CONFERENCE THEME: TRANSFORMATION OF INDUSTRIES & THEIR ARCHITECTURES

BUILDING ORGANISATIONAL CAPABILITIES THROUGH RECONCEPTUALISING AND REDEFINING THE KNOWLEDGE BOUDARIES OF THE FIRM[1]

ABSTRACT

What an organisation does versus what it out-sources to the market is a classic boundaries of the firm question that has previously been dominated by efficiency arguments. However, a knowledge-based view suggests these boundaries are integral to the ability of a firm to deploy existing knowledge stocks efficiently, as well as develop new knowledge through learning that will drive future competitiveness. Furthermore, the nature of these boundaries, in respect of their permeability is critical in understanding the likelihood of knowledge flowing into and out of the organisation. Using these concepts, we present a case study of Main Roads Western Australia to illustrate how these principles have allowed it to start rebuilding its internal capabilities through repositioning its operational boundaries and via ensuring their boundaries are highly porous as they move more major projects into alliance contracts.

Keywords: *Knowledge transfer, firm boundaries, learning, capabilities, knowledge-based view*

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1.0 INTRODUCTION

Organisational structure is synonymous with a firm's knowledge – both today and in respect of a firm's future knowledge stocks. For some, this may seem obvious, yet for most scholars (and practitioners) this is not the case, as structure – particularly where the boundaries of the firm lie and what they look like – rarely makes it into any knowledge management discussion. Yet what a firm does today, be it broad in its activities or highly focussed to the point of being a virtual organisation, is both a reflection of its existing capabilities as well as determining its likely learning and transformational opportunities into the future. In addition, the permeability of any organisational boundary and the existence of any mechanism to maximise the inflows of new knowledge are fundamental to developing new or reconfiguring existing capabilities. This paper therefore addresses how knowledge and structure are inextricably linked and through the use of a case study illustrates how a public sector organisation has significantly rebuilt its capabilities by rethinking its organisational boundaries, both in terms of location and their basic characteristics.

The determination of organisational boundaries is a classic theme with theories being developed on the basis of tasks and activities (Katz & Kahn 1966; Lawrence & Lorsch 1967; Thompson 1967), to theories of economic organisation focused on property rights and transaction costs (Alchian & Demsetz 1972; Grossman & Hart 1986; Jensen & Meckling 1976; Williamson 1975), and strategic theories of resources, capabilities and knowledge (Barney 1995; Foss 2002; McGee 2003; Teece, Pisano & Shuen 1997). While these different theories each provide a different lens with which to understand how organisations structure themselves to create their boundaries, these theories tend to be weak in linking organisational boundaries to value creation (or competitive advantage). Furthermore, these theories say little about the nature of organisational boundaries beyond their basic location. To counter

this perceived weakness, we draw primarily upon the knowledge based view of the firm which proffers an alternative explanation regarding organisational boundaries and the need for organisational alliances. The knowledge literature simultaneously provides an opportunity to investigate the nature of organisational boundaries in the context of alliances and knowledge transfer.

Positing that organisational structure in terms of firm boundaries (location and permeability) fundamentally drive an organisation's ability to engage in learning and knowledge transfer, we use a case study of Main Roads Western Australia (WA) to illustrate how rethinking their structural boundaries and the nature of these boundaries allowed for a rebuilding of key organisational capabilities.

2.0 TRADITIONAL THEORIES OF ORGANISATIONAL BOUNDARIES

Early theories of organisations (March 2007) conceived organisations as semi-open systems in interaction with their environments (Katz & Kahn 1966) where organisational design is contingent on environmental conditions (Lawrence & Lorsch 1967). These theories provided two broad sets of principles for drawing the boundaries between organisations and environments. The first principle concerns the size of the organisation: the existence of unused managerial services (Penrose 1959) stimulates organisational growth and enables economies of scale and scope (Chandler 1962). However, organisational growth itself also generates bureaucratic costs of administration and control (Pugh et al. 1968), leading to diseconomies of complexity. The balancing effects of economies of scale and scope and diseconomies of complexity generate a self-regulating mechanism which automatically determines an optimal organisational size (Blau & Schoenherr 1971). This maximum size of

the organisation thus determines how many activities and departments can be located within the boundaries of the organisation.

The second principle is based on the nature of the technology of the firm (Woodward 1965) and the type of task interdependency that exists (Thompson 1967). Thompson (1967) recommends that activities should be grouped together based on their degree of interdependency: pooled, sequential, reciprocal (in order of increasing intensity). Activities that are reciprocally interdependent should be located within the same organisational sub-unit, sequentially interdependent activities should be located next to one another, whilst activities that are merely part of the same organisational pool – say, payroll and R&D – can be quite distant from one another. This perspective leads to thinking about organisations as 'loosely-coupled systems' (Orton & Weick 1990). This contingent approach to organisational design based on the nature of interdependencies was primarily based on studies of manufacturing organisations, and predicated on facilitating a smooth flow of the manufacturing process. The perspective of semi-open systems indicates that the organisation exchanges inputs and outputs with its environment, through some well-specified interfaces. But outside of these 'gates' the boundaries of the organisation are not permeable. Therefore, such an approach does have its limitations: for example, it would not be capable of accounting for the externalisation of activities that are tightly coupled, as in the Toyota Production System (Womack, Jones & Roos 1990).

Theories of economic organisation acknowledge the importance of operational interdependencies and their impact on system efficiency, but argue that these are superseded by considerations of 'first-order economising' (Williamson 1991a) which involves the governance of asset residual rights, incentive structures, and transaction costs. According to

Coase (1937) the boundaries of the firm are not determined by considerations of process interdependencies and production system efficiency, but by the relative costs of market transactions relative to entrepreneurial coordination within the organisation. Williamson (1975; 1991a) develops this line of theorisation by proposing that economic governance covers more than the market/firm (hierarchy) dichotomy to encompass hybrid forms, depending on the degree of asset specificity, the risk of opportunistic behaviour between contractants, and the frequency of transactions. Thus organisational boundaries depend on the ability of managers to draw up contracts covering the contingencies of their transactions: high asset specificity and high exposure to opportunistic behaviour lead to the internalisation of the activity within the boundaries of the firm.

Agency theory (Jensen & Meckling 1976) takes Coase's arguments in a slightly different direction. Instead of opposing managerial 'fiat' (Williamson 1975) and market contracting, agency theory conceives of the firm as a nexus of contracts, within and beyond its boundaries. In this perspective, organisational boundaries are not drawn based on the costs of transacting, but according to the costs of monitoring the execution of contracts. Market-based transactions are based on relatively easily defined terms (price, quantity, specification, delivery date, and so on), whilst internalised transactions involve ill-defined terms (such as levels of service), require the monitoring of behaviour and require the institution of incentive structures to align the interests of agents (managers and employees) with those of principals (shareholders). Thus, in the perspective of agency theory, the boundaries of the firm are determined by agency costs and the ability of principals to monitor the behaviour of their agents.

Grossman & Hart (1986) develop a theory of property rights which goes some way towards providing a synthesis between transaction costs and agency costs. They suggest that the scope of the firm is determined by residual rights, or those rights over assets that cannot be easily specified *ex-ante*. The theory of residual rights thus explains vertical (dis–) integration in terms of the differential incentive structures afforded by market transactions versus managerial authority.

The limitations of these theories of economic organisations have been widely noted: they assume quasi-substantive rationality on the part of principals and agents (Tsang 2006), they are predicated upon situations of market equilibrium and thus are ill-equipped to account for the evolution of structures over time (Rumelt et al. 1994), they embody assumptions about human behaviour that are extreme and not borne by empirical evidence (Bromiley 2005; Tsang 2006) and it is argued that they to lead to self-fulfilling prophecies (Ghoshal & Moran 1996).

Perhaps most significantly, the boundaries of a firm in terms of what is completed internally versus what is undertaken via market-based contracts tends to treat boundaries as absolute. That is, either an activity is undertaken internally or externally and that by considering all of the activities completed by a firm, it is possible to draw some activity boundaries around a firm. The problem, as Harrigan (1985) notes, is that firms may both make and buy a particular input. For example, a firm may 'buy' recruiting services for some of its positions and it may 'make' the same activities for other positions. Bradach and Eccles (1989) suggest that it therefore necessary to consider the whole organisational structure rather than just individual transactions one at a time. In this respect, the knowledge-based perspective with

its ability to easily account for alliances and its focus on the knowledge underpinning routines central to an organisation's operations provides a useful approach for furthering this field.

2.1 KNOWLEDGE BASED VIEW OF THE FIRM

Firms are far more than transactional vehicles: they provide the basis for generating, sharing and applying knowledge (Kogut and Zander 1996) – something that is not well accounted for within the economic theories concerning organisational boundaries. In this sense, knowledge and resource driven theories of the firm provide not only an alternative perspective for understanding firm boundaries, but they do not divorce the boundaries of the firm question from the value creation question (whereas transaction cost economics and agency theory are best utilised at the corporate strategy rather than the business strategy level).

The knowledge-based view or theory of the firm (KBV) has emerged from the resource-based view of the firm and views competitive advantage as a function of effective acquisition and utilisation of knowledge (Grant 1996; Spender 1996). Inherent within KBV is the need to take a dynamic perspective with respect of knowledge and thus the continual acquisition and deployment of knowledge through mechanisms such as learning become a central feature of research in this area. KBV also specifically develops a rationale for the existence of strategic alliances as there is never a perfect congruence between the activity boundaries of the firm and the knowledge boundaries of the firm. Given the failure of these boundaries to align, opportunities exist for alliances or other forms of intermediate or hybrid organisational structures. These organisational arrangements are not only important in terms of understanding the structural boundaries of organisations, but the alliances can themselves be a central part of the learning process which underpins much of the thinking by KBV scholars.

In these alliances (or hybrid forms), firms have pulled back their corporate boundaries through outsourcing and divestment of core activities. As a result, they have increasingly cooperated with other organisations to engage in activities and access resources, including knowledge, outside their own boundaries (Grant & Baden-Fuller 2004). Essentially such firms are using contractual structures, especially strategic alliances, to replicate the vertical integration which previously existed internally (Williamson 1991b). KBV, however, does not address how the knowledge actually flows between organisations and instead implicitly treats knowledge like other tradeable assets without delving into the practical complexities of transferring knowledge across organisational boundaries (Grant 1996; Grant & Baden-Fuller 2004).

3.0 PERMEABLE BOUNDARIES AND KNOWLEDGE ACQUISITION

To date, we have reviewed the principal theories concerning organisational boundaries. We posit that organisational boundaries are important for determining firm-level competitiveness because the location of the boundaries will determine the likely future knowledge boundaries as well as the potential for learning. Perhaps more importantly, it is the nature of the boundary that also fundamentally affects knowledge transfer and therefore we suggest that the whole question of firm boundaries needs to move towards an integration of organisational boundaries and value creation. In this respect, the knowledge-based view of the firm and related knowledge driven theory concerning competitive advantage provide the best opportunity for moving this field forward in terms of the way that knowledge generation, sharing and application directly affects both organisational structures and competitive advantage.

On the basis of our review of the literature, we posit that the exact location of organisational boundaries are not as important as the nature of these boundaries – and in this respect we propose that the permeability of the boundary is a critical dimension. Jacobides and Billinger (2006) introduce the notion of permeable organisational boundaries to explain how markets and hierarchies can be used simultaneously for the same activity as permeability allows for inputs and outputs, and most importantly knowledge, to move relatively freely into and out of the organisation. And Hamel (1991) used the analogy of a collaborative membrane to similarly describe the permeability of the firm boundary. The extent to which the membrane is permeable and the direction/s in which it is permeable determine the capacity of knowledge flow and thus relative learning (Hamel 1991). By sharing skills and knowledge, firms engage in learning – something that fundamentally affects where future organisational boundaries may lie.

The ideal scenario is that organisations with specialised or complementary knowledge learn from each other via a two-way flow of knowledge through permeable organisational boundaries. This is itself unlikely to be enough, as knowledge transfer is rare when an explicit and clearly communicated learning motive is lacking (Hamel 1991; Inkpen 2005). That is, inter-partner learning must be by design and not default, i.e. an explicit strategic intention (Davenport & Prusak 1998; Dixon 2000; Inkpen 2005). While Helleloid and Simonin (1994) believe that learning can occur as an unintended consequence of inter-firm collaboration, Hamel (1991) found that in the absence of a clearly articulated learning agenda, individual businesses appeared unlikely to devote resources to the task of learning and that they could expect skills substitution or surrender. Thus permeability in itself is important, but true benefits are most likely to accrue when the knowledge is being actively pushed or pulled across the organisational boundaries.

4.0 THE RATIONALE FOR HYBRID PUBLIC-PRIVATE ALLIANCES

As the knowledge boundaries and activity boundaries of the firm often fail to align, opportunities exist for alliances or other forms of intermediate organisational structures (Grant & Baden-Fuller 1995; 2004). Hybrid structures are not a new phenomenon and have existed since the early 20th Century. The sense that hybrids are a new phenomenon may be garnered from a rise in popularity since the 1970s, as well as a shift in motives for their establishment, such as higher levels of knowledge exchange and technology transfer between partners (Inkpen & Crossan 1995; Mowery et al. 1996), the adoption of new ways of structuring boundaries and internal organisation (Foss 2002), and for the efficiency, flexibility and responsiveness they offer (Lorenzoni & Baden-Fuller 1995). With the emergence of New Public Management, large government departments have pulled back their activity boundaries through outsourcing and divestment of core activities (English 2005; English & Skellern 2005; Pollitt & Bouckaert 2000). As a result, they have increasingly cooperated with other organisations, mainly private enterprise, to engage in activities and access resources (Hood 1995; Lapsley 1999; Seal 1999), including knowledge, outside their own boundaries. This mirrors trends in large industrial organisations where new organisational forms are emerging as firms roll back their boundaries through downsizing, divestment, refocussing and outsourcing (Grant & Baden-Fuller 1995). Essentially government is using contractual structures, such as strategic alliances, to replicate the vertical integration which previously existed internally (Williamson 1991b).

Based on the idea that the value chain might be dispersed across different owners but that they are controlled in economic terms through the operation of core competencies (McGee, Thomas & Wilson 2005), McGee (2003) develops the notion of the knowledge web. The

knowledge web replaces the activity sets of the value chain with knowledge concepts. At the centre is the corporate glue, which is the organisationally embedded tacit knowledge or collective knowledge. This corporate glue supports and is supported by core competencies, which in turn are buttressed by closely held partnerships (McGee et al. 2005). Subcontracting relationships for which market contracting in sufficient are more remotely managed (McGee et al. 2005).

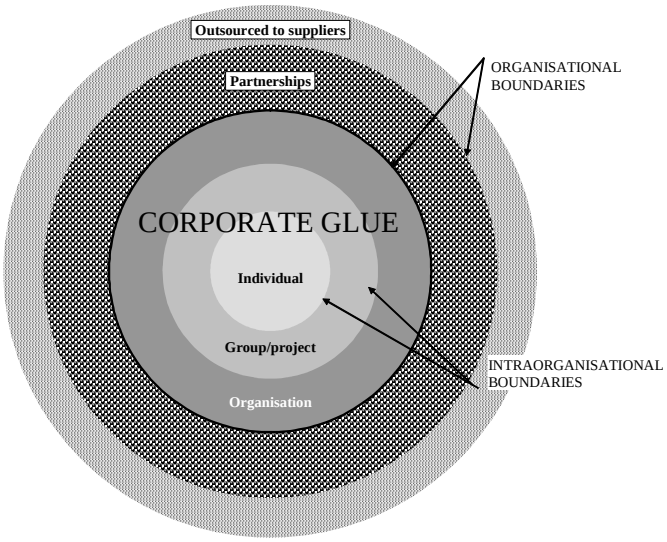

Figure 1: Organisational Boundaries and their Relative Permeability to Knowledge Transfer

Building on the knowledge web, Figure 1 reflects the existence of extraorganisational boundaries, as well as intraorganisational boundaries, to knowledge transfer. The corporate glue equates to corporate paradigm or culture (Fiol 1991), which has a profound bearing on how organisations perceive and engage with their environment (Daft & Weick 1984; Weick 1988). The nature of the organisational culture, which may be impacted by intraorganisational boundaries, is critical to the permeability of the relationship and thus the knowledge boundaries between the organisation and its external partners. While shared causal maps and values might be sources of efficiency for managing socially complex organisations, their wholly tacit nature might generate causal ambiguity for outsiders

(Tywoniak 2007b). This blurring of the boundaries between markets and hierarchies indicates that boundaries are more permeable than suggested by the economics of organisation (Foss 2002; Jacobides & Billinger 2006). Hamel's (1991) 'collaborative membrane' analogy describes this permeability, at the heart of which is the fluid nature of knowledge, rather than issues of structure – legal, governance or task. Conceiving of an alliance as a 'collaborative membrane' suggests that access to people, facilities, documents and other forms of knowledge is traded or shared between partners in an ongoing process of collaborative exchange (Hamel 1991).

The hybrid public-private strategic alliances, formed between government agencies and private enterprise, reflect Teece's (1992: 19) definition of strategic alliances as 'agreements characterized by the commitment of two or more firms to reach a common goal entailing the pooling of their resources and activities'. The commitment to common goals and the equitable sharing of resources contrast with Hamel's view competitive collaboration. Hamel found that the power vested in an organisation through the alliance contract will almost certainly erode if its alliance partners are more adept at internalising knowledge or building new competencies. In contrast, Broadbent, Gill and Laughlin (2003) found that public-private partnership contracts engender the development of trust which facilitates the management of future uncertainty. Campbell and Harris (1993) suggest that in the context of long-term contracts individual self-interest as a measure of economic rationality should be replaced by common interest. Thus the adequate form of self-interest in these contracts becomes cooperation (Campbell & Harris 1993). However, trust and reciprocity are complements, not substitutes to contractual obligations (Bradach & Eccles 1989; Lorenzoni & Baden-Fuller 1995). Trust and value congruency is critical to any knowledge transfer between partners, whether at an individual and organisational level (Aadne, von Krogh & Roos 1996). The co-

evolution of cooperation, communication and trust are critical factors for managers to assess the outcome of any interorganisational activity (Anderson & Narus 1990; Inkpen & Birkenshaw 1994 in Aadne et al. 1996). Partners in knowledge transfer seek to reduce ambiguity and create shared meaning (Aadne et al. 1996; Lorenzoni & Baden-Fuller 1995). The importance of trust is indicative of knowledge creation as a complex, intensely emotional and quintessentially human process (Walker 2004). The role of trust and relationships for the functioning of long-term hybrid partnerships (Langfield-Smith & Smith 2003) is supported by empirical evidence, which suggests that partners will work to preserve hybrid relationships despite issues arising from contractual obligations (Campbell & Harris 1993).

Achieving effective knowledge transfer in public-private alliances, in the current public sector environment, requires a shift in thinking which recognises the need to share a culture that goes beyond the organisational boundaries (Badaracco 1991b; Rowlinson & Cheung 2002). It also requires a move away from the adversarial nature of contracting relationships which use dispute resolution mechanisms as a fall back position. These partnerships enable the organisations to benefit from integration and specialisation in a manner that is most likely more difficult to replicate than if the knowledge was simply held internally. Certainly, the flow of knowledge, enabled by information and communication technology, is changing the way individuals and organisations interact and work, both within and with those outside their boundaries such as suppliers, consultants and contractors (Dixon 2000; Galbreath 2002). In many instances new organisational forms have seen the boundaries of the firm radically transformed, not only by increasing moves to outsourcing and other forms of relational contracting and networks, but because of the implications of the fluid nature of knowledge capital versus the relatively static nature of physical capital (Foss 2002; 2007; Galbreath 2002). Galbreath (2002, 9) speaks of ‘extended enterprises’ and suggests that knowledge in

the form of intangible 'relationship assets' may come to represent an organisation's most strategic asset given its potential to influence learning and thus future organisational capabilities.

5.0 METHODOLOGY

Using the Hamel's (1991) propositions concerning knowledge transfer (i.e. intent, transparency and receptivity) as a theoretical underpinning (Yin 1994), a case study of a hybrid public-private strategic alliance was built. Thus the case study is both a process of enquiry and a product of that enquiry (Stake 2005). The individual case study is a specific, unique, bounded system which concentrates on experiential knowledge and pays close attention to the influence of its social, political and other contexts (Stake 2005). This methodology is invaluable for reflecting on the complexity of organisations because it allows us to explore the interplay of resources and competences within firms, and sheds light on the influence of corporate ideologies, beliefs, routines and how and when the firm sub-units are loosely- or tightly-coupled (Weick 1995). While the boundedness is a counterbalance to complexity on a large scale, the uniqueness is a challenge to generalisability (Stake 2005).

The case provides the rich data (Siggelkow 2007; Weick 2007) required to understand the second order complexity of knowledge processes which are contextualised in social and cultural experiences (Tywoniak 2007a). Knowledge of second-order complexity is not validated through direct successful experience but rather through social processes of intersubjectivity (Passeron 1996). Thus the use of unstructured, qualitative interviews, which are seen to achieve Habermas' (1984) 'ideal speech situation', is a sound methodological choice for eliciting data for case study development. This was supplemented with secondary data sources. For Habermas (1984) this social 'communicative action' is an act of

communicative rationality, where two subjects engage in an intersubjective relationship to achieve shared understanding. The choice of a single, rich case study gives us interesting insights into the experiences of those in an organisation which has only recently started reconceptualising their organisational boundaries using strategic alliances as a means of achieving its objectives. While the methodological intention is to capture the richness of the single case study, Yin (1994) suggests that the description and analysis of a single case study has the ability to convey information about a more general phenomenon by calling attention to issues and by highlighting discrepancies between theory and practice.

In practical terms, the material for the case study was collected via 16 semi-structured interviews with appropriate personnel as well as key contractors/alliance partners that work with Main Roads WA. Purposeful and theoretical sampling was used, and the data collection process ceased when saturation occurred (Creswell, 2002). Secondary sources including annual reports, procedures and various reports (including progress and completion reports concerning selected projects) were used as background information and to provide additional information concerning how different hybrid structures were being used to encourage learning. Qualitative data from interviews was coded, using open coding (Creswell 2002), analysed and managed using NVivo™. NVivo™ was chosen as the preferred analysis software because of its ability to assist in the maintenance of large data sets (Parry 1998), as well as contributing to the maintenance of precision and rigour in qualitative data analysis. Rigour was achieved via methodological thoroughness and the incisiveness of the analysis (Charmaz 1990). Developing a clear philosophical and theoretical framework, with explicit assumptions, provided the foundation for methodological and analytical rigour.

6.0 CASE STUDY: MAIN ROADS WESTERN AUSTRALIA

Established in 1926, Main Roads Western Australia is the State's statutory road authority and its oldest public sector organisation. Its net assets are worth A$22.5 billion (US$20 billion) and responsibility extends to total asset management of the road network, project delivery to expand and maintenance the network and traffic and road user management (Main Roads WA 2006). The network has a replacement value of A$21.4 billion (US$18.9 billion). Western Australia has 174,008 kilometres of roads, of which declared highways and main roads comprise 17,706 kilometres or about 10 percent. Main Roads also contributes funding to assist in the maintenance of 125,968 kilometres of local roads and 30,334 kilometres of roads through national parks and forests.

6.1 CONTRACTING GUIDING PRINCIPLES

Three clear guiding principles govern contracting processes. These specify that contracts should be commercially viable; transfer appropriate decision making and risk to industry; while Main Roads retains responsibility for standards and compliance (Main Roads WA 2007). Projects are classified into three categories. Category 1 projects are discrete major projects, with significant scope, costing more than $20 million. They are either delivered by Design and Construct or Alliance contracts. Category 2 projects generally cost between $1.5 million and $20 million and are competitively tendered either as Design and Construct contracts or as a mixture of separate design and separate construct. Category 3 projects are maintenance and rehabilitation projects, including capital works up to $1.5 million, delivered through Term Network Contracts and Term Asset Contracts.

6.2 HISTORY OF ALLIANCING IN MAIN ROADS

Up until the 1980s Main Roads had total control over the design and construction of roads. While as much as 60 percent of work was handled by contractors, the organisation continued

to employ a huge internal labour work force and employees felt that the organisation had a very strong sense of control over its own destiny. In 1996, Main Roads began a metamorphosis from maker and maintainer of roads to owner and manager (Edmonds 1997). Change was driven by the State Government's economic rationalist reform agenda. The rapid refocusing on outsourcing to the private sector resulted in severe staff reductions (Edmonds 2007). A 2001 ministerial report into the effects on Main Roads of contracting out virtually all services, including design, found that the 'full on' contracting out approach had severely impacted Main Roads knowledge base (Edmonds 2007). The report recommended that within three years, Main Roads rebuild about 25 percent of its in-house design capacity, so that it was not just an 'informed buyer', but a partner in the State road industry. Another critical step in becoming a partner in the road industry was the move towards relationship contracting and particularly alliancing. In December 2002, a new Commissioner brought with him a wealth of contracting experience and knowledge about relationship contracting (Edmonds 2007). Relationships based on goal congruence were placed on the strategic agenda as a focus of the strategic plan. In November 2003, Main Roads entered into its first public-private alliance (Edmonds 2007). This initial alliance contract was still fairly prescriptive, but was a significant step in an evolutionary process toward relinquishing control to the alliance entity as an autonomous decision making body.

6.3 AN EXPLICIT INNOVATION, KNOWLEDGE TRANSFER & LEARNING AGENDA

Alliance contracts are awarded based on the reputation of the alliance partners rather than on cost, with the cost not determined until after the contract has been signed and preliminary design work is completed. The key driver for Main Roads is to build the best possible roads for the community and they seek alliance partners who can bring innovation to each project (Edmonds 2007). While alliances are primarily risk/reward-sharing arrangements, they afford

the opportunity for both public and private partners to engage in projects larger than any one entity would be able to undertake on their own. Thus alliances provide a capacity building potential for all individuals and organisations involved that is not inherent in conventional contracting arrangements. In addition, alliance partners have to complete all land resumptions, approvals, heritage considerations and stakeholder relations, formerly dealt with by Main Roads ahead of the awarding a contract. These processes now run concurrently, thus speeding up the process, but says one project director: "For everyone this is a new way of working and we probably didn't appreciate the risk and time associated with what Main Roads does before they award a traditional contract." At the start of each project, an independent alliance facilitator works with the alliance management team to determine goals, including a commitment that everyone will exit the alliance with enhanced knowledge and skills. This process involves establishing explicit non-cost key performance indicators, which are measured and rewarded by the client as part of the contract. These include training and the development of individual training plans. Thus there is a clearly articulated learning agenda. Says a project director: "The sharing of knowledge is a two way street and no one is bleeding off anyone else. While I have enhanced my knowledge of design and geotechnical issues, I know that the Main Roads guys have a better understanding of contracting issues. Although there is a contract in place, things are very different from a conventional contract in that we negotiate better outcomes and there is a different mindset."

6.4 TRANSPARENCY BETWEEN ALLIANCE PARTNERS

Alliance partners agree that the biggest challenge in establishing an alliance partnership is bringing people from different organisations together to think as one. The alliance facilitator supports much of the team development process and the establishment of common values. "Team development is essential for future success. Because of the different cultures it has

been a battle from day one to build a team and we have had to constantly work on our team culture and development. We have tried to get people out of their huddles and focused on creating a new team with a unique identity," said a Main Roads alliance member. An industry partner comment reflect the assertion that complex cultural differences distinguish firms, including those in the same city (Badaracco 1991a): "No one way is right, but different organisations have a different cultures, behaviours, work ethics and time management and we have had to work to formulating common goals." Building on this, people feel safe to communicate openly. Thus, the alliance is simultaneously a common space, for alliance members to share knowledge, learn and problem solve, and a 'collaborative membrane' (Hamel 1991) between the alliance members and their parent organisations. Alliance members indicate that the interface with Main Roads is fluid, but never intrusive. However, from the Main Roads perspective the alliance interface is made complex by the multiple roles which it plays in the alliance, namely alliance partner, client, stakeholder (regional office) and advisor (Technical Advisory Group). Tension arises because those who are integrally part of the process appreciate the flexible and innovative practices employed inside the alliance, while those on the outside may work to maintain the status quo and reinforce standards. These tensions raise potential issues for receptivity and absorptive capacity within Main Roads, despite the multiple conduits for knowledge transfer and learning into the organisation.

6.5 RECEPTIVITY AND ABSORPTIVE CAPACITY WITHIN MAIN ROADS

When alliance members return to the parent organisation they take with them invaluable knowledge not only about the practice of constructing a particular road, but also about the way that alliance partners think and the collaborative, problem solving processes involved to achieve the outcome. Main Roads alliance members indicate that they closely document the

contracting award process, all other processes and lessons learnt at each critical milestone. Specific interventions throughout the project are also documented and all this detail is fed back into Main Roads. Documenting the alliance experience embellishes knowledge which flows back to the organisation through other conduits like formal reporting, designs and the Technical Advisory Group. People entering new alliances have described the knowledge gleaned from the documented processes of previous alliances as invaluable. Many employees see the exchange of ideas, the flexibility to resolve differences of opinion and innovate in the open environment of the alliance as a very healthy way of building knowledge. This is particularly because effective feedback loops are being developed and this new knowledge challenges existing, traditional thinking within the parent organisation. However, some employees are still skeptical about whether these feedback loops are effective fearing that much of the knowledge is still in people's heads and not captured in systems. They suggest the need for conversations which capture not only the lessons learnt, but also the stories that go to make up experience. Certainly the lessons learnt from each alliance are supporting the development of future alliances. Employees involved with developing and implementing design standards see great benefits flowing back to their team.

Main Roads employees have a broad range of opinions about the effectiveness of alliancing and views differ depending on whether or not people have been involved in an alliance. One Main Roads alliance member admits that before going into an alliance he was skeptical when people spoke of the potential for knowledge transfer. "I didn't think that the knowledge and skills transfer would work the way people told me it would, but I have learnt a huge amount about how contractors work and I have taught the contractors about how Main Roads works and there has been an enormous transfer of knowledge," he said.

This attitude reflects some of the anxiety over asymmetric learning expressed in other studies (Hamel 1991; Inkpen 2005). Also, there is an element of frustration with alliances because they are resource hungry and take away some of the best people for extended periods of time. Limited resources potentially lead to a loss of opportunity in other areas. However, this must be balanced against the knowledge flowing back into the organisation. This reflects classic tensions between the rigidity and complexity of traditional organisational structures and the flexibility of alliance project team highlighted by Nonaka and Takeuchi (1995). Essentially organisations need to develop new organisational structures in order to effectively and continuously create knowledge (Badaracco 1991b; Nonaka & Takeuchi 1995). The hypertext organisation proposes interlacing flexible task forces (project layer) with hierarchical formal structures (business layer) to allow for knowledge to move dynamically between the two structural layers to create the organisation's knowledge base (Nonaka & Takeuchi 1995). The organisational structure and culture needs to be oriented towards allowing the best people to move between these structures for the duration of projects, in the best interests of building the knowledge base.

7.0 DISCUSSION AND CONCLUSION

The boundaries of the firm question has long been a central question for management scholars. While a variety of theoretical approaches have been used to explain what determines these boundaries, we suggest that the knowledge based view with its focus on where the boundaries lie and what drives competitive advantage offers a useful lens to study contemporary industries in the 21st Century. However, rather than focus on simply the location of a firm boundary, we suggest that it is the nature of the boundary that is more important – with permeable boundaries providing significant advantages in terms of learning opportunities. We then use a detailed case study of Main Roads Western Australia to

illustrate how they have rebuilt some of their capabilities via a reconceptualisation of the structure of the boundaries of their organization such that they were more permeable and focused specifically on both parties to any alliance benefiting from the learning that is possible.

What was clearly evident from this case study was that organizational structure, especially the location of boundaries (ie what was undertaken by each partner) and the nature of the organizational boundary (which was designed to be as permeable as possible) fundamentally affected the learning and subsequent knowledge of Main Roads. Main Roads changed the boundaries of what they did such that their alliance partners worked with them on the preliminary stages (land resumption, heritage considerations etc) and at the same time, their employees were actively engaged in parts of both the design and the construct phases of the project. Strict delineation of firm boundaries became far more difficult as both parties to the alliance were involved in many stages of the process. This in itself lay the foundations for knowledge transfer. However, what also became central to the attempt by Main Roads to rebuild their capabilities, was the design of organisational boundaries that were permeable. It was on this basis that the knowledge was able to flow into Main Roads WA and subsequent systems that sought to maximise the benefits from these knowledge flows was established to rebuild relevant organisational capabilities.

Because of the structures used, in this environment where it is government policy to de-integrate, the competition for knowledge between alliance partners does not exist as Hamel (1991) describes it. Rather than an alliance between competitors we see an alliance between an elite public organisation and several specialised private suppliers. Here the elite public organisation equates to Quinn's (1992) idea of the 'central firm' which collects together

partners to contribute to the whole system (Inkpen & Tsang 2005; Lorenzoni & Baden-Fuller 1995) and whose roles are clearly defined in a positive and creative way. The collaborative nature of these public-private alliances with their strong orientation towards team building, shared learning and relationships, as opposed to competing with partners for knowledge, results in the dual nature of the alliance as both collaborative membrane and common space. This intersubjective space is where the transfer of explicit knowledge easily occurs and as relationships develop the efficacy of tacit knowledge transfer increases. Here knowledge can be seen as neither the representation of reality nor the result of an application of ultimate rational criteria, but instead a competence to engage successfully in practice (Habermas 2003), which is at the heart of tacit knowledge or 'know how' (Nonaka & Takeuchi 1995; Polanyi 1966). The intersubjective social context and the processes they embody represent knowledge of second-order complexity as explicit and tacit knowledge are combined to create common knowledge which is able to pass from one community to another (Tywoniak 2007).

For the construction industry as a whole, this case demonstrates the need for senior management to consider where they position their operational boundaries (be they highly restricted through the use of out-sourcing or far wider in scope) as these boundaries are critical determinants of a firm's knowledge stocks both now and into the future. Restricting the operational boundaries does not necessarily mean limiting a firm's knowledge and its subsequent capabilities. The purposeful creation of permeable boundaries is likely to be even more important than where the firm boundaries were originally set. In fact, coupled with cooperative contracts such as those found in alliance contracts as opposed to taking a more adversarial tack with contractors could allow a firm to develop its knowledge (and capabilities) to be a systems integrator (as per Brusoni, Prencipe & Pavitt 2001) as opposed to

a contracts manager. Finally, at its most fundamental level, this case clearly demonstrates that knowledge management (and subsequent competitive advantage) cannot be disconnected from organisational structural issues as the two are inextricably linked.

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