications. The management and information systems literature is now full of terms such as ‘networked organisation’ (Lipnack & Stamps 1994), ‘virtual enterprise’ (Byrne, Brandt, & Port 1993), ‘network-centrism’ (Warne, Ali & Hasan 2005b), ‘communities of practice’ (Wenger 1998), ‘small-worlds’ (Buchanan 2003), ‘six degrees of separation’ (Newman 2003), the World Wide Web (WWW) and now Web 2.0 (McAfee 2006).

A networked organisation is one where “people and groups act as independent nodes, link across boundaries, work together for a common purpose; have multiple leaders, lots of voluntary links and interactions” (Lipnack & Stamps 1994). In a network-centric structure, members of an organisation use the Internet to “leverage information and increase competitive advantage through the collaboration of agile self-directed teams” (Hasan & Pousti 2006). In a network, connections and flows of knowledge tend to be horizontal, across boundaries of traditional organisational units, not vertical (i.e. up and down the hierarchy). Originally conceived as being technology-based, the network-centric paradigm is now concerned with how people are organised to provide the flexibility to match the current volatile environment (Warne, Ali & Hasan 2005b). The network-centric paradigm is “a return to the reality and value of human relationships, commitment, engagement and purpose, as the driving forces behind shared endeavour” (Crawford et al. 2009). As a result, networked organisations are less formal, have more distributed decision-making and are more responsive
to change. The new Internet generation, Web 2.0, supports this informal people-focussed configuration with emerging social networking tools and cultures (Pfaff & Hasan 2007). Whereas Web 1.0 refers to the use of the Internet to enable information sharing and e-commerce transactions, Web 2.0 is a new generation of the WWW where the Internet is used as the platform for social technological tools that allow people to communicate, coordinate and collaborate in ways which are natural and widely accessible (Hasan & Pfaff 2007).

Characteristic of network-centric organisation are: flatter hierarchies; decentralised decision-making; a greater capacity for tolerance of ambiguity; permeable internal and external boundaries; employee empowerment; the capacity for renewal; self-organising units, and self-integrating coordination mechanisms (Daft & Lewin 1993; Warne, Hasan, & Ali 2005a). It is probable that a successful network-centric organisation is dependent on the vitality of small autonomous, self-directed and self-coordinating groupings (Warne, Ali & Hasan 2005b) and this is one lesson that should be heeded by leaders of networked research entities such as SInet.

Further lessons on network operations of interest to both research and practice come from an increase in network-related structures enabled by the expansion of the Internet and globalisation. Among these are the developments of virtual teams and virtual enterprises (Byrne, Brandt & Port 1993), where temporary networks of individuals, groups and entire organisations often undertake joint projects that are unrestricted by time and place due to support from Web-based information and communications technologies. Research in this area points to the importance of balancing face-to-face with online activities (Crawford & Hasan 2006), and the critical role of social learning with the importance of developing a culture of empowerment, trust, and forgiveness in these ways of working (Warne et al. 2001). A definitive lesson on the viability of network-centric configurations comes from the challenges of allowing them to exist within traditional hierarchical organisations. Research on such hybrid or blended organisations is scarce indicating that there are as yet unresolved problems in this space (Peltokorpi & Tsuyuki 2006).

More recently, the social networking phenomenon has grown exponentially in the supportive online environment and become self-sustaining even within organisations (Hasan & Pfaff 2007). These are invariable ‘scale-free’ networks having a few highly connected nodes, which act as focal points for hubs within the network, and many nodes have very few links to other nodes (Newman 2003). The online end-user generated encyclopaedia Wikipedia has been widely studied in this regard and the work of Ingawale, Roy & Seetharaman (2009) on the development of cultural norms within the network of contributors to Wikipedia has particularly relevant findings. This study demonstrates the importance of establishing a self-determining practice early in the life of the network which empowers high degree nodes (people with many connections) to impose a culture of respect and support among members and that once established this culture is very hard to change. This study also recognises the importance of network members who span the naturally forming hubs and that these ‘boundary spanners’ are usually serendipitous links between sub-sections of the network.

Characteristics of researchers as knowledge workers
The term ‘knowledge worker’ is ascribed to Drucker (1959) who used the term to describe someone who processes existing information to create new information which could be used to define and solve problems. Researchers could thus be considered knowledge workers. One of the defining characteristics of knowledge work is that the outputs of work activities entail knowledge as an essential component where the worker has a deep understanding of the body
of knowledge that underlies the object of their work (Iivari & Linger 1999). The way one maximises knowledge workers’ performance is by capitalising on their strengths and their knowledge rather than trying to force them into moulds (Drucker 1988). They perform best in an organisation that welcomes change and supports an open culture where knowledge workers are left alone to work, with sufficient support and resources.

As knowledge workers, researchers have two main allegiances. On the one hand they belong to their institution, and/or a unit within it, who pays them and provides resources. On the other hand they have strong connections to their disciplinary peers in the worldwide body of scholars who judge their work for publication, for its quality and contribution. The second of these probably has some hierarchical structures, such as professional associations and so on, but it also has many informal networks of researchers who meet at conferences, visit each other for sabbaticals and seminar presentations, collaborate on projects, reference each other and critique each other’s work. These networks are for the most part self-selected and self-organised. They may not have a formal identity and are probably in a constant state of flux regarding composition, activities and arrangements. Most researchers flourish through their external networks and are comfortable working this way with those in disciplines or similar areas. The viability of such networks has increased through the use of Internet-based applications as shown by work on e-research (Anderson & Kanuka 2003; Cram 2003; Thomas & Streib 2005).

As mentioned above, the context is different within institutions such as universities where similar disciplines are usually organised into formal structures such as Faculties, Schools and Departments. These units manage careers, resources and recognition, and they are mainly focussed on the individual. Although small collaborative groups do form, either for limited projects or for ongoing joint research, the competitive institutional culture mitigates against their success. They subsequently break up, continue to exist informally without much support, or are formalised into official centres. Snnet is an attempt to form a network of small centres and project groups with its own identity, resources and means of functioning. The following section presents some theory and previous research on networks.

Theoretical underpinnings of organisational networks
It is clear that the demand for a social innovation, such as a research network, in the current environment poses different problems requiring different levels of understanding and analysis as well as different solutions. In seeking a theoretical basis for the study of organisational networks it is important to cover three perspectives of the area: (a) reasons and justification for network-centric configurations; (b) making sense of the network-centric paradigm and its characteristics; and (c) understanding how to act in a network-centric arrangement of the workplace. A separate theoretical framework is used for each of these aspects.

a) reasons and justification for network-centric configurations
There is no doubt that we dwell in a varied and turbulent environment accelerated by advances in digital technologies and the Internet. In this complex environment elements are increasingly interrelated and constantly evolving. A climate of both evolutionary and revolutionary change, with a confronting variety of risks, is stressing all human enterprise (Hasan 2008). Strategies for surviving the current challenging environment of diversity and change include the concept of being a ‘learning organisation’ as introduced by Senge (1990) or becoming a ‘learning networked organisation’ (Kuutti & Vikkunen 1995). The need to match the diversity and responsiveness within an organisation to the complex and dynamic challenges of the environment is consistent with the Law of Requisite Variety (Ashby 1957),
which implies that, with the support of logical reasoning and empirical evidence, only variety can master variety. So if the environment contains a complex network of diversity and change, this well-tested Law provides us with a reason to consider networked arrangements within organisations as a sensible way to match the problems posed by this environment.

**b) making sense of the network-centric paradigm and its characteristics**

To make sense of the spectrum of problems and solutions facing a social innovation network requires a holistic sense-making model. One such model often used in this context is the Cynefin framework developed through the research and practice of knowledge management by Dave Snowden (2002) whilst working at IBM. Cynefin provides a perspective, language and conceptual lens which allows us to characterise issues and find suitable solutions to a wide range of diverse problems, particularly those that are complicated, complex and dynamic (as is often the case with networks). As shown in Figure 1, the Cynefin framework has five domains reflecting the different relationships between cause and effect and different ways of working in these various domains. Each domain has a different mode of community behaviour and each implies the need for a different form of management and a different leadership style, with the adoption of different tools, practices and conceptual understanding. For example, a network is inherently different, and needs to be managed differently, to a hierarchical bureaucratic organisation. In proposing the Cynefin model, initially for knowledge management but increasingly for other areas of investigation, Snowden (2002) makes a point of strongly resisting the existence of a single or idealised model but rather sees the key to survival and growth as coming from the ability to adapt to change through the diversity of approach. This involves an awareness and understanding of the borders between different domains and the acquisition of tools and techniques to enable border transitions as needed.

![Unordered Domains and Ordered Domains](image)

**Figure 1: The Cynefin framework with two ordered and two unordered domains with disorder in the centre. The vertical and horizontal connection strengths of Cynefin domains are drawn from Kurtz and Snowden (2003).**

As shown in Figure 1, the Cynefin framework has five domains reflecting the different relationships, structures and ways of working in a diverse world. Four of the Cynefin domains are acceptable places to be. Going anticlockwise starting at the bottom right, they
are:

The **Known or Simple Domain**, in which the relationship between cause and effect is obvious. This suits a centralised bureaucratic way of working using vertical command and control with weak horizontal links in organisations. Solutions to problems in this domain often involve the generation of best practice, standard routines, rules and regulations.

The **Knowable or Complicated Domain**, in which the relationship between cause and effect requires analysis or some other form of investigation and/or the application of expert knowledge. This domain is the realm of scientific research where it is assumed that all knowledge is knowable. Matrix organisational structures reside in this domain with strong relationships both vertically and horizontally.

The **Unordered Complex Domain**, in which the relationship between cause and effect can only be perceived in retrospect, not in advance. Aspects of Complexity Theory developed in biology are relevant to this domain. This is where community and networked structures usually occur. The main subject of this paper proposes solutions to problems in this domain.

The **Chaotic Unordered Domain**, in which there is no relationship between cause and effect at a systems level. Aspects of Chaos Theory developed in mathematical disciplines are relevant to this domain. The connections between individuals and organisations working in this domain are weak. Here there is no discernable structure or obvious solutions.

The fifth central domain is **disorder**, which is the destructive state of not knowing what type of causality exists and thus not knowing which way of working is best. While problems may legitimately be allowed to exist in the other four domains if approached with suitable solutions, those in states of **disorder** are normally harmful and should be moved into one of the other domains.

The two right hand domains (known/simple and knowable/complicated) are **ordered** whereas those on the left (complex and chaos) are sensibly viewed as **unordered**. As ordered or simple problems become more complicated, there are two main types of solutions. On the one hand, problem solvers can endeavour to retain order by imposing structure, simplifying and decomposing into small problems that can be tackled more easily. On the other hand, problem solvers can move to the left unordered side of Cynefin and take a holistic view where the complexity and chaos is retained and attempts at order are relaxed.

The Cynefin framework has previously been used to make sense of the network-centric paradigm (Kazlauskas & Hasan 2009; Crawford et al. 2009) and therefore it is an appropriate means of understanding the challenges of SInet. An intra-organisational network, such as SInet, inevitably suffers the tension of naturally fitting into the complex domain, with its strong horizontal links and weak vertical ties, but it exists within an ordered hierarchical institutional structure that imposes a strong top-down command and control administration. Characteristics of entities in the complex domain include the need for strong individual or small group identity, self-determination and intrinsic rewards. There is little need for external rewards or a costly system of formal rules, administrative procedures and detailed accountability. A formal command and control institutional regime, as is common within an ordered institution such as a university, limits the inherent flexibility, adaptability, responsiveness and re-configurability of a network – i.e. factors which provide its intrinsic value.

c) understanding how to act in a network-centric arrangement of the workplace

A well-established and comprehensive theory of human activity emanated from the work of the Russian psychologist Vygotsky from the Cultural-Historical tradition. Several of his
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students, in particular Leontiev, developed what is now known as the Cultural-Historical Activity Theory (see Verenikina & Gould 1998). In this tradition, activity (such as a research project) becomes the unit of analysis and is undertaken by means of a set of subordinate actions. An activity is the purposeful engagement of a subject (person or people) towards an object (i.e. it is the sense of the “object of the exercise”). Each human activity is identified through the dialectic relationship between subject and object, where the object encompasses focus and purpose of the activity while the subject (the person or group engaged in the activity) incorporates the various motives involved. The core subject-object relationship, i.e. “who is doing what and why”, is mediated by physical (primary) and psychological (secondary) tools, and the community within which it takes place (a tertiary tool). This is a two-way concept of mediation where the capability and availability of tools mediates what is able to be done, and the tools, in turn, evolve to hold the historical knowledge of how the community behaves and is organised. As described in Hasan (2003), following the work of Engeström (1987) and Kuutti and Vakkunen (1995), most situations involve many interconnected activities. These can form an activity system and so they are a suitable way to describe what is happening in a network of small active units. Each node of the network can be considered as a separate collective activity with its own focus and using its own research tools within its own disciplinary community. These are interconnected by boundary-spanning members, similar interests or a common purpose. Activity Theory provides a language and concepts to describe what is happening, allowing for diversity and change as well as multiple motives and allegiances.

Research networks: an appropriate context for knowledge workers
It is often said that managing academics is like “herding cats” and this implies a challenge to the way that academic institutions are structured and managed. A better understanding of ways to meet this challenge should be welcome to those charged with this task. In this paper, we examine the possibility that a network is an appropriate structure for academic research. The Introduction posed the questions: what is a research network; why have one for intra-institutional research; and how can it be created, sustained and its value determined? The following sections propose some answers to these questions.

Characteristics of a research network
Successful network-centric organisation depends on the vitality of small autonomous, self-directed and self-coordinating groupings. As previously noted, in networks “people and groups act as independent nodes, link across boundaries, work together for a common purpose; have multiple leaders, lots of voluntary links and interactions” (Lipnack & Stamps 1994). Just like alternative configurations, sustainable networks require reward structures, infrastructure and technologies, a supportive culture and a sympathetic leadership style. For networks to be successful, these should be aligned with the beneficial characteristics of networks, namely; flexibility, adaptability, responsiveness to change, and the ability to leverage the diverse capabilities of members.

In accordance with the theories described above, studies by Warne and others (Warne et al. 2001) have explored the types of technologies as well as the human skills and capabilities required to achieve the transformation to a viable network-centric configuration. Here integrity, maturity, adaptability, flexibility, job competency, and a sense of humour all emerged as highly rated skills and qualities for the members of the loosely coupled, self-organising teams that form the nodes of networks.
Where are networks suitable?
Researchers can be classed as knowledge workers who work well in small self-organised groups, which provide a suitable context for discovery and innovation. They do not thrive if forced into moulds, instead preferring the open culture of less formal, networked organisations with distributed decision-making and the flexibility to respond to change. The Law of Requisite Variety (Ashby 1957) suggests that there should be a match between the current complex environment – possessing enormous variety and a rapid rate of change – and the adaptability of networked organisational arrangements. Ways of prospering in complex (unordered) and complicated (ordered) domains can be understood and distinguished between using the Cynefin framework. Whereas complicated situations are ordered and respond to top-down management, a complex world needs a lower concentration of power and more flexible systems to improve problem-solving. A sensible way to successfully manage any complex environment is to incorporate the concepts of emergence and distributed decision-making from Complexity Theory. This leads to the adoption of a network-centric paradigm in organisations, complementing or replacing the rigidity and control of traditional hierarchical bureaucracies that are now becoming increasingly complicated.

How can organisational networks be established and managed?
Transforming a traditional organisation, or a part of it, to incorporate networks is a challenge because managers have to relinquish some of their traditional control to small, self directed teams. At the same time workers need to increase their situational awareness in order to take on greater responsibility and cooperate with others within a small, less prescribed group setting. As shown by the work of Ingawale, Roy & Seetharaman (2009) networks can become self-sustaining if key members are empowered early with the responsibility and authority to build an appropriate sharing culture of mutual respect and support. This situation is consistent with the notions of agreed shared objects among interrelated collective activities in a dynamic activity system. The language and concepts of Activity Theory can be used to explain how such a system can become self-sustaining if the supporting tools are allowed to develop along with the activities in a reciprocal mediating manner. These primary, secondary and tertiary tools include technologies, resource-allocating mechanisms, governance processes and reward structures. The activities, direction and growth of a network can be guided but not mandated. This is counter to the workings of the modern bureaucracy which demands planning, due process and accountability. The positive side of self-direction is relatively inexpensive as there are fewer administrative overheads. However there are other demands, such as trust, the tolerance of failure and the acceptance of outcomes that were not originally anticipated.

How can the value of a network be determined?
Looking specifically at university research, the value of output is usually determined in terms of a set of key performance indicators such as publications, external grants, and research student completions. When these are considered as a Return on Investment (ROI) the cost-effective nature of network must surely be attractive with its low overheads in terms of administration. There are also intrinsic benefits of networks in promoting collaborations that are cross-disciplinary, responsive to new areas of interest and therefore potentially innovative.

Conclusion – practical implications
The discussion in this paper, arising from examining network-centric organisation, has practical implications for research arrangements, such as those at our institution (University of Wollongong), and, in particular, for the research network SNet. This leads to the assertion
that a network provides an identity to a research collective that does not fit the traditional institutional mode. This identity is real, has status and can attract support, but it is fundamentally different to a research institute. It is particularly appropriate for research into social innovations, which is a complex, cross-disciplinary domain. To be effective and to benefit from its flexible configuration, a network requires an open governance philosophy that is appropriate to the complex domain. This is socially innovative with the added bonus of operating with lower administrative overheads. Thus, if judged for its ROI, a research network is potentially the best arrangement for many fields of research endeavour.

To summarise the theoretical underpinnings of organisational networks presented in this paper: Organisations need to be responsive to the complex and dynamic challenges of the environment, as determined by the Law of Requisite Variety (Ashby 1957). Networks such as SInet can help fulfil this need. Understanding the function of organisational networks is enabled through the sense-making Cynefin framework which clarifies the difference between unordered complex structures such as networks, and ordered hierarchical structures common in large organisations. Networks, as complex adaptive systems, can be productive without costly systems of formal rules, administrative procedures and detailed accountability as long as members are allowed to set their own objectives and manage their own affairs with minimal constraints and appropriate resources. The ongoing workings of a network can be understood as a dynamic system of interrelated activities as understood in Activity Theory. Each activity can be seen as a dialectic relationship between subject and object (i.e. “who is doing what”), whose purpose is co-constructed as the activity progresses and is mediated by appropriate primary, secondary and tertiary tools.

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