LEARNING ACROSS BOUNDARIES AND CHANGE OVER TIME: THE VALUE OF THE NOTION OF NETWORK LEARNING.

Theme: Learning Across Boundaries

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Abstract

This paper presents the concept of network learning, and relates this to change and change management. Network learning is defined as learning by a group of organizations as a group (Knight, 2002; Knight & Pye, 2002). Derived initially from a review of literature on organizational learning and interorganizational networks, and secondary cases of network learning, the concept was evaluated and developed through empirical investigation of five network learning episodes in the group of organizations that comprise the English prosthetics service. From this, we argue that the notion of network learning enables a richer understanding of developments in networks over extended periods of time than can be afforded through more established concepts of change and change management..

Introduction

In business and public management, interorganizational networks and a network perspective are now recognised as fundamentally important. Groups of organizations work in partnership to deliver public services (e.g. Kickert et al., 1997; Huxham & Macdonald, 1992) and commercial organizations establish alliances to exploit business opportunities (e.g. Kanter, 1994; Stuart & McCutcheon, 1995; Levinson & Asahi, 1995); efforts to resolve problems and improve performance often require an integrative view across organizational boundaries and at local and collective levels of analysis (e.g. Macbeth & Ferguson, 1994; Harland, 1996a; Harland, 1996b; Nielsen, 2000). Increasingly practitioners, regulators and legislators recognise the network effects of 'local' decisions, and network forms of organizing are advocated (Nohria, 1992; Crozier, 1993; Fukuyama, 1999). Reflecting this, academics interested in organizational learning have in recent years turned their attention to learning in interorganizational settings (e.g. Crossan & Inkpen, 1995; Levinson & Asahi, 1995; Larsson et al., 1998; Dyer & Nobeoka, 2000; Lane, 2001) using various terms for the subject of their research endeavours, most often 'interorganizational learning'.

Review of works on interorganizational learning reveals however that the term is used to refer variously to learning by individuals, groups, organizations, and strategic networks (Knight, 2002: 439). These authors share a common interest in terms of the interorganizational context for learning, but the entity that is 'doing' the learning differs. The term 'interorganizational learning' has been used to describe learning *by* a group of organizations (i.e. an interorganizational network) but, more often, it refers to learning by network members *within* an interorganizational setting. This inconsistent, and potentially confusing, use of terms led us to research the notion of 'network learning' – learning by groups of organizations *as a group* (Knight, 2002; Knight & Pye, 2002) – in a study designed to explore whether and how the notion of organizational learning might be translated to the level of interorganizational networks.

Drawing on empirical evidence from this study, this paper addresses two particular boundaries to learning: that of organizations and of time. Based on a literature review, we first present the notion of network learning and differentiate it from the related concepts of interorganizational learning and learning networks. We then go on to illustrate the value of this concept for appreciating change over time, using data on change and learning in an interorganizational network, which were structured and analysed using Pettigrew's (1985a; 1985b; 1987; 1990) context-content-process (CCP) model of strategic change in organizations.

An important and recurrent tension through this study was the relationship between learning and change. While we had begun with an interest in learning, we were aware that what we were researching might often be described more simply as change, so perhaps it would be better to account for what was happening in such situations through the lens and long established literature of organizational change? Although the CCP model provided us with a motif, it still did not address the substantive issue of how one might know and evaluate change, given that all else in the meantime has also changed. In the discussion section, we draw on our empirical evidence to present an analysis of the relationships between learning and change/changing in interorganizational networks, in general terms and specifically in relation to strategic change. In so doing, we seek to develop links between themes from

OLK4 (learning and change) and OLK5 (learning across boundaries). We conclude that the concept of network learning has greater resonance and relevance for describing and explaining 'progress', 'developments' or 'change' over time in interorganizational settings both to academics and to practitioners, rather than more directorial or stewarding notions of change and change management.

The Concept of Network Learning

In their review of organizational learning research, Crossan et al (1995) identified three perspectives on organizational learning (OL). Some authors regard the agents of OL as individuals or groups *within* organizations (e.g. Simon, 1991; Daft & Weick, 1984), whilst others take an 'organization-centred' view of OL in which the organization is seen as the learning entity. Crossan et al (1995) also identified a fourth, more recent 'level' in research on 'interorganizational learning', stating that strategy "theorists can depict learning that occurs between organizations as predominantly individual, group or organizational" (p.346).

If we accept Crossan et al's proposition that those taking an individual or group-centred view of OL are in fact concerned with learning *within* organizations, rather than learning *by* organizations, then logically the fourth level of learning is more appropriately seen as learning by *groups* of organizations – termed here (interorganizational) networks. Much of the body of work identified by Crossan et al as being about interorganizational learning addresses learning within networks, in contrast to learning by networks which can be termed 'network learning' (Knight, 2002).

Adopting, for the present discussion, the view that organizational learning outcomes are constituted by changes to organizational cognitive structures or behaviours, or both (Crossan et al., 1995; Dodgson, 1993), then evidence of changes to shared cognitive structures (e.g. norms, shared interpretations) and collective or co-ordinated practices across a network would support a network-centred view of network learning. With this in mind, we searched empirical literature for descriptions of change in networks that might be interpreted as network learning, whether or not it was described as such by the authors.

Spender's (1989) comparative study of three sectors revealed 'industry recipes' – general prescriptions about how to manage firms within an industrial sector. Similarly, studies of 'population-level learning' (e.g. Anderson, 1999) describe how concepts and beliefs shared at the network level shape, and are shaped by, organizational-level practices, structures and performance outcomes. These recipes are however not necessarily related to better performance; for example, situations in which companies adopt practices which are not supported by evidence of improved performance are described. In these studies, the 'network' is taken to be a commercial sector in a nation, and at the level of the network learning is an emergent rather than planned process.

A set of papers on learning in emergency service networks (Paton et al., 1998; McHugh, 1995; Kouzmin et al., 1995) describe how network learning and organizational learning occurs in groups of organizations. Often prompted by the findings of an inquiry, new practices and structures based on altered understandings of what is needed for effective performance are implemented within and between relevant organizations. In a similar vein, Nathan and Mitroff (1991) described efforts to establish a set of routines to be instigated in

the event of a product tampering crisis, in a network of US food product suppliers and other interested authorities, such as federal agencies. These examples relate to very different types of networks, in terms of the numbers of actors, their geographical proximity and their familiarity with other actors in the network, but both refer to behavioural and cognitive, planned network-level learning outcomes.

Dyer and Nobeoka (2000) provide a description of Toyota's efforts to develop a learning community to improve production techniques among its network of key suppliers in Japan, and then to import this approach to its US supply base. Compared to some of the other examples, this network has relatively few members, and it is clearly bounded. Whilst the specific content of learning varies over time, this case also relates to planned learning. However, the learning outcomes from participation in this 'learning network' (Ruggie, 2001) relate primarily to changes to production techniques within firms, and are thus organization-level outcomes of interorganizational learning. In our view, this ongoing sharing of production knowledge characterises *'being'* a learning network whereas our data lead us to propose that instead, network learning occurs as the network learns to manage knowledge jointly, emphasising *'becoming'* a learning network.

These examples provide evidence from prior research to support the concept of network learning as learning by a group of organizations as a group. They indicate that network learning and organizational learning are mutually shaping, and that network learning may be purposive or emergent, and may lead to improved performance, but also may not do so. In each study, researchers had to bracket and punctuate (Weick, 1995: 35) network experience to create temporal and structural boundaries for their empirical case, which can be seen as an 'episode' of network learning. This notion of learning episode was employed to analyse data relating to the network of organizations which provides the prosthetics service in England, and on which our empirical investigation of network learning was centred. The next section is focused on empirical aspects of the study, presenting methods, the network and five network learning episodes, and the resulting model of network learning, to provide the context for then discussing change and learning.

Empirical Evidence of Network Learning

Methods

The study is based on data from three English health service supply networks (Harland, 1996b), relating to pressure area care equipment, electronic assistive technology and prosthetics. Limited data from the first two inform much more extensive work in the prosthetics service. Data were gathered through participation and observation, from 1997 to date, from 34 formal interviews between November 1999 and May 2001, and from documentary sources. Using NVivo software to support data handling, five network learning episodes were identified and described using Pettigrew's framework of the context, content and process of strategic change (1985a; 1985b; 1987; 1990). Treating each episode as a discrete analytic case, an iterative, comparative case analysis was undertaken, leading to the development of a model of network learning based on conceptual themes that were critical in each episode, and common and consistent between episodes. Finally, in May 2002, twelve members of the prosthetics network provided feedback on the draft findings.

Network Context

Organizations in the prosthetics network are involved in the delivery of the prosthetics service in England, through 34 National Health Service (NHS) Disablement Service Centres (DSC). The prosthetics service was originally established to meet the needs of limbless ex-servicemen, and the biggest patient grouping is elderly, lower limb amputees. The service is now often regarded more broadly, to include the care of limbless people who do not use a prosthesis and the provision of a more holistic care, in particular including counselling services.

The National Health Service is discrete from, but accountable to, Ministers in HM Government's Department of Health. Rehabilitation services, of which prosthetics is a part, was often called a 'Cinderella service' within the NHS. In recent years, however, with increasing patient expectations, an ageing population and efforts to reduce waiting lists, their profile within healthcare has been rising. An important feature of government's policies on the NHS has been to improve the role, status and contribution of nursing and the 'allied health professions' (AHPs), such as physiotherapists. A number of Members of the House of Lords take an active interest in the prosthetics service, the best known of whom are Lord McColl, a surgeon who led a major review of the service commissioned by the Government in the mid-1980s, and Lord (Marmaduke) Hussey, an amputee who was formerly Chairman of the BBC. Users of rehabilitation services, and prosthetics in particular, have long established patient associations, which have close links with Parliamentarians.

Each DSC is based on hospital premises and, since the early 1990s, is accountable to the host hospital Trust's management board. Prior to then, the service was centrally managed, having originated as a specialist service for amputees from the First and Second World Wars. Disablement Service Centres are run by managers, some of whom have a clinical background. The status of the managers within hospital Trusts varies widely. In some cases, managers are viewed as administrators. At the other extreme, some managers are responsible for a range of services within Trusts and control large budgets.

Prior to NHS restructuring in April 2002, local Health Authorities commissioned most services from local hospital Trusts. Since prosthetics is a specialist service, each DSC serves a much wider catchment area than is typical for a hospital Trust. Some DSCs served as many as eight Health Authorities and, since 2002, the commissioning of prosthetics service is the responsibility of regional Strategic Health Authorities. Some Centre Managers liaise directly with commissioners, rather than through Trust senior managements, and run the centre with relative autonomy.

Usually, doctors lead the provision of care but some consultants are primarily concerned with other forms of rehabilitation, such as care for stroke patients, and provide only a limited input to prosthetics. Practice varies between centres but, in general, doctors, prosthetists and other professionals determine a target for mobility with a patient, and then doctors or prosthetists, or both, select the appropriate hardware for achieving this. The prosthetist takes a plaster mould of the patient's residual limb, or measures it using CADCAM (computer aided design/computer aided manufacture) facilities, if these have been installed at the Centre, from which to form a socket. Limb hardware is ordered by prosthetists against the framework agreement organized by the NHS Purchasing and Supply Agency. Prosthetists fit limbs, most

of which are manufactured from modular componentry at the DSCs by technicians. A very few patients now use 'conventional' limbs, which are crafted in off-site workshops. With additional input from physiotherapists and occupational therapists, patients are assisted in developing their mobility.

Prosthetists are educated on degree courses at the University of Strathclyde or the University of Salford. They are represented by the British Association of Prosthetists and Orthotists (BAPO). Other clinical personnel and DSC Managers also have active professional associations and groups which meet regularly.

In all but two English Centres, prosthetists and technicians are employees of commercial firms which have contracts with Centres. This is a highly unusual situation since, despite past and current Government efforts to engage the commercial sector, clinical personnel in NHS hospitals are still almost universally NHS employees (taking agency and locum clinical personnel as NHS employees. Orthotists are another exception). The NHS Purchasing and Supply Agency advises Centre Managers on contracting for prosthetist and technician (P&T) services. Four firms provide prosthetist and technician (P&T) services to the NHS. They also provide prosthetics services to private patients and, through separate operating divisions, they manufacture and distribute limb components. A small number of other firms manufacture componentry and provide services to private patients. The Medical Devices Agency (MDA) plays a regulatory role in the prosthetics network, overseeing the safety of componentry.

In 1997/8, the NHS Supplies Authority – the NHS Purchasing and Supply Agency's predecessor organization – facilitated the establishment of the 'Prosthetic Strategic Supply Group' (PSSG), with representatives from all types of organizations within the network, to address collectively cross-network issues.

The key actors and relations between them are illustrated in Figure 1.

Five Network Learning Episodes

Since the time of the McColl report (1986) there has been a great deal of change in the prosthetics network. Five episodes of current network learning were identified. Two relate to the introduction and implementation of new technologies; two more to governance arrangements; one to the status and role of a key professional group.

The first episode is about CADCAM systems, and the implications their introduction has for the organization of limb production and fitting. The second episode is about the impact of the introduction of high-definition SILICONE COSMESIS to England (Knight & Pye, 2002). There has been much debate and controversy about whether the NHS should fund high-cost, high definition cosmeses and, if so, about prescription criteria, given that demand is expected to exceed what can be afforded.

The third episode is about CONTRACTING between the private and public sectors (Knight et al., 2002). Two highly critical reports in the mid and late 1980s led to substantial changes to the structure of the supply market. One major firm ceased trading in prosthetics and several new service providers were established. Throughout the 1990s there were considerable changes to the methods and outcomes (in terms of supply market structure) of contracting.
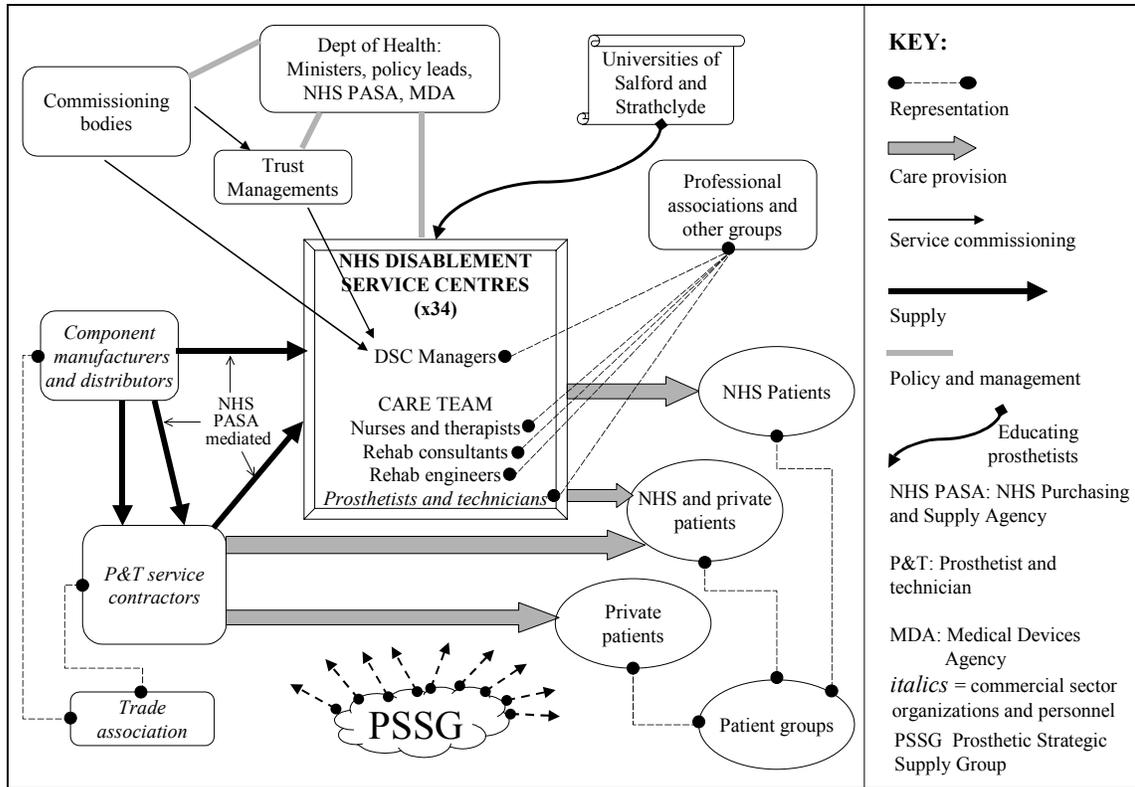
Figure 1 Illustration of the prosthetics supply network in England

Late in 1997 the new Labour Government published a White Paper with proposals for reforming the National Health Service including reorganizing the commissioning of health services. There was widespread concern that this would fragment the prosthetics service and lead to loss of service quality. Actions and reactions since then to influence and improve the situation relate to the fourth episode, on COMMISSIONING.

Government policy has also been an important factor influencing the fifth episode, the progressive 'PROFESSIONALISATION' of the prosthetics profession, from being more technical and craft oriented to being a formally recognised 'allied health profession'. An integral part of this development has been the profession's relations with service contractors, the prosthetists' employers, and with other professions, notably doctors and rehabilitation engineers. Next, we present this last case in more detail, demonstrating the rich and complex character of a network learning episode, and to indicate the scale, scope and timing of changes relating to professionalisation, and the ways in which such changes come about.

The PROFESSIONALISATION *network learning episode*

This network learning episode is about the increasing professional status of prosthetists and the development of their role and profile within the clinical team. The changes and change processes that constitute the episode were shaped by factors internal to the network, such as the recommendations of the McColl report (1986), and reflect broader changes within the health service for groups of health workers now collectively called the 'allied health professions'.

In the 1980s, the role of prosthetist was technical and craft-oriented. (Male) technicians were employed in workshops manufacturing conventional limbs. The best of the experienced technicians were selected and sponsored to qualify as prosthetists, and then appointed to a prosthetist vacancy in one of the employer's centres.

"They were technicians – 'if you're really good you can get to do this really great job and you'll have people you can call them your patients… Your social standing will go up …' – It took them a long time to get there. There were guys coming in for training at 40 and they got there., They made it and they were happy." (former prosthetist)

The prosthetics service in the 1980s was characterised by poor service levels and poor relations between the public sector and companies, which led to two major reviews, the first chaired by McColl, and the second undertaken by the Monopolies and Mergers Commission (1989). Contributors to the McColl report observed that training was 'trade-oriented' (1986: 20-21), and pointed out that members representing commercial interests outnumbered all others on the Board of Governors and the Management Committee of the London School of Prosthetics, which was established during the McColl investigation. Suppliers had significant influence over the course, as well as over the students.

The McColl Report (1986: 5, 22) argued that the professional status and training of prosthetists should be upgraded. Specifically, it recommended:
"In order to upgrade the present low status and inadequate training of prosthetists a new professional organisation should be created which will set recognised educational standards comparable to those of Strathclyde University. The education should be provided by independent bodies whilst the Orthotic and Prosthetic Training and Education Council can properly continue to oversee industrial training for craftsmen and technicians."

McColl's objective was achieved in 1992, when Salford University established a degree course for prosthetics and orthotics. Nowadays, the Salford and Strathclyde courses compete with subjects such as physiotherapy to attract post-school applicants, though the entrance requirements are much lower than for physiotherapy, and some network actors consider applicants to be less than committed to their profession:
"I often wonder whether people that are going into prosthetics and orthotics, are actually going to take up prosthetics and orthotics at the end of it and not just going in for a degree."

In Scotland, previous reforms had led to prosthetists being employed by the health service, and technicians remaining with companies (McColl, 1986: 32). Scottish prosthetists, disaffected with the British Institute of Surgical Technologists (BIST), founded the Association of Prosthetists and Orthotists (APO) in 1986:
"There was a group of prosthetists… that had decided that they were not very happy with BIST because … they felt it was too close to … trade and they wanted a more professional organisation more focused on the profession and not the trade side of things." (prosthetist)

Gradually, the membership grew till:
"we had something like about 500 members in APO as opposed to the couple of hundred in BIST." (prosthetist)
and the two organizations merged because:
"APO had approached the Privy Council with a view to becoming state registered with CPSM (the Council for Professions Supplementary to Medicine) … They came to the view that there were effectively two

professional bodies representing the professions. Basically, they came back and said 'Look, we want to deal with one body. We're not interested in dealing with APO on one hand and BIST on the other hand. It makes sense to us to have to deal with one professional body. Can you not go away and sort yourselves out?' And, really, that was the reason for the amalgamation."

Subsequently, the British Association of Prosthetists and Orthotists (BAPO) was formed. It is now the sole body representing these professions, and has become an active participant in the network, contributing to the development of policy and guidance.

The changes described above are primarily internally driven. More recently, there have also been significant pressures for change related to government policy and clinical practice. As allied health professionals, prosthetists are now regulated by the Health Professions Council, established in April 2002. Further changes to governance and regulation are planned. The implications for individual prosthetists are that they are now state registered, expected to contribute to clinical governance arrangements and to take part in continuing professional development (CPD). In due course, a new career structure will be implemented. This is currently being developed by a sub-group of the PSSG, chaired by a supplier Chief Executive and including the Executive Officer from BAPO. The proposed structure follows the approach being developed in other professions with a hierarchy of grades, from newly qualified to consultant-level prosthetist. Below, various aspects of these changes are described.

In the UK, there is a general move in clinical practice towards multi-disciplinary teams providing more integrated care less dominated by doctors. An indicator of the extent to which this has been achieved is the pattern of prescribing. Prescribing is rarely left entirely to prosthetists. In one favoured scenario, a doctor states the patient's needs in terms of clinical outcomes (mobility targets, etc.), and the prosthetist prescribes componentry and fits the limb to achieve these. Thus, the prosthetist is the expert on hardware. In other cases, doctors still retain control over the prescription in full. As part of their broader contribution to the clinical team, prosthetists engage in service developments, for example product evaluations and improving pre-amputation consultations. Despite considerable pressures for changes to practice, progress is limited by reluctance to change on the part of some individuals and by constraints embedded in practices, structures and culture. One doctor explained:
"It's very long process. There is a lot of fear, going back to the long tradition of doing what the doctor ordered." *LAK: I wonder whether that is true of many professions, or whether there is something different about prosthetics?* "I think it is true about prosthetics, because that is a contracted service, whereas if you look at all the other players in the rehab team… they are all NHS… In (named Centre)…, some (prosthetists) are very much what I would call NHS team players. There are others who find it very difficult to get into the team ethos, if you like. I don't know whether it is just because they are long in the tooth, and just comfortable with the way things used to be."

Pressure to adopt new approaches to professional development arises both from developments in the NHS, and because service suppliers are gradually implementing new human resource management practices. For some prosthetists, CPD has been challenging:
"For the prosthetists and orthotists, because they're a new profession, it seems difficult for them to come to terms with (CPD) because they've all worked in isolation. They're not used to reflecting on their own practices. That's a sweeping generalisation; some of them are very good at it but, as a group of professionals as a whole, it's not something that's been encouraged and it's actually quite threatening for them." (Centre Manager)

The complexity of the debate about the role of 'non-doctors' in prescribing is greater in prosthetics since the professionals concerned are private sector employees and there is still widespread concern that their prescribing practice might favour their employing organization. In the past, there has been suspicion and mistrust between suppliers and centres, especially rehabilitation engineers, around three inter-related issues – cross-subsidy; over-prescribing; preferential prescribing – which have been sites of political struggles.

At a corporate level, there was evidence that, under the pressure to reduce service costs, suppliers were marginally, or under, costing service contracts in order to win them, and then recouping funds through componentry sales, or other service contracts. The over-prescribing issue concerned prosthetists who, it is believed by some, would incur excessive costs for patient treatment by selecting more expensive products than necessary, though some contend this is a problem relating to doctors:

"it's actually (about) asserting control over the doctors. It's not the prosthetists; it's the doctors. It's the doctors that... you know someone says 'I want to be a springy jumpy athlete' and he sits there looking at this dear old 90 year old who's really sweet and says 'Yes, of course you do' and he writes 'Flexfoot'!" (Centre Manager) (Flexfoot is a relatively expensive product suited to a high-activity user)

Linked to over-subscribing, preferential prescribing refers to the suspicion that prosthetists may prescribe componentry supplied by their employer in lieu of a cheaper or more suitable product from a competitor. This, though, is disputed:

"I am told - and I've never seen it - that there was an audit done and when they looked at individual Centres round the country from the different manufacturers, they actually found that the Centres - say a Company 1 Centre - was proportionately prescribing less Company 1 components than the Company 4 Centre and a Company 2 Centre was prescribing less Company 2 (products) than a Company 3 Centre." (prosthetist)

And yet, in an interview that was not recorded, when questioned about claims that prosthetists do not prescribe their own companies' products by preference, a rehabilitation engineer asserted that there is clear evidence to the contrary, from comparing figures on componentry purchases before and after a new contract has been let for services.

Cross-subsidy, over-prescribing and preferential prescribing are not unique to the prosthetics service. For example, how clinicians decide which products to use has long been of interest to auditors and purchasing professionals (e.g. Audit Commission, 1996: 10-19). In the last ten years within the prosthetics service, various measures have been taken to address these issues, such as establishing distinct operating divisions in the firms that provide both componentry and services. Developments such as the profession's increasing independence from employers, employers' education and training arrangements, and better management information on componentry usage in some Centres can also have a positive impact. Overall, there is conflicting evidence about whether nowadays there really is an issue to address. It is clear, however, that many believed there once was, and some say there still is, a significant problem, which continues to be a source of conflict, suspicion and mistrust within some Centres, and between some professional groups.

In summary, since the mid-1980s, there has been a significant improvement in the professional status of prosthetists, though progress has been slow, and practices vary greatly between Centres and between individual doctors and prosthetists. At the level of the network, data that could tell us whether these changes have led to performance improvements are not available. Even at the level of individual Centres, companies or prosthetists, tracking changes in performance would be problematic, since all are inter-linked. Undoubtedly,

however, there have been major changes at individual and organizational levels, which cumulatively and over time, have led to changes that are discernable at the network level. By tracing these changes collectively and relating them to 'professionalisation', we identified and described a case (episode) of network learning.

Our Conceptual Model of Network Learning

Whilst each episode had a common context, the temporal boundaries and learning outcomes/content and processes differed across them. Treating each of the episodes as a case, a comparative analysis of network learning was undertaken. To analyse network learning outcomes, realised and prospective network-level changes relevant to the episode were identified. Cross-case comparison enabled us to identify patterns across outcomes/contents as changes to **network structures**, **network practices** and **network interpretations**.

However, the analysis of learning process is recognised to be more problematic (Easterby-Smith & Araujo, 1999). Each episode unfolds through a complex web of actions and interactions between actors, and groups of actors, in the network, influenced by contextual and content factors. These actions and interactions are not evenly distributed in time or among actors, but can be seen as coalescing into a number of sub-plots that are critical components of the episode storyline. Cross-case comparison enabled us to identify patterns across these sub-plots or learning processes as being relevant to **developing meaning, developing commitment or developing method**. Across the five episodes, 42 network learning outcomes and 46 episode sub-plots were distinguished. The network learning outcomes and sub-plots for the PROFESSIONALISATION episode are shown in Table 1.

There are two parts to the model of network learning. First, the network learning episodes have been described in three linked, narrative elements – context, content (episode focal topic and learning outcomes, i.e. network-level changes) and process. The content and process narrative elements for the PROFESSIONALISATION episode are summarised in Table 1 (see inner columns). Second, each narrative element is then complemented by a conceptual element; the conceptual themes for content and process are shown in the outer columns of Table 1, below. A critical feature of this model is the recursive relationships between aspects of learning context, content and process. As stated in the introduction, this paper seeks to address two particular boundaries in the study of learning: organizational boundaries and time. Our focus here is not on a detailed presentation of the conceptual framework itself (for which, see Knight & Pye, forthcoming), but on understanding the relationships between change and learning over time and in the context of networks, and explaining our case for speaking of network learning, which we address next.

Discussion

Within management and organization studies, there is a vast body of work on strategic change in organizations. Pettigrew (1985a: 438) defines 'strategic' as "just a description of magnitude of change in, for example, structure and organizational culture, recognising the second-order effects, or multiple consequences of any such changes". Academics are concerned to understand how, why and when strategic change occurs, and does not occur, in organizations (Pettigrew et al., 1992: 267; Van de Ven & Poole, 1995: 510). From a

management perspective, the purpose of such studies can be summarised as being about either, or both, of:

- change capability – developing organizational capability in determining appropriate change objectives and implementing change plans
- the relationship between change and performance – improving organizational performance through strategic change within organizations

There have been various attempts to map out the many different perspectives, assumptions, theoretical groundings and objectives that provide the enormous diversity in this field (see, for example: Van de Ven & Poole, 1995; Rajagopalan & Spreitzer, 1996; Weick & Quinn, 1999). Looking across these, we can more readily differentiate our conceptualisation of network learning from some aspects of strategic change management literature and concepts than others.

Outcomes ↓	PROFESSIONALISATION		Processes ↓
	Realised and prospective network-level changes	Sub-plots	
Changes to **network practices**	• delivery of training and education for prosthetists • role of prosthetist in prescribing • role of prosthetist in clinical governance (CPD, clinical audit, etc) • integration in to multi-disciplinary clinical team	• developing BAPO's 'place at the table' and others learning to accommodate it • suppliers implementing new HR systems • developing training and education • clinicians and Centre Managers adapting contracts, local clinical governance arrangements etc to reflect changes and fostering new working practices	**developing method**
Changes to **network structures**	• BIST disbanded; establishment of BAPO; other parties' relations with BAPO • University of Salford, and relations between education providers and other network members • reduction in formal authority of suppliers over prosthetists' professional association and education	• designating prosthetics a Profession Allied to Medicine (PAM) • establishing BAPO • making prosthetists' training and education independent of suppliers • setting up the PSSG sub-group on prosthetist career structure	**developing commitment**
Changes to **network interpretation**s	• prosthetics as a profession of similar standing to physiotherapists • reduced mistrust of prosthetists	• developing view of prosthetist as core member of clinical team (clinicians vs. craftsmen) • developing views about allied health professions • reconciling the above developments with traditional suspicion of preferential prescribing by prosthetists	**developing meaning**

Table 1: Network learning outcomes and sub-plots for the PROFESSIONALISATION episode.

Where change management relates to discrete issues in predictable situations with a limited number of actors over a relatively limited time period, there may be scope for a 'rational' approach (Rajagopalan & Spreitzer, 1996) to change management. We question the extent to which this is relevant to 'strategic change' in complex organizations, and this change scenario is far removed from that sketched out above. In the prosthetics network, the various changes are not discrete. For example, the status of prosthetists is influenced both by contextual changes (government policy on AHPs) and the contractual relationships between professionals, commercial firms and the NHS. There are so many factors and actors interacting over such long timescales that complexity and uncertainty are high.

Relative to other networks in the English health service, the prosthetics network is a 'small', simple network, comprising a few, densely-connected actors. And yet, the description above shows that it is nevertheless a complex political and social landscape. Within the network, there are some formalised, hierarchical relations, for example between the Department of Health and NHS institutions, between DSCs and the companies contracted to provide prosthetics goods and services and between companies and their prosthetist employees. There are also many other forms of governance, relating for example to clinical professions, and many informal, social relations between individuals. Organizations and individuals that make up the network have highly divergent needs and expectations of other network actors. So the final and perhaps most significant argument against applying a rational perspective of strategic change to this network is that there is no clearly defined agenda for change and no unitary authority with a mandate to plan and control the network.

There are however other views on, and studies of, strategic change that are more relevant to the network and learning episode described above. Weick and Quinn (1999: 366) and Rajagopalan and Spreitzer (1996) associate learning with particular views of change, which emphasise change as continuous and more emergent, rather than radical and planned/rational. Among European academics, this perspective is found in the work researchers at the Centre for Corporate Strategy and Change at the University of Warwick (e.g. Pettigrew & Whipp, 1991; Pettigrew et al., 1992) and Stacey (1995) who mention learning in their writings on change. In this view, change and continuity are relevant, and the relationships between the context, motives, processes and outcomes of change are complex and recursive. Links between cause and effect break down, and social and political relations and processes are emphasised. The role of change agent is not to 'manage' change, in the sense of 'plan and control', but to facilitate it (Stacey, 1995: 492). Indeed, Schein (1996: 46) proposes that 'planned change' is better conceptualised as 'managed learning'.

These views are consonant with our understanding of organizational and network learning outcomes and processes, but there are also important differences. In this latter view of change management (which Rajagopalan and Spreitzer (1996) refer to as the 'learning perspective'), though strategy may not be realised, there is a sense of intent, or direction, in the case of strategic change: usually a problem to be addressed, an opportunity to be exploited or a policy to be implemented, in which one or more groups or individuals within the organization formulate some (more or less) explicit objectives for doing so. In such cases, the assumption is that change can be at least shaped or led, if not managed, with a focus typically, but not exclusively, on the role of the executive: "The critical leadership tasks in managing change were more fragmentary and incremental than the popular images of 'business heroism' allow, and could involve action by people at every level in the business." (Pettigrew et al (1992: 20) summarising findings in Pettigrew et al (1991)).

However, there is no clear locus for change or learning leadership in an extensive network and many different interests and objectives shape the evolution of an episode. In the episodes studied in prosthetics, changes may be regarded as strategic in so far as they are high profile, important and have 'deep'/2nd order effects although they are not strategic in the sense of being intentionally radical or transformative; that is, they are not change programmes as typically conceived of being led and implemented in an organization setting. For many learning outcomes and sub-plots in our networks, it is possible to identify actors who have, in some way, 'led' change, but at a cumulative level, over time and across the network, the

development of the episode cannot be said to have been led. To summarise, whilst our view of network learning as social and political process is highly consonant with some authors' views of strategic change outcomes and processes, we find that, at the level of network, the notion of 'managing' strategic change breaks down.

The principal indicator of effective strategic change management is improved performance. Measuring and evaluating performance in organizations is problematic, but it is even more so in networks (see, for example, Doyle, 1994; Boland & Fowler, 2000; Kickert et al., 1997; Sydow & Windeler, 1998; Provan & Milward, 1995). Since there are no network-wide measures of performance, we might focus on performance with respect to the 'end user' (Harland, 1996b). The Audit Commission (2000) found that the number of prosthesis users who expressed dissatisfaction with the comfort of their limb in a patient survey was c.30% - a figure that is reportedly much the same as survey results done 10 years previously. So, it might be argued, on this measure at least, that the performance of the network had not improved. In other respects though, interviewees and other sources suggested that much had changed, often the better. For instance, new products, some of which were available through the NHS, provided much higher functionality, allowing greater mobility and participation in sports, and better organization of clinical teams enabled better quality, more integrated care.

Related to the CONTRACTING episode, the Audit Commission (2000: 34) also noted that "McColl found there was an unhealthy lack of competition in the prosthetics market, and recommended that it should be opened up to new entrants. However, few new suppliers have entered the market in the intervening years". It is correct that there were no more suppliers in the market in 2000 than there had been in the mid-80s, but it is not correct to deduce that there had been no change. Of the four service companies of the 80s, only one is still supplying the NHS. Post-McColl, many prosthetists set up as 'independents'. Gradually these small companies went out of business or merged. Two of today's companies were formed through this process. The fourth company currently supplying services to the NHS is German-owned; it began providing componentry into the UK market post-McColl and subsequently diversified into service provision. This example, and the one in the previous paragraph, demonstrate to us the limitations of evaluating change by comparing the situation in the network at two points in time. Not only do such snapshots provide a static view that does not reflect the richness and complexity of the case, but also they may lead to erroneous conclusions. Rather than just focus on changes between 'time^0' and 'time^1' (i.e. the temporal boundaries of an episode), our analysis of learning has also examined changes within episodes, and their recursive influences on other changes, and learning process and context.

The complexity of the network and the episodes suggests that, at best, we might infer some associations between 'inputs', learning processes, learning outcomes and performance. We can call the actions of organizations and individuals 'intentional' and 'purposive', but the cumulative effects of these actions are not predictable (Stacey, 1995: 490). Rather than focus on performance, we have found it more useful to consider the impact of network learning in terms of progress and capability. If structures and practices reflect and are reflected in the values, identity and goals of the service, there will be a shared sense that progress has been made, that the network has in some way moved forward. In each of the episodes, problems were not 'solved' *per se*, and there were no collective, pre-determined change objectives to achieve. There was however a sense that there were improvements in collective capability, through developments in the profession, contracting and commissioning, silicone cosmeses and use of CADCAM.

The aim of this study was to improve network-level understanding of how network actors, their actions and interactions shape and are shaped by issues, events, actors, etc. that comprise network change over time. Early analysis indicated that developments in the network could be themed into the five episodes described above. Analysis of the episodes themselves (e.g. examining process), however, proved much more problematic, until we began to describe and interpret the outcomes and processes of developments within a structure provided by Pettigrew's (1987) CCP framework.

Use of the notion of 'episodes' and the CCP model provided a number of valuable benefits. First, we were able to contend effectively with the inevitably partial and fragmented nature of network data. Second, the analysis recognised embeddedness (Dacin et al., 1999), emphasised the contextual, historical and processual (Pettigrew, 1987) characteristics of learning, and highlighted the recursive relations between context, content and process. Third, it enabled us to bracket and punctuate (Weick, 1995: 35) the stream of network 'experience' in a way that is meaningful to network participants. Fourth, by analysing learning process in terms of how network level changes come about during an episode, we identified episode sub-plots. These elucidate the agency of individuals and organizations within *aspects* of an episode, whilst acknowledging the absence of hierarchy and 'leadership' at the level of the episode as a whole. Network actors are neither merely adapting to changing exogenous factors, nor managing change.

For us, the concept of network learning described here enables an integrative, multi-level understanding of network developments that acknowledges the importance of social and political processes, and actors' roles in shaping, but lack of control over, network context and developments. We find the notion of learning more useful than 'change', as the latter seems to undervalue the meaning, relevance and integrated nature of developments or changes, and more useful than 'change management', which seems illogical and misleading in the complex, diverse setting of interorganizational networks. This argument, of course, is conditional on certain assumptions that underpin our conception of learning. Like Cook and Yanow (1993) on organizational learning, the model of network learning is not based on a cognitive perspective of individual learning. Instead we offer a different conception of learning, focusing on its social, political, situated and practice-based character (Gherardi, 2000; Araujo, 1998; Coopey, 1995; Coopey & Burgoyne, 2000). Whilst we do not assume a relation between learning and improved performance, we recognise that in identifying learning episodes, researchers and practitioners are likely to bracket aspects of network life that relate to perceived past progress and/or the need for future progress. It is important to remember that learning does not always have solely positive connotations; the process may involve conflict, abuse of power, mistrust, etc, and the outcomes may be loss of capability, or detrimental in some other way (Miner & Mezias, 1996; Crossan et al., 1995).

Conclusions

In investigating *learning*, instead of change or change management, we have found we were able to 'see' different processes, and develop a more valuable understanding of networks and how they evolve, whilst (1) using terminology that we know to be relevant to practitioners; and (2) bracketing and punctuating (Weick, 1995: 35) developments in networks in a way which was meaningful to network actors. The model of network learning derived from the

empirical phase is consonant, but not isomorphic (Rousseau & House, 1994: 19), with certain conceptions of organizational learning, which emphasise its cultural, social, political and practice-oriented characteristics.

Weick (1991: 122) criticised "previous efforts to grasp the phenomenon of organizational learning (that) have mixed together change, learning, and adaptation, with only casual attention to levels of analysis and to referents for the activity itself." Especially given that we (a) define learning outcomes as changes to network-level properties, and learning process as the processes by which they come about, and (b) relied on Pettigrew's CCP model of strategic change management in organizations, it seems important to seek to explain why we choose to speak of 'network learning', rather than 'network change' or 'network change management'. This has been a primary objective of this paper.

Our analysis led us to conclude that learning outcomes are not the net change in terms of performance – the primary indicator of planned strategic change – between the beginning and end of an episode. Rather, they reflect changes in practices, structures and interpretations in the network, which evolve during the course of an episode. Thus, learning outcomes recursively influence learning context, learning process and other learning content/outcomes within an episode. Compared to a change perspective, a learning perspective helps us to understand developments and processes by which they come about in a more holistic way that captures their emergent, social and political qualities and recognises their complex, changing context.

Though the empirical settings are very different, we agree with Antonacopoulou (2001: 11) that "learning from changing is not the same as changing from learning nor do learning and changing necessarily take place simultaneously". So we argue that our complex setting (i.e. network) with no overarching formal hierarchy and its enormous diversity highlights the emergent and uncertain aspects of learning (i.e. both process and outcome developments over time) rather than the concept of change which inevitably implies a distinction between $time^{0}$/ $time^{1}$ and evokes *management* (of change). For us, notions of planned change and change management do not translate to the complex, dynamic, uncertain and diverse contexts of interorganizational networks, but the notion of learning and, specifically, network learning has significant descriptive and explanatory power to help us better understand how interorganizational networks come together, develop and sometimes break down. This understanding can, in turn, contribute to practice by informing the work of those individuals and organizations with responsibilities for facilitating network development.

Further research could be undertaken to assess whether the notion of network learning, and more specifically the model of network learning presented above, could be used to analyse and then influence network change and change processes. This might be focused on specific issues – improving network learning to achieve particular collective goals – or to more generally improve the learning capability of the network and its members – engender a 'learning network'. The notion of facilitating network learning, as opposed to managing network change, translates Schein's (1996) and Stacey's (1995) arguments to the network level.

From the way that practitioners have adopted and worked with the concepts of organizational learning and the learning organization, we might assume that network learning and learning networks hold similar promise. We recognise however that caution is needed. The image of

OL/LO as consensual and conflict-free is increasingly challenged (Easterby-Smith et al., 2000; Coopey, 1995; Coopey & Burgoyne, 2000; Vince, 2001), but there is plenty of scope for narrow assumptions about learning leading us quickly back to notions of planned, rational change. Our conception of network learning emphasises clearly a much bigger canvas on which to develop this image and, while challenging assumptions of managed change, we believe it offers a valuable means by which to appreciate learning across organization boundaries and changes in a network over time.

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