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FOCUS on...

Towards
better
policy and
practice
for Primary
Health
Care
Research
networks
and the
Divisions
of General
Practice
network.

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UNDERSTANDING NETWORKS

Main messages

- Networks offer innovation, the opportunity to exchange knowledge and skills, the flexibility to respond to changes in the environment and more efficient operation. A salient quality of networks is their capacity to change and diversify.
- Network development is principally guided by the choices of the members and their network management capabilities. Fulfilment of self interest of members is an important incentive in developing and sustaining a network. Networks are essentially self-regulating.
- Networks consist of 'a grouping of individuals, organisations and agencies organised on a non-hierarchical basis around common issues or concerns, which are pursued proactively and systematically, based on commitment and trust' (World Health Organisation, 1998, cited in Pedler, 2001, p3). However, the term network is often applied widely and indiscriminately.
- Networks take multiple forms and serve a range of purposes. Different kinds of networks are best suited for different kinds of tasks and need different strategies. The key to network effectiveness is determining the best match between network form and desired function to ensure the strengths associated with different forms are optimised and weaknesses minimised.
- Achieving network purposes relies on creating cohesive relationships and interconnected partners, through styles of leadership and management appropriate to the type of network.
- Network infrastructures can affect network configurations and can influence the development of network relationships. If a network is to remain viable it requires resources to be committed in the form of some network infrastructure organisation. Networks require resources to support linking and competency in collaboration.
- Evaluation of networks is important as without self-knowledge a network cannot be self regulating. The effectiveness of a network should be assessed within its own terms of reference and local context, and should consider multiple domains of activity and attempt to capture unanticipated consequences.

CONCENTRATING ATTENTION - MAXIMISING CLARITY AND DEFINITION

FOCUS on...

With the aim of informing primary health care policy and practice in Australia, this research summarises examples of key recent research findings identified by the authors. Feedback and suggestions for future issues in this **FOCUS on...** series are welcomed.

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“Networks are emerging as the signature form of organisation in the information age.”

Introduction

This paper focuses on enhancing understandings of the **network** concept for better practice and policy in general practice and primary health care research, evaluation and development (see glossary). It highlights key network literature, and discusses conceptual, organisational and operational issues as they relate to some of the networks associated with innovation, service delivery, knowledge and research. These networks are relevant to the Divisions of General Practice Network and research networks associated with the Research Capacity Building Initiatives (RCBIs) funded through the Primary Health Care Research Evaluation and Development PHCRED Strategy.

The Divisions network, with its local knowledge and connections, is positioned to play a vital role in strengthening our primary care system (Commonwealth of Australia, 2004).

Australia needs a primary health care system with a thriving research culture and evidence base. Research networks could be an important tool for achieving this aim (Gunn, 2002, p65).

Networks are emerging as the signature form of organisation in the information age (Kreis-Hoyer & Grünberg, 2003). Networks are not a new concept, but have been given a new life by the rapid advance of the Internet and the World Wide Web, which act as both conceptual models and practical enablers of networking (Pedler, 2001). Networks offer innovation, exchange of knowledge and skills, flexibility to respond to changes in the environment and efficiency of operation.

The literature refers to a wide variety of networks, such as knowledge networks which create and disseminate knowledge for use beyond the membership of the network (Clark 1998; Creech and Willard, 2001), clinical or service delivery networks (Pedler, 2001, Goodwin et al, 2004), innovation networks (Pittaway et al, 2004), policy networks (Mingus in Mandell, 2001) and research networks (Gunn, 2002, Thomas et al, 2001, Williams & Bailey, 2002). Knowledge, service delivery, innovation and research networks are of particular value to Divisions and PHCRED activities. This paper has not focussed on clinical service delivery networks, as detailed work is being undertaken in this area by the National Centre for Clinical Studies.

Different kinds of networks are best suited for different kinds of tasks and need different kinds of strategies.

A [research] network set up to encourage evidence-based practice will have different structures, goals, activities and outputs from a network set up to foster individual GPs undertaking small-scale, practice-based research, or a network set up to undertake large-scale, interventional or longitudinal studies (Gunn, 2002).

The term 'network' is applied quite widely and at times indiscriminately, raising a number of organisational and management issues. The capacity to distinguish between different forms of networks is critical to understanding more clearly their dynamics and ultimately to managing and supporting them appropriately (Williams & Bailey, 2002). Distinguishing between different forms of networks requires an understanding of:

- 1 Common characteristics of networks
- 2 Network forms, organisational arrangements and functions
- 3 Network value

- 4 The pitfalls or disadvantages of networks
- 5 Network development and sustainability
- 6 Network management issues
- 7 Evaluating networks

This paper discusses each of these areas in more detail.

1 - Common characteristics of networks

1.1 How networks are characterised

Networks represent a clearly distinguishable form of social integration, which transcends individual societal groups and organisations (Küppers, 2005). Accordingly, the network concept refers to patterns of relationships between individuals or member organisations within it (Goodwin et al, 2004). Networks have been broadly characterised as follows:

'any moderately stable pattern of ties or links between organisations or between organisations and individuals, where those ties represent some form of recognisable accountability (however weak and however often overridden) whether formal or informal in character, whether weak or strong, loose or tight, bounded or unbounded' (Goodwin et al, 2004, p13)

'a grouping of individuals, organisations and agencies organised on a non-hierarchical basis around common issues or concerns, which are pursued proactively and systematically, based on commitment and trust' (World Health Organisation, 1998, cited in Pedler, 2001, p3).

'structures of interdependence involving multiple organisations or parts thereof, where one unit is not merely the formal subordinate of the others in some larger hierarchical arrangement' (O'Toole, 1997, cited by Khator and Brunson in Mandell, 2001, p154).

1.2 Common features and structural components

The common features of networks are summarised in Table 1.

The basic structural components of networks are nodes and ties. Nodes can be individuals, groups, business groups, teams or organisations. The ties which link them can be informal or formal, weak or strong, sparse or dense, and actioned via means such as meetings, conferences, newsletters, joint projects and working partnerships.

Networks are characterised by structural stability, **density**, **diversity** and formality. The number of overlapping ties between members is called **multiplexity** (see glossary).

Table 1: Common features of networks

(adapted from Küppers, 2005; Pedler, 2001; Williams & Bailey, 2002)

Features

- Networks are usually virtual associations in whole or in part, where the technology of computer networking underpins and enhances face-to-face interaction
- Membership includes diverse groups of independent people or organisations, with their own values and core objectives
- Members are linked by common goals and held together primarily by personal relationships
- Status and authority of members within the network is based more on knowledge, usefulness, sharing and innovativeness, than on formal position or qualifications
- Links between network members are based on ties of mutual interest, sharing, reciprocity and trust
- Different members may be involved in a network at different times
- Networks take collective actions to achieve goals
- Networks can include and exclude particular groups or people

- Structural stability within networks encourages the formation of trusting relationships, which in turn enhances the willingness of partners to take risks. Common values and norms also influence willingness to trust.
- Density refers to the extent of relationships between the nodes in terms of volume, regularity, distance and quality of exchanges. Increasing density expresses the dynamic development of a network.
- Diversity refers to the dissimilarity between the individuals or organisations in a network. The degree of rivalry generally declines with increasing diversity of partners (Kreis-Hoyer & Grünberg 2003).
- Formality within networks varies from informal activities where people are only weakly linked to each other to more formal network structures where people must actively work together to accomplish what has been recognised as a problem or issue of mutual concern (Mandell, 2001).

2 - Network forms, organisational arrangements and functions

2.1 What forms do networks take?

Determining the form of a network involves assessing aspects of the network's organisational arrangements and function, relative to the type of relationships

“Determining the form of a network involves assessing aspects of the network’s organisational arrangements and function, relative to the type of relationship between members.”

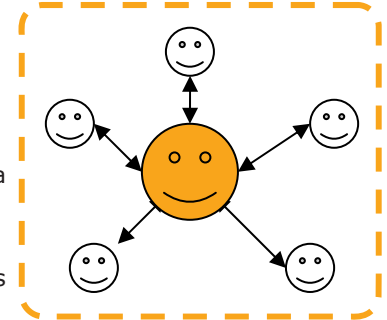
between nodes (members) of the network (Goodwin et al, 2004; Mandell, 2001; Williams & Bailey, 2002).

2.1.1 Common types of relationships between members of networks

a) Relationships with members with few ties to others

This type enables control of the network for the principal member. Such a network might meet the objective of an organisation seeking power over its members or consumers in an innovation network (Pittaway et al, 2004).

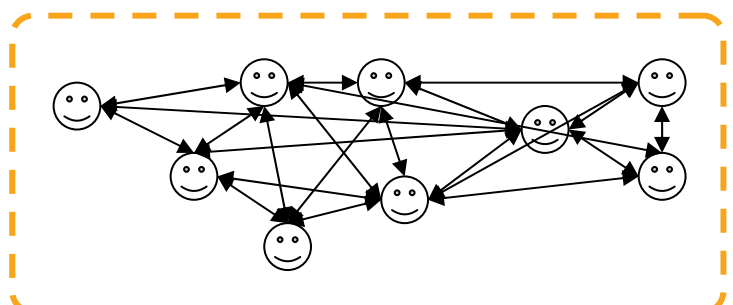
Some research networks have a hierarchical organisation with a strong centre (often based at a university) which leads satellite units or network members. The central organisation manages the daily operations of the network, which functions as a collective of research partnerships between the coordinating organisation and each individual member with little collaboration between the members. Thomas et al (2001) describe a top-down leadership network of France’s national College of Teachers in General Practice, with strong institutional links and research projects led by experts. This approach has been found to be valuable for producing high quality research quickly (Griffiths et al, 2000). Creech and Ramji (2004) suggest that such partnerships in knowledge networks may be more easily funded on an individual rather than a network basis, questioning whether the collective of individual partnerships achieves the network advantage of joint value creation, increased capacity development and strengthened engagement and influence.



b) Relationships with members with many interlocking ties

This type can be useful for partners all facing common problems, for example, adverse legislative actions or new technological opportunities (Pittaway et al, 2004). A strength of this form is that it facilitates the development of trust and cooperation. In this collaborative model, members interact consistently with each other as well as the coordinators, which act as members of the network undertaking their share of research, information sharing and input to the work of others. One of the hazards of this form of network is that members may get so close and collaborative that knowledge does not flow beyond the network (Creech & Ramji, 2004).

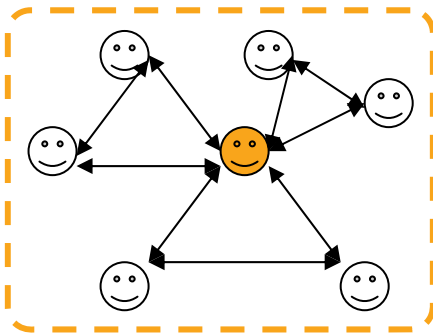
This type is good for developing grass roots participation. Some research networks reflect this type, with coordination and cooperation between satellite units and members as well as with the centre (Griffiths et al, 2000). Thomas et al (2001) describe practitioners developing their own ideas in the Israeli Family Practice Network led by a peer group, working from the interests of the



practitioners themselves. Another example of this network type is the West London Research Network which has whole system leadership, and produces cultural change as enthusiasts in different parts of the health care system become involved (Thomas et al, 2001).

c) Relationships with members with many non-overlapping ties

This network type is ideal for an organisation whose primary business entails the brokerage of information and technology, as it provides knowledge and information benefits. Diversity of network members is important for innovation, as formal and informal communication between people with different information, skills and values increases the chances of unforeseen novel combinations of knowledge which can lead to radical discoveries (Pittaway et al, 2004). A limitation of this form of network is the absence of opportunities for sharing knowledge and information benefits amongst members.



2.2 How are network organisational arrangements described?

Various stylised models of network have been developed that relate to the types of relationships described above. Three models relevant to Divisions and PHCRED in Australia are outlined below, with further details in Appendix A. These models are based on concepts such as strength of links, degree of **interdependence**, regulation, and **durability** (see glossary).

Model 1 – Based on the strength of links between members (Mandell & Steelman, 2003)

This model includes a *network structure* characterised by intense links between mutually interdependent organisations. It proposes four basic network forms: *coalition*, *regular coordination*, *temporary task forces*, and finally *intermittent coordination* where organisations are independent and only weakly linked.

Model 2 – Based on social regulation and integration (Goodwin et al, 2004)

This model includes four basic network forms: *hierarchical* networks which are strongly regulated and strongly integrated; *enclaves* which are weakly regulated but strongly integrated; *isolates* which are strongly

regulated but weakly integrated, and *individualistic* networks which are weakly regulated and weakly integrated.

Model 3 – Based on organisational interdependence and network durability (Heracleous & Murray, 2001)

This model includes five basic network forms: *edge of chaos*, with extensive operational and strategic interdependence, and low durability; *embedded* with high durability and extensive interdependence; *brokered* which is intermediate on both concepts; *atomistic* which has negligible interdependence and low durability; and *association* with high durability and negligible interdependence.

2.2.1 Matching network form and function

The nature of a network's form and its utility for its intended function (i.e. innovation, service delivery, knowledge sharing) depends on the strategic interests of individual members of the network. Research has not yet clearly demonstrated which network forms can best achieve specified purposes in particular contexts (Pittaway et al, 2004). The literature does acknowledge however, if networks are to achieve their intended purposes that careful attention to achieving the best fit between network form (as determined by members relationships) and desired function is needed. The literature also emphasises that care needs to be taken to ensure that this match is achieved in the first instance and maintained over time. In practice, network forms within each model overlap or change over time, resulting in networks which are hybrids of the stylised forms, with the potential to change in dynamic ways (Goodwin et al, 2004; Mandell & Steelman, 2003). In fact, all types of network configuration change and adapt in response to the requests of members and the context within which the network operates (Pittaway et al, 2004). For example, organisations will use networks in different ways and will reconfigure them if necessary to meet changing objectives.

The model proposed by Goodwin et al (2004) (model 2) based on a literature review of many sectors was developed for the service delivery networks in the health sector. Functions appropriate to each basic form are outlined below.

Individualistic forms are appropriate for functions such as innovation and rapid development of ideas, knowledge and practice. However, as stable bodies of knowledge and production emerge, people begin to reach for more socially integrated forms of inter-organisational relations.

Hierarchical networks are practical and appropriate for functions such as a predefined task, or a major outbreak of disease, with discipline in carrying out the task more

“All types of network configuration change and adapt in response to the requests of members and the context within which the network operates.”

important than local initiative.

Enclave networks offer internal equality of status and voluntary participation, ideal for functions such as providing longer term local health promotion activities.

Further discussion of network functions is provided in Section 3 of this paper — What is the value of networks. Management issues associated with the different network forms and the functions of networks are discussed in more detail in Section 6.

Reflections on form and function

The Divisions of General Practice Network

Divisions can be seen as a hybrid of three forms proposed in Model 2. Each Division, with its local GPs, practice staff and local service providers could be regarded as an enclave with a shared commitment to primary care service delivery, enabling information and ideas to be shared among professionals with a common interest. Professionals will be more dominant in some Divisions than in others. For a (relatively) defined task of implementing a federal initiative such as the Better Outcomes in Mental Health Program, the Network has hierarchical characteristics, particularly at State and territory level around the state based organisation as coordinator. Within the main Network are individualistic networks of a small number of Divisions that explore innovations in specific areas, such as practice nurse demonstration projects or IT/IM development (Kalucy, Hann and Guy 2005).

PHCRED funded RCBI research networks

SARnet, the SA Research network initiated and coordinated by the RCBI of Flinders University Department of General Practice, fits the model of an enclave of primary health care researchers who benefit through reduced isolation, information and training in research skills, and opportunities to take part in an electronic forum, all part of building research capacity in primary health care (SARnet website). Another enclave network with university coordination is PHReNet, which is a regional research network for GPs and other primary health care practitioners funded through the Research Capacity Building Initiative at the Department of General Practice at the University of NSW. PHReNet provides training, support and mentoring for individuals and organisations wishing to develop their research skills and experience. Both these networks also provide more intensive research mentoring for small numbers of members — a function that could be seen as an individualistic form within the larger enclave (PHReNET website).

3 - Network value

3.1 General

The most salient value of networks is their ‘amorphous’ or nebulous nature, which provides management and practice capabilities that contribute to accommodating and responding to change, diversity and variety (Kandampully, 2002). Networks (in concert with knowledge and technology) therefore constitute a resource for

organisations (Kandampully, 2002). In the innovation area, Pittaway et al (2004) found that organisations that did not network and that did not formally or informally exchange knowledge, limited their knowledge base on a long term basis and ultimately reduced their ability to enter into exchange relationships. In the longer term, this correspondingly affected their capacity to enjoy the benefits flowing from these relationships (Pittaway et al, 2004).

The strategic and functional objectives that can be achieved through networks are quite varied, (Table 2).

3.2 The value of innovation networks

Research shows that innovation occurs more effectively where there is an exchange of knowledge between systems, for example, between different sectors, regions or between science and industry (Kaufmann & Tödtling, cited in Pittaway et al, 2004).

The multiple benefits of networking associated with innovation include: the production of new knowledge within the context of an intended application; enhanced ability to bridge the gap between different interests, values, ways of knowing and doing; learning about innovative work practices of others; speeding delivery of new products, services or programs; skills pooling and,

safeguarding intellectual property rights (Küppers, 2005; Pittaway et al, 2004).

As well as promoting innovation within and across organisations, networks also play a key role in the diffusion of innovations within and across sectors, allowing organisations to exchange knowledge and resources needed to learn about, assess and implement innovative solutions (Swan et al, 1999, Pittaway, 2004).

3.3 The value of knowledge networks

The main purpose of knowledge networks is to create and disseminate knowledge for use beyond the membership of the **network** (see glossary). A feature of knowledge networks is that membership tends to be selectively based on expertise in a particular area (CHSRF, 2005). As a result an important benefit of a knowledge network is that it can bring together experts from different fields (e.g. research, policy, knowledge brokering and management) around a common goal or issue (CHSRF, 2005).

Clark's study of the Canadian experiences of formal knowledge networks indicates that optimal knowledge networks:

- Produce knowledge at a faster rate than otherwise possible
- Reduce boundaries between sectors
- Result in better relations with industry and government funders
- Effectively influence decision-makers through the size of the network, reputation of members and the quality of collaborative work, maintained by careful balance of management and selectivity of members (Clark, 1998).

3.4 The value of research networks

Primary care research networks are a tool, not an end in themselves. Well designed and supported networks can facilitate a wide range of research of great direct value to patients and society (Green et al 2005). Thomas et al identify that research networks can:

- Collect morbidity data
- Undertake practice based research and large multi-centre trials
- Conduct research training
- Coordinate diverse activities
- Disseminate information quickly
- Produce multi-disciplinary coalitions of researchers
- Provide widespread ownership of research activity
- Motivate members to disseminate and adopt research findings quickly.

Research networks incorporate various structures with

Table 2: A summary of what can be achieved through networks

(adapted from Kandampully, 2002; Heracleous & Murray, 2001; Pittaway et al, 2004)

Objectives

Strategic

- Access to new knowledge and/or populations and/or markets
- Enhanced adaptation to environmental change
- Enhanced organisational performance and/or competitiveness
- Management of uncertainty
- Sharing of resources and risks
- Lobbying

Functional

- Developing and increasing innovation and innovative output
- Increased organisational flexibility and efficiency
- Exchange of information, including diffusion of innovations across and within sectors
- Provision of physical goods and services
- Facilitation of payments or transfer of resources
- Increased access to critical network resources at low cost
- Enhanced emotional or peer support
- Enhanced education and training

“Primary care research networks are a tool, not an end in themselves.”

varying goals and outputs (Gunn, 2002). The structures range from practice based research networks to networks of individual primary care practitioners interested in research. While the primary focus for these networks is on research in primary care, practice based research networks focus on facilitating the use of practices as ‘laboratories’ making it possible to recruit patients from different practices for epidemiological and clinical research, to conduct effectiveness studies and to study the process of care in a primary care setting (Green et al, 2005; van Weel, 2002). Research networks comprising individual primary care practitioners are usually geographically based and linked to a university department. They focus on promoting evidence-based practice, increasing the research capacity of individual primary care practitioners and conducting research in primary care (Gunn, 2002).

4 - The pitfalls and disadvantages of networks

The main pitfalls or disadvantages of networks include issues of power, conflicts between individual and organisational commitments, dichotomy between need for flexibility and need for rules and procedures, difference between needs and expectations of ‘national public’ and ‘local public’, and accountability issues resulting from need to satisfy both outside regulators and the goals of the network (Mandell, 2001).

Because of these factors, networks can be a ‘double edged sword’ to milestone dominated, output driven agencies and organisations (Brown & Keast cited in Williams & Bailey, 2002). For instance, networks rely on members working together to achieve outcomes, however, when the purpose is ill defined or ambiguous or when differing views cannot be accommodated, the network can become ineffective or disintegrate (Brown & Keast, cited in Williams & Bailey, 2002). Furthermore, because members set network direction, networks can move away from their original intentions and therefore cannot be assured of achieving their original purposes. In these ways network diversity and fluidity can work against realising their potential and achieving specified organisational goals or outputs (Brown & Keast, cited in Williams & Bailey, 2002).

Network vibrancy and member autonomy can also have negative effects on durability and sustainability. They can result in networks losing influence and support as they become disconnected from the realities and decision making processes of members’ organisations (Williams & Bailey, 2002). The autonomy and/or activities of one or two members or organisations can represent a threat to the stability of a network, damaging the entire network. It needs to be ensured that the direction the network takes reflects the common needs of the entire network, not just one member.

Issues of network development, sustainability and management arise in overcoming these pitfalls and disadvantage as discussed in more detail in the next two sections of the paper.

5 - Network development and sustainability

5.1 Why join a network?

Individuals and/or organisations join and remain in networks for many different reasons. Fulfilment of self interest is an important incentive: the network is seen as the best way of attaining organisational goals (Khator and Brunson in Mandell, 2003). A common reason for network development among organisations interested in innovation is to gain access to new or complementary competencies, technologies and opportunities (Pittaway et al, 2004). Other reasons are to share information or to undertake joint projects.

5.2 How are networks developed?

Network development is dynamic and principally guided by the choices of members and their network management capabilities which means it is often beyond the direct influence of policy intervention (Pittaway et al, 2004). In the early stages of development, lead members or organisations often play key roles, forming and shaping the network. The literature indicates a range of contextual, organisational and operational factors affect network development and sustainability (Table 3).

Table 3: Factors affecting network development and sustainability

(adapted from Ahuja, cited in Pittaway et al, 2004; Butterfoss et al, 1993; Pittaway et al, 2004; Williams & Bailey, 2002)

Factors

Contextual

- Failure of existing efforts to address the problem
- Legislative or extra-organisational mandates
- Previous history of collaboration or competition between coalition members
- Compatibility among organisations

Organisational

- Each member of the network directing efforts to a common purpose
- Positive attitudes and commitment towards coordination, including developing and improving collaboration
- Adequacy of resources for networking related activities

Operational

- Articulation of a clear mission or guiding purpose
- Developing and maintaining trust
- Capacity to maintain linkages
- An effective, motivated catalyst organisation
- Recognition of a mutual need or purpose
- Reduction of opportunism

5.2.1 'Life cycles' in networks

Networks evolve through different stages of a life cycle, from initiation to mature stage of operations. Creech and Ramji (2004) identify four stages in knowledge network life cycles which could be relevant to other forms of networks: start-up; growth; decline, leading to closure or renewal; and long term sustainability, (Table 4).

Throughout their life cycle, networks develop according to positive and negative factors, internally and externally, resulting in expansion or contraction in each stage of operation. Provan and Milward (2001) state that even newly evolving networks may be effective if members provide essential services. The mix of services should gradually expand to include more peripheral services, as the network evolves and matures.

The concept of the Divisions Network is much more recent than the concept of the Divisions program. Divisions of General Practice have been referred to as a network only since 2002, when the review of the role of the Divisions was undertaken aimed at 'strengthening

Table 4: Life cycle of knowledge networks

(adapted from Creech and Ramji, 2004)

Life cycle period	Interactions and work activities
Formative (approx 1-3 years)	Members get to know each other, work independently with little collaboration; members productive if not interactive. Investment at this stage in setting up coordination systems and procedures to support collaboration may result in work of individual members being aggregated into 'network' successes.
Status quo and growth (approx 4-6 years)	Benefits of investment apparent; should be possible to assess effectiveness of network in knowledge contributions, communications and relationships with those it seeks to influence. Members are productive, but begin to question the value of working within network, recognising they may be limiting their effectiveness by not adding value to each other's work. Signs of non-performance begin if stagnation is not responded to. Productivity is either quite high or dramatically falling off by year 5 and 6. A core group may emerge with desire to keep network going in future.
Decline and renewal (approx 7-10 years)	Further stagnation and outright failure Or significant reduction of activities to simple information sharing Or real collaboration among core group if not all members.
Sustainability (10 years plus)	Long term relationships built, interaction sustained among members including joint work, peer review, communications and real recognition and influence beyond the network.

“Network development is dynamic and principally guided by the choices of members and their network management capabilities.”

and building on the work of the Divisions network’ (Commonwealth of Australia, 2003). Prior to that, documents such as the General Practice Strategy Review in 1998 and General Practice in Australia 2000 referred only to ‘the Divisions of General Practice Program’. However, the GP Strategy Review used the term ‘networking’ in relation to the role of state based organisations, identifying that one of the core functions of SBOs should be “to promote and strengthen collaboration between and give support to Divisions by providing networking opportunities such as special-interest groups, telecommunication based links and professional development forums” among other activities. Until 2002 Divisions were considered independent organisations within a single national Program. They came together annually in national Forums once ADGP was established in 1998, and interacted more frequently at state level through activities coordinated by state based organisations from 1998.

In terms of network life cycle depicted in Table 4, the Divisions network is approaching the end of the three-year start up phase or the advent of the growth phase. The fact that 35% of Divisions reported having formal reciprocal arrangements with other Divisions in 2003-2004 (Kalucy et al, 2005) suggests that some Divisions have started to question whether they may be limiting their effectiveness by not working with others in the network, and have taken steps to consolidate their relationships. The extent to which Divisions of General Practice perceive they are part of, or wish to be part of, a national Divisions network is not yet known.

5.3 The size of networks

The ideal size of a network varies with the form and function of that network. For example, in a ‘flat’ or enclave network, social network theory suggests that as the group gets bigger, the density (the proportion of all ties that could logically be present within a network) will fall, and separate and partitioned groups are more likely to emerge. If information sharing by electronic means is the main function, it is not a problem for a network to have large numbers of members — many of whom may receive but not send information. The evaluation of the UK based Contact, Help, Advice and Information Network (CHAIN) identified that the ‘lurkers’ (those watching but not actively engaging with network activities) also benefited in terms of increased knowledge and confidence, even though they did not contribute substantially to the network (Russell et al, 2004). However, primary care research networks providing intensive research mentoring must consider the size of network carefully, in terms of balancing demand against availability of resources. Size is also important in a knowledge network designed to create high quality research. The feasibility of supporting larger number of members will depend on the extent of the human and financial resources available, and the opportunities to be gained from the network that could not be achieved independently.

5.4 Sustaining networks

Once the appropriate form and function for a network has been determined, achieving its purposes, and maintaining and sustaining the network, relies on having cohesive interconnected partners (Ahuja, cited in Pittaway et al, 2004). Butterfoss et al (1993) identified that positive expectations are key to networks achieving their purposes. They also identified the following factors which influence

network maintenance:

- formalised rules, roles and procedures
- leadership characteristics
- member characteristics
- benefits and costs of participation
- membership satisfaction and commitment
- member skills and training
- relations between members
- patterns of communications
- decision-making, problem solving and conflict resolution processes
- the nature of relationships with external bodies
- working backwards from collective long term goals rather than immediate member needs
- having short term quick wins that are consistent with and not a distraction from longer term goals.

The social and political environment in which a network exists can help determine whether it survives. The three conditions for network sustainability are compatibility, resources and socio-political environment (Ring and Perry (1985) in Mandell, 2001). The group must function cohesively and be compatible to achieve network goals as well as their own individual goals. A network must be able to provide its members with the resources they need or they will not need to continue with the network (for example, the ability to seek joint funds, creative ideas, expertise, contacts, access to information).

Network infrastructures can have an impact on network configurations and can encourage or hinder the development of certain forms of network relationships. If a network is to remain viable, it requires resources to be committed in the form of some network infrastructure organisation (Provan and Milward, 2001). Without this, members need a higher commitment to network goals and inter-organisational cooperation that is difficult to sustain (Provan and Milward, 2001). Lack of resources to facilitate engagement in linking activities (e.g. conferences, meetings) can inhibit members' capacity to interact with networking activities, particularly those who are geographically isolated.

Infrastructure requirements for successful practice based research networks (PBRNs) in the US include a director, coordinator, regular new-sharing function, a means of regular two-way communication among member practices, a membership roster, a provision for meetings and an organised means of ensuring human subjects protection (Green et al, 2005). The Agency for Healthcare Research and Quality specifies these requirements in order for a PBRN to qualify for grant funding. Size is also specified, the minimum being 15 ambulatory practices and/or 15 clinicians devoted to primary care of patients (Green et al, 2005). Recognising

the evidence about the importance of adequate infrastructure, ARC Research Networks fund both a Network Convenor responsible for operation and performance of the Network and a Network Administrator to administer finances, human resources, workshop and visitor programs, freeing researchers to pursue research-related activities (ARC, 2003).

As an example of the level of infrastructure required for a research network, a large English university (Manchester) set up a network of local health providers and researchers interested in health science. Employing a communication officer and an administrator, the network has been successful in bringing together interdisciplinary teams which have won consultancies and research grants (Libby Kalucy personal communication Bonnie Sibbald, 5/2005). More information about this network (The Institute of Health Sciences) can be found at <<http://www.ihs.man.ac.uk>>

Reflections on network development

The Divisions of General Practice Network

Staff members from remote Divisions of General Practice incur considerable costs in terms of travel and time to attend Division Network events in capital cities. City event organisers are not always aware of the cost and time as disincentives to interaction.

PHCRED funded RCBI research networks

In the area of primary health care research some PHCRED funded RCBI programs developed research networks as a key strategy in developing research capacity (e.g. SARNet and PHReNet). The RCBI staff members administering these networks played key roles in determining the initial function and form of these networks, which were based on local needs, available skill base and the overall national goals of the PHC RED Strategy.

6 Network management

6.1 The importance of management

Goodwin et al (2004) argues that it is better to think of network management and governance in terms of 'crafting' with its connotations of motivating people and shaping preferences, than of 'designing' according to defined procedures and fixed templates. Goodwin et al (2004) distinguishes between managing 'within' and 'of' a network.

- Management within the network means undertaking tasks such as decision-making,

“Research stresses the importance of boundary-spanning individuals in leadership and management for network effectiveness.”

resource acquisition and allocation, coordination, planning and strategy development within member organisations, in relation to other organisations in the network.

- Management of a network is the inter-organisational work of a salient network member to influence the pattern of relations found across the whole network. The key challenge is to balance autonomy and dependency, from a central position. Those engaged in management or governance must be able to achieve a position from which to exercise power to shape, or manage, networks. This requires that power be legitimated, which involves some kind of consent to its exercise by the prevailing members that define the network (Goodwin et al, 2004).

6.2 Management tasks in networks

The primary task of network management is to support strong cohesive ties between members. Management tasks are therefore associated with three areas:

Influencing members to participate, through champions and sponsors activating the skills knowledge and resources needed to sustain the network, and by influencing rules, procedures, values and norms.

Securing commitment from members to take joint action, and develop cooperation and collaboration among a diverse group through achieving a set of common objectives for the network.

Creating a favourable environment for productive interaction by arrangements which minimise the cost to participants, usually through a network administrative organisation or person (Mandell 2003 quoted in Williams and Bailey, 2002).

Goodwin et al (2004) approaches this issue by proposing that instruments of power can be summarised into four types, each of which is associated with a basic network form.

- Control by exerting direct authority, steering and regulating applies to hierarchical networks
- Inducement by negotiating, brokering, contracting, providing incentives, and granting money applies to individualistic networks
- **Suasion** by informing, persuading, legitimating applies to enclave networks (see glossary)
- Coping by securing survival applies to isolate networks.

6.3 Leadership and networks

Leadership is as important in networks as in other organisational forms, but the style of leadership needs to be compatible with the form of network. For example, Goodwin argues that inclusive, facilitative and consensus-building approaches suit enclave-type networks, while less inclusive, more partisan, advocacy styles are more likely to work in individualistic or hierarchical networks. In any network, authority comes from the basic forces that hold the network together. In hierarchical networks it comes from status and the ability to rule and hold network members to account. In enclave networks, such as those among health professionals, shared commitment and egalitarianism allow no place for central authority, though charismatic leadership is often provided and needed in

relationships external to the network. In individualist networks, leadership is intrinsically entrepreneurial, and authority comes from the ability to take control, access and distribute resources (Goodwin et al, 2004).

6.4 The importance of boundary spanning to network management

Research also stresses the importance of boundary-spanning individuals in leadership and management for network effectiveness. Boundary spanners are individuals who participate in inter-organisational networks through which they can keep up to date in a given field, and work the 'middle ground' between different agencies with an authorised role in managing inter-organisational relations (Tushman & Scanlan, cited in Swan et al, 1999, Goodwin et al, 2004). Boundary spanners can also play an important role in linking networks to other networks (Goodwin et al, 2004).

To be effective, boundary spanners need to be skilled in forming and sustaining ties through inter-personal relationships, working contacts to gain information, understand values and undertaking negotiation.

Reflections on leadership and management

The Divisions of General Practice Network

It is a challenge to achieve a position from which to exercise power at different levels within the Divisions network. With little or no ability for Divisions to hold autonomous GP members to account, or SBOs or ADGP to hold autonomous Divisions to account, consensus building approaches within the network are necessary and charismatic leadership is valuable in relating to state and national bodies. Division leaders at Division, State/Territory and national level have an important boundary spanning role at appropriate levels.

PHCRED funded RCBI research networks

Staff changes in the leadership of research networks affect management and boundary spanning, as new leaders develop relationships with other networks. Leadership within research networks tends to be inclusive, facilitative and consensus building, as these networks are closest to the non-hierarchical enclave form.

7 - Evaluating networks

7.1 Determining effectiveness: principles, outcomes, objectives and indicators

Evaluation is an important aspect in network life-cycles, as without self-knowledge a network cannot be self-regulating. Evaluation also provides necessary information about the network's impact and processes to relevant external bodies, such as funding bodies (Hill, 2002). Demonstrating network effectiveness is important and challenging, as it is for other complex organisations.

A network's effectiveness should be assessed within that network's own terms of reference and local context. The evaluation should consider multiple domains of activity, including the function of the network, the level of maturity of the network, the complexity of the organisation, baseline research experience and skills of members, the extent to which membership is open, levels of funding, and geographical differences. Like all evaluations, an evaluation should also attempt to capture unintended consequences, good and bad (Clement, Pickering and Rowlands, 2000; Hill, 2002, Griffiths, 2000).

Creech and Ramji (2004) identify five principles of investigation that all network assessments should cover (Table 5). Creech and Ramji's work is based on knowledge networks but the principles could apply to research networks and the Divisions network, both of which engage to different degrees in collaborative

Table 5: Principles of knowledge network assessment

(Creech and Ramji, 2004)

Principle	Assessment criteria
Effectiveness	Are networks goals and objectives clear and are they being achieved? Is the network fully realising the advantages of working together? Is the knowledge being produced relevant to the needs of decision-makers?
Structure and governance	How is the network organised and how is it taking decisions on its work? Are structural and governance issues impeding its work?
Efficiency	Are the transactional costs of collaboration a significant barrier to success? Is capacity being built across the network to strengthen members ability to collaborate on research and communications?
Resources and sustainability	Does the network have the required resources to operate?
Life-cycle	How is the network performing in comparison to other networks at similar stages in development? What is the continuum of growth of the network?

“Demonstrating network effectiveness is important and challenging, as it is for other complex organisations.”

research and information exchange, and engage with stakeholders to move research into policy and action. (A formal knowledge network is a group of expert institutions working together on a common concern, to strengthen each other’s research and communications capacity, to share knowledge bases and develop solutions that meet the needs of target decision-makers at the national and international level.)

It has been proposed that health service delivery networks can be evaluated at four levels: community, network, organisation and individual, each of which has its own set of effectiveness criteria (Provan and Milward, 2001; Hill, 2002). Table 6 outlines potential outcomes at each of these levels for service delivery networks. The relevance of this evaluation framework needs to be tested for networks with other functions.

Table 6: Potential outcomes for service delivery networks

(adapted from Hill, 2002)

Education level	Outcomes
Community	Behavioural change, policy, program development, exposure/penetration, social capital, problem solution, population level outcomes.
Network	Importance of network in its environment, nature of problems addressed, content and context of network’s work, network structure, integration, network effectiveness, deliberation. Agenda-setting/power, achieving shared norms, accountability, alignment, interdependence, collaborative attitudes, collaboration, communication quality, network growth, network development, financial responsibility.
Individual organisation	Agency survival, enhanced legitimacy, resource acquisition, service costs, client satisfaction, referrals, collaborative attitudes.
Individual	Service access, client outcomes, staff outcomes.

Outcomes at each of these levels have a direct effect on outcomes at another level. Network effectiveness at one level does not ensure effectiveness at the other levels. Provan and Milward, (2001) identify cases where network success and overall outcomes for the community can be best achieved through actions that run counter to the goals of organization level stakeholders.

The United Kingdom primary care research networks (PCRNs) emerged independently from 1991. Many started without specific measurable objectives, uniform reporting structures or concurrent evaluation (Gunn, 2002). Today there are 40 members of the UK Federation of Primary Care Research Organisations with formal links to an academic department (<http://www.ukf-pcro.org/>). They have brought together health care professionals interested in primary care research and have assisted them to gain training and undertake research. Formal evaluation is needed to assess how much PCRNs have contributed to increasing the quality, quantity and usefulness of primary care research, which was the reason for their inception (Gunn, 2002). Clement et al (2000) propose the following specific objectives and indicators as a conceptual framework for evaluating primary care research networks (Table 7). Table 7 illustrates the objectives and some selected process and outcome indicators.

Table 7: Proposed objectives and indicators for primary care research networks*(adapted from Clement et al, 2000)*

Objective	Process indicator	Outcome indicator
To develop a network infrastructure	Existence of communication channels	Extent of use of communication channels
To develop the research capacity of primary care professionals (PCP)	Number/quality of training sessions offered	Extent of PCP's research skills
To increase the number/quality of research projects led by PCPs	Number of PCP-led projects undertaken	Number of PCP-led projects published/presented
To increase the use of research findings by PCPs	Use of Evidence-based (EB) resources	Implementation of EB guidelines
To increase the number/quality of research projects in which PCPs collaborate	Number of research projects in which PCPs are collaborative	Proportion of network projects that are multi-centre
To increase the number/quality of research projects in which PCPs participate	Number of research projects in which PCPs are participants	Rates of practice/PCP recruitment to studies
To provide a network that PCPs find acceptable	Number of network members/turnover	PCPs satisfaction with network

Griffiths et al (2000) suggest that such measures of process and outcome may best suit hierarchical networks, where communication within the network is channelled through the centre and there is little contact

Reflections on evaluating networks

The Divisions of General Practice Network

The first step in applying these evaluation principles to the Division network would be to determine the extent to which individuals at different levels of the Divisions Network (GP members, Division management and board members, SBOs, ADGP) perceive themselves as belonging to a network, what this network consists of, and what value the network has for them.

PHCRED funded RCBI research networks

The review of the PHC RED Strategy has indicated that the research networks have added considerable value to PHC research and have flourished to a greater extent than anticipated. (Oceania Consulting 2005). Without duplicating evaluative work already taking place in the sector the assessment principles and objectives could be useful to examine these research networks as part of strategic planning for the extension of the PHC RED strategy which was announced in July 2005.

between satellite units. In 'flatter' networks with informal relationships based on trust and cooperation, the quality of interactions is essential for the success of the network and it is more difficult to describe and measure the interactions of individual units and therefore of the network. This has important implications for evaluating the flat enclave research networks associated with PHCRED funded RCBIs.

Glossary

Density

The proportion of all ties that could logically be present within a network. As the group gets bigger, the density will fall, and the more likely it is that differentiated and partitioned groups will emerge.

Diversity

Diversity refers to the dissimilarity between the organisations in a network. The degree of rivalry generally declines with increasing diversity of partners.

Durability

The extent of persistence over time with broadly similar participants allowing the development of dense ties, supporting creation of trust and generative learning.

Interdependence

The extent that network members utilise each others' outputs (raw materials) and resources (market related information) in their own activities.

Knowledge network

A formal knowledge network is a group of expert institutions working together on a common concern, to strengthen each other's research and communications capacity, to share knowledge bases and develop solutions that meet the needs of target decision-makers at the national and international level.

Multiplexity

The number of overlapping ties between network members: a measure of network density, strength and durability.

Network

Any moderately stable pattern of ties or links between organisations or between organisations and individuals, where those ties represent some form of recognisable accountability (however weak and however often overridden) whether formal or informal in character, whether weak or strong, loose or tight, bounded or unbounded. (Goodwin et al, 2004)

'Suasion'

Smoothing, being even handed.

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"A network's effectiveness should be assessed within that network's own terms of reference and local context."

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Attachment - Network typologies or models

Model 1. Strength of links between members – Mandell and Steelman (2003)

This typology, based on the relative strength of links between members, conceptualises network function and organisational arrangements as sitting along a continuum consisting of five different kinds of arrangements (Table A-1).

Table A1: Different kinds of inter-organisational arrangements associated with different forms of networks

(adapted from Mandell & Steelman, 2003)

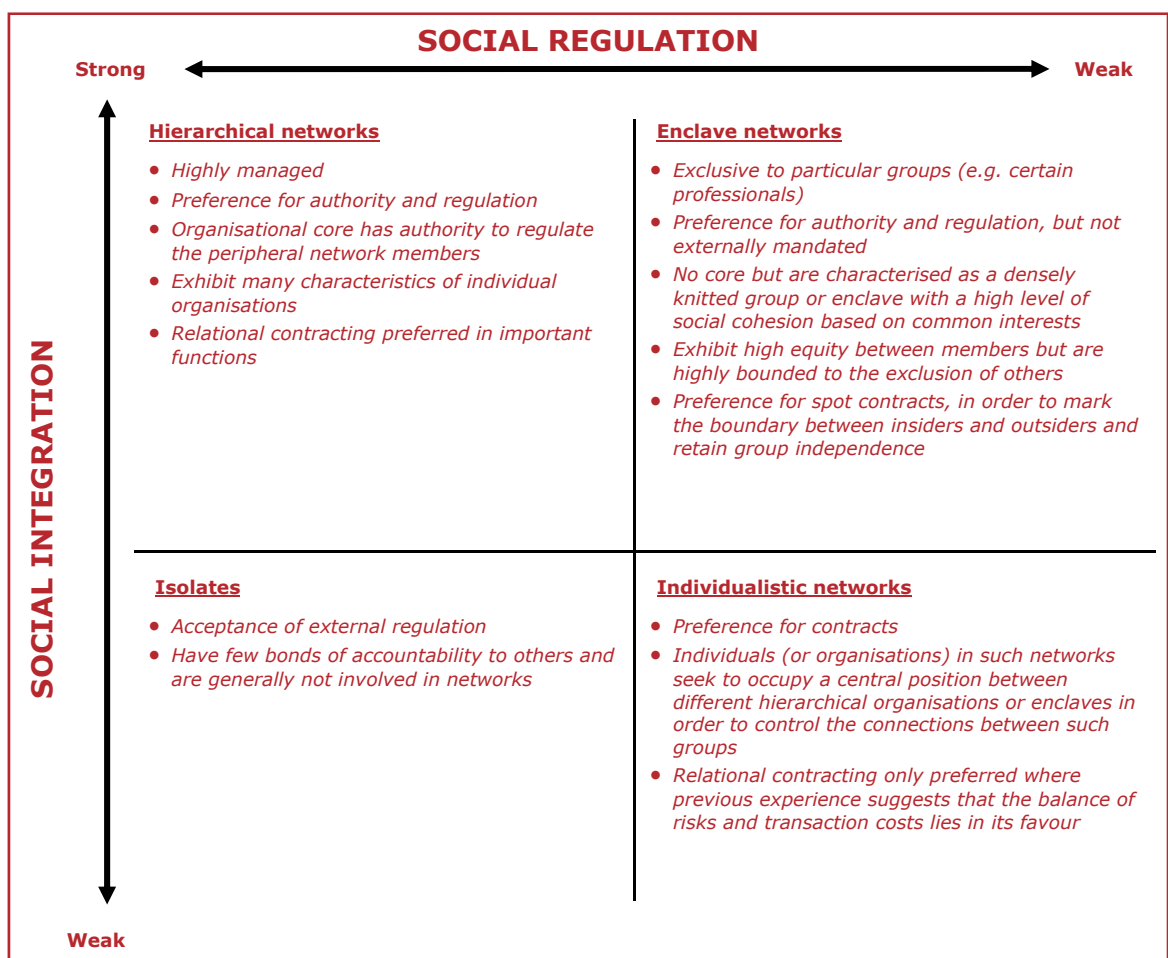
Strength links	Type of inter-organisational arrangement	Key characteristics	Examples
Weak [Independent]	<i>Intermittent coordination</i>	<ul style="list-style-type: none"> Low levels of interaction Members may cooperate on a number of different activities Commitment to each other is at arm's length Resource sharing is relatively small and low risk, often around information sharing 	Coordinating the activities of various agencies dealing with disasters - fires or earthquakes. Multidisciplinary teams to manage a patient's chronic illness
	<i>Temporary task force or ad hoc activity</i>	<ul style="list-style-type: none"> Low levels of interaction Ad hoc in nature Set up to work on specific and limited purpose and will disband when that purpose is accomplished Resource sharing is limited Commitment is to a limited goal or set of goals only 	Groups set up to discuss problems and potential solutions for very specific issues, e.g. the Divisions' network Review Implementation Committee.
	<i>Permanent and/or regular coordination</i>	<ul style="list-style-type: none"> Formalised agreement to engage in limited activity Commitment of resources beyond information sharing There are common goals Membership is delineated strictly and restricted so that there is stable coordination Formal requirements apply on activities and relationships Resource sharing requires commitment by the members in terms of time, staff, facilities etc Risk is kept to a minimum 	
	<i>A coalition</i>	<ul style="list-style-type: none"> Interactions are collaborative Interdependent and strategic action(s) are taken Purposes are narrow in scope All actions involve the sequential or simultaneous activity of the participant organisations Purpose is specific and involves a long-term commitment Membership is relatively stable Formal agreements usually dominate the relationships Members commit significant resources 	Public-private partnerships Memorandum of understanding between agencies and/or other entities to achieve specific longer term goals
	<i>A network structure</i>	<ul style="list-style-type: none"> A broad mission Action is joint and strategically interdependent, and may include, but reaches beyond coordination, task force or coalitional activity Strong commitment to goals Members agree to commit significant resources over a long period of time A high degree of risk is involved 	Community building efforts Economic development programs
Intense [mutually interdependent]			

Model 2. Type of social organisation - Goodwin et al (2004)

This typology, based on the degree of social regulation and integration of an organisation, conceptualises network function and organisational arrangements according to four structural 'types' or forms of network (Figure A-1).

Figure A-1: Different kinds of generic structural 'types' of networks

(adapted from Goodwin et al, 2004)



Model 3. Organisational interdependence and network durability - Heracleous & Murray (2001)

This typology, based on aspects of organisational interdependence and network durability, characterises network organisation and structure in terms of five different forms (Table A-2 & Figure A-2).

The philosophy behind this typology is that a culture of networking has associated challenges of understanding more about the origins, evolution and management of relationships. In this typology, Heracleous & Murray (2001) conceptualise interdependence as the extent that network members utilise each others' outputs (raw materials) and resources (market related information) in their own activities. Network durability is conceptualised as the extent of persistence over time with broadly similar participants allowing the development of dense ties, supporting creation of trust and generative learning (Heracleous & Murray, 2001).

Figure A-2: Network typology based on organisational interdependence and network durability

(adapted from Heracleous & Murray, 2001)

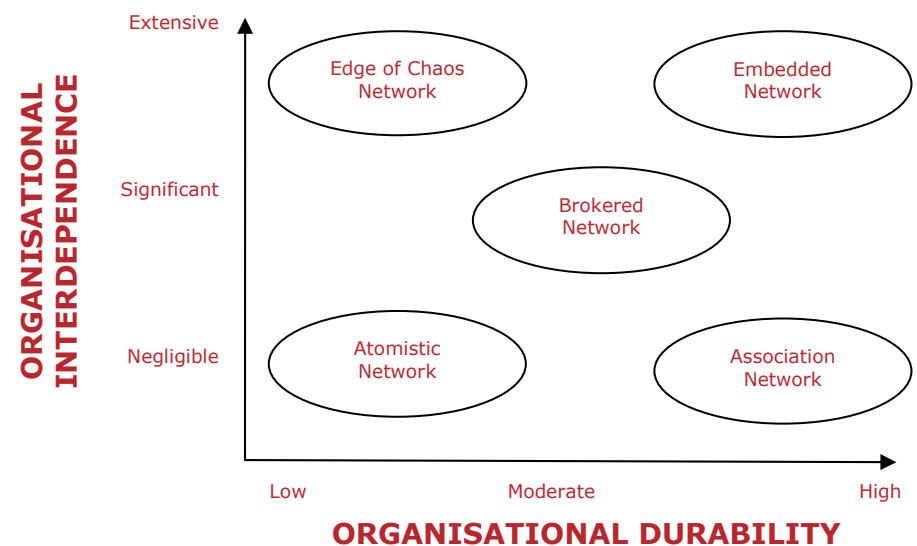


Table A-2: Types or forms of network structures associated with organisational interdependence and durability

(Adapted from Heracleous & Murray, 2001)

Form of network arrangement		Key characteristics
Edge of chaos	Extensive operational and strategic interdependence/ low (no) durability over time	Based on industry life cycle literature and complexity theory. Reflects the conditions usually found in embryonic industries, in industries experiencing the shock of technological revolution or invasion, or in industries coping with de-regulation. Characterised by intense but short term interdependencies as organisations experiment, search for and purchase options on the future and join or leave technical and market based alliances.
Embedded	High degree of durability/ extensive level of inter-organisational dependence	Can involve such mechanisms as interlocking Boards or directorates, cross-shareholdings, personal exchanges, information exchange and significant inter-trading and interaction. Members act intentionally to nurture and sustain the social capital that leads to high levels of durability (Heracleous & Murray, 2001).
Brokered	Intermediate interdependence/ moderate durability	Include hub-and-spoke network structures, often involving a strategic centre which acts as a leader and coordinator of the network. The nurturing of social capital and trust are limited features of this type of network as they rely on governance mechanisms to maintain membership and on the self interest of members to uphold compliance. Typically exist with quite sparse and often bilateral relational ties.
Atomistic	Negligible interdependence/ no (low) durability or relationships beyond individual transactions	Can be characterised as a market where individuals behave individualistically.
Association	High degree of organisational durability/ negligible interdependence	Usually 'one dimensional' networks within which members combine to appropriate certain resources to the whole industry or association.

FOCUS on... PHC RIS

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