

**Creating and Sustaining Competitive Advantage in Collaborative Systems:
The What? And The How?**

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Abstract

This paper starts by asking two questions; In order to create and sustain competitive advantage through collaborative systems WHAT should we be managing? and HOW should we be managing it?

It introduces the Competitive Business Structure and reviews some of the global trends in manufacturing and business, which leads to focus on Manage Processes, Value Propositions and Extended Business Processes. It then goes on to developing a model of the collaborative architecture for extended enterprises and demonstrates the validity of this architecture through a case study.

It concludes that, in order to create and sustain competitive advantage, collaborative systems should facilitate the management of; the collaborative architecture of the extended enterprise; the extended business processes and the value proposition for each extended enterprise through a Meta Level Management Process. It also identifies areas for further research, such as better understanding of; the exact nature and interaction of multiple strategies within an enterprise; how to manage people/teams working along extended business processes; and the nature and prerequisites of the manage processes.

Key Words: Extended, Collaborative, Enterprises, Architecture

1. INTRODUCTION

The globalisation of commercial and industrial activities is symptom of increasing levels of collaboration between individual enterprises, examples of these may include supply chains, business process outsourcing, collaborative product development and so on. The motivation for each individual enterprise comes not from the fact that they want to collaborate but from the fact that there are economic advantages to be gained through collaboration. With this focus on collaboration one of the key issues at the forefront of any chief executive's mind are the questions *"how best to manage the collaborative enterprise?"* and *"how the individual enterprises operating within the framework of a collaborative enterprise should be managed?"*.

Previous research in strategic, production and operations management developed models and frameworks to allow us to better-manage single enterprises [Porter M. 1985, Richardson 1985 and Treacy and Wiersema 1996, Bititci and Turner, 1999]. The research question "what to manage and how to manage the performance of collaborative/extended enterprises" remains largely unanswered. In this paper we try to add to this vast body of literature by answering the following set of questions:

1. What is it that we should be managing? - In tackling this question we will take an internal, i.e. resource based, view of the extended organisation to rationalise the cybernetic structure of the extended organisation that creates value
2. How should we be managing it? - In tackling this question we will take both an internal, i.e. extended processed based view, and an external, i.e. market based view, to the extended enterprise

In tackling these questions, the paper integrates a number of existing concepts and it demonstrates that like all businesses, extended enterprises also have a common, cybernetic structure that needs to be managed. This paper makes a contribution by:

1. Making the complex structure of collaborative enterprises explicit from two points of view:
 - a. From the point of view of the extended enterprise
 - b. From the point of view of the individual enterprise who has to manage its participation in one or more collaborative/extended enterprises
2. Proposing a management systems architecture that would facilitate efficient and effective management of the collaborative enterprise from both of the viewpoints described above.
3. Outlining a requirements specification for management systems that would support the above architecture.
4. It also raises further research questions on the management of the collaborative/extended enterprise.

From the methodological perspective, this paper presents two distinctive sections: theory-building and theory-testing. In the theory-building phase the authors' experiences in the previous research projects and with certain industries led them look at literature. In particular the trends in manufacturing and business were examined. Consequently, theory was built up on a pre-understanding based on personal experience, which was then backed up by literature as presented on this paper. The theory developed was then tested through a single but in depth case study. The case data was collected through a series of semi-structured interviews and workshops with the management team of the case study organisation.

2. BACKGROUND

The background of the work presented here extends back to the earlier work done by the Centre for Strategic Manufacturing on Integrated Performance Measurement Systems and The Competitive Business structure.

The objective of the original R&D programme we embarked on during 1995 was to analyse the literature in the field of performance measurement, study practices of companies considered good practice and consolidate the lessons learned into a reference model for integrated performance measurement systems. This original objective was achieved; a reference model of integrated performance measurement systems and an audit methodology were developed. The results of this work have been published in several academic and practitioner journals [Bititci and Carrie 1998, Bititci and Turner 1999, Bititci 2000a].

In conducting the above research, our research team analysed numerous literature covering performance measurement, strategic management, operations management, financial management and business process management. The team also studied the practices of companies worth looking at, including European Business Excellence Prize Winners and others (such as Texas Instruments, HP, Rank Xerox, Nortel, TNT and so on). As a result of this initial research, the team developed a list of good and bad practices for performance measurement.

The next task was to present these factors in a structured and logical manner to create a Reference Model. In order to achieve this objective, the researchers investigated a number of existing models and frameworks covering areas, such as Hard Systems, Soft Systems, Systems Dynamics and Cybernetics. Finally, the research team identified that CIM-OSA business process architecture [Childe et al ,1994

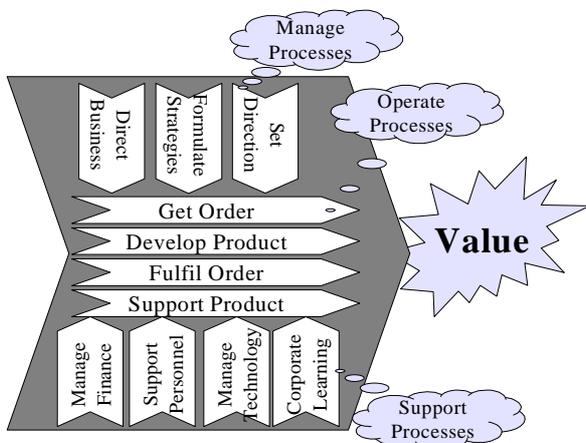
and 1995, ESPRIT Consortium AMICE, 1991] together with Porters Value Chain Model [Porter, 1985] and Beer's Viable Systems Model (VSM) [Beer S. 1985] complemented one another, and that their integration would provide a powerful structure (Figure 1) for planning and managing today's modern organisation [Bititci and Turner 1999]. The researchers called this structure the Viable Business Structure (or the Competitive Business Structure) as it represented the cybernetic structure of the organisation irrespective of how it was actually organised.

In essence this work has described the competitive structure of any business which needs to be managed. This structure, which is illustrated in Figure 1b, may be summarised as:

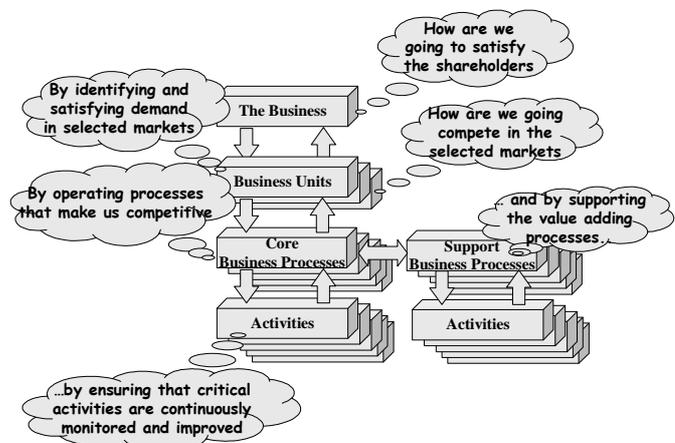
- The business exists to create wealth for its shareholder (or satisfy expectations of its key stakeholders).
- It achieves this by operating one or more business units that need to remain competitive in their selected markets in order to satisfy the needs of the business. Here a Business Unit is defined as *the logical part of the business, which exists to service a particular market sector with specific competitive requirements*. In our experience Business Units may be product oriented or market oriented. In a product-oriented business unit, it is the design characteristic of the product or product group, which determines how the product competes in that market sector. In a market-oriented business unit the same product may be subjected to different competitive pressures in different markets. For a more in-depth explanation on the definition of business units refer to Bititci and Turner 1999.

- Each business unit competes by operating a number of value-add processes supported by the support processes. The efficiency and effectiveness of these processes determines the competitiveness of the business units.
- The efficiency and effectiveness of each business process is determined by the combined performance of its critical activities.

The management implication of this is that, in order to create and sustain competitive advantage for one enterprise, we need to manage this structure... but how does this theory apply in the case of extended enterprises where collaborative systems are required to co-ordinate and synchronise the activities of a number of enterprises?



a. The Business Process Architecture



b. Integration of business process architecture with VSM

Figure. 1. The competitive structure of a business (From Bititci and Turner 1999).

3. TRENDS IN MANUFACTURING AND BUSINESS: COMPETING IN THE 21ST CENTURY

In order to understand "what to manage" and "how to manage it", it is necessary to understand some of the trends over the 80s, the 90s and into the new millennium. Table 1, which is based on UK's technology foresight [DTI, 1998] exercise which was then adapted by Bititci [2000b], illustrates these trends. The foresight exercise was based on an extensive Delphi study involving UK manufacturing practitioners and academics. The practitioners represented a typical cross section of the manufacturing industry including UK base multinationals as well as SMEs and consultants. Bititci [2000b] adapted the results of the foresight study based on survey he conducted of the Electronics Original Equipment Manufacturers such as (Dell, IBM, Compaq, Sun, HP, Motorola, NCR, and so on)

The contents of Table 1 may be summarised as follows:

- 80s had been about the Just-In-Case Enterprise, with highly functionalised organisational structures, slow and cumbersome processes which were difficult the change, with little strategic outlook in terms of facilities, information systems and stakeholders
- 90s had been about the Lean Enterprise, with flatter organisational structures, emphasis on flexible manufacturing processes, teamwork, concurrent product and process design, TQM, cellular manufacturing, more accurate financial control, distributed information systems and partnerships across the supply chain.
- The millennium is clearly going to be about the Collaborative Agile Enterprise, which will be able to continuously and quickly change its organisation, process, people, products, facilities, information systems, performance measures, business partners and so on to adapt in to a continuously changing business environment [Jagdev and Bourne, 1998].

	1980's	1990's	2000+
Operating philosophy	<ul style="list-style-type: none"> • Product/process oriented • Just-in-case • UK / Europe 	<ul style="list-style-type: none"> • Customer service oriented • Just-in-time • Waste min • Business processes 	<ul style="list-style-type: none"> • Market focused • Customer value • Mass customisation • Collaborative • Responsive • Easy to adapt and change
Organisation	<ul style="list-style-type: none"> • Hierarchical • Functional • High % of indirect 	<ul style="list-style-type: none"> • Flat • Matrix • Min. Indirect 	<ul style="list-style-type: none"> • Flexible
Processes	<ul style="list-style-type: none"> • Manual • Stand-alone • Long set-ups 	<ul style="list-style-type: none"> • Manual / automated • Integrated • Short set-ups • Flexible 	<ul style="list-style-type: none"> • Very flexible • Innovation • Environmental • Sustainable • Short life-cycle
People	<ul style="list-style-type: none"> • Individuals • Specialists • Self-oriented 	<ul style="list-style-type: none"> • Teamwork • Multi-disciplined • Company oriented 	<ul style="list-style-type: none"> • Strategic leadership • Flexible • Self managed • Extended-process oriented • Social responsibility
Product	<ul style="list-style-type: none"> • Designed separately from process 	<ul style="list-style-type: none"> • Design for manufacture • Simultaneous eng. • CAD/CAM 	<ul style="list-style-type: none"> • Innovation • Short life-cycles • Global
Quality	<ul style="list-style-type: none"> • Inspected in • Assured? 	<ul style="list-style-type: none"> • Designed in • Total • SPC 	<ul style="list-style-type: none"> • Corporate excellence • Habitual • Granted
Facilities	<ul style="list-style-type: none"> • Use existing space • Functional 	<ul style="list-style-type: none"> • Min. space • Cellular 	<ul style="list-style-type: none"> • Alliances • Global • Mobility • Flexible
Finance	<ul style="list-style-type: none"> • Standard costing • Direct labour allocation 	<ul style="list-style-type: none"> • Actual costs • Activity based 	<ul style="list-style-type: none"> • Working capital • Integrated performance management
Information	<ul style="list-style-type: none"> • Mainframe (Slow) • Batch processing 	<ul style="list-style-type: none"> • Distributed (fast) • Networked • On-line 	<ul style="list-style-type: none"> • Real-time (very fast) • Web based/facilitated • Work flow management • Integrated communication
Materials	<ul style="list-style-type: none"> • Large inventories • Large batches • Adversarial vendor relationships 	<ul style="list-style-type: none"> • Minimum inventories • Lot size =1 • Partnerships • Supply chains 	<ul style="list-style-type: none"> • Max. throughput • Extended partnerships • Flexible value chain
Overall posture	Just in case Enterprise	Lean Enterprise	Collaborative Agile Enterprise

Table 1 - Trends in manufacturing and business.

The study presented in Table 1 has led to the identification of a three themes, which are explained in the following sub-sections.

3.1. MANAGING PERFORMANCE

In this section we will explore the need for an integrated, dynamic and agile strategy and performance management process to facilitate the management of the collaborative enterprise. Literature relating to strategic and performance management of collaborative and extended enterprises are scarce. The Supply Chain Models such as SCOR [www.supply-chain.org] and CPFR [www.cpfr.com] are well understood and used but they are too operational and focus on supply chain management rather than collaborative enterprises, which by definition is much broader. For this reason, in this section we will first examine the nature of the strategy and performance management in single enterprises and extrapolate the need for a dynamic and agile strategy and performance management process in collaborative enterprises.

In the context of business processes, we have already demonstrated earlier in this paper that the *operate-processes* create competitive advantage. However, it is the *manage-processes* which create and sustain competitive advantage. There are several examples of how manage-processes enable companies to “maintain and develop a winning business formula” or “identify and change to a new business formula”.

We do not need to look too far to see evidence in support of this proposition. Examples of how manage-processes enable companies to “maintain and develop a winning business formula” or “identify and change to a new business formula” include:

- TNT's and DHL's history provides excellent examples where the manage processes successfully maintained a winning formula and developed this formula to create further competitive advantage. Both of these enterprises started with providing a reliable parcel delivery service. However, today

both of these enterprises offer far more than a parcel delivery service. They provide an integrated logistics support solution. Today, their clients do no longer use them as a parcel delivery service; they outsource their logistics and transportation management processes to DHL and TNT. Here it is clear that, the management teams in these organisations, having recognised a winning formulae successfully developed this formulae to sustain and develop their competitive advantage in a particular direction, through efficient and effective manage processes, i.e. setting identifying development opportunities, setting direction and managing change.

- Tesco, a UK based Supermarket Chain, recently re-deployed their Balanced Scorecard within days of Wal-Mart's takeover of Asda (one of their primary competitors), demonstrating real agility in their ability to react to an external change. By redeploying their Balanced Scorecard Tesco revised its objectives and deployed a strategy to deal with this new threat. This suggests that the manage processes which sets the strategic direction and objectives and ensures that the operational processes are managed to change in that direction were able to react quickly to external change.
- Highland Spring were in the business of producing and selling commodity bottled water with no real business success. In 1992 they adopted a brand management value proposition and focused on developing the brand. As a result, they are one of the most successful mineral water companies in the UK. In this case, the management team at Highland Spring have recognised that the previous business model was under threat and chose to adopt a new business model based on brand value. That is, through their manage processes have identified and changed to a winning business formula.
- ICI [Turner, 1998], demonstrated the ability of their manage processes to recognise the need for radical change, identify and effectively deploy a new business model. As a result, they changed

from manufacturing and selling explosives to their customers (quarry operators) to providing a “rock on the ground service”. Here, the quarry operators would use the explosives to blow up large hills into rocks which would then be used to manufacture gravel. The new business model used mobile manufacturing units that would manufacture the explosive on customers site, ICI’s experts would then administer the explosive and manage the explosion. Now the customers are no longer buying explosives, they are buying a service that gives them “rock on the ground”.

In the literature [Childe et al, 1994 and 1995] it is stated that ‘Manage Processes relate specifically to business direction and strategy as well as business planning and control’. Others also attempted to place the tools of strategy management within an overall process model for the whole company. The work carried out by Pearce and Robinson [1988] and Wheelen and Hunger [1980] also offers a perspective on strategy management where manage processes are central to creation of competitive advantage. In their model the firm’s strategy acts so to maintain an acceptable performance in the constantly changing environmental conditions.

Through this discussion we have emphasised the importance of the manage-processes, particularly that of the strategy and performance management process, in creating and sustaining competitive advantage. However, Mintzberg et al [1999] conclude that strategies can emerge as a result of a variety of factors. They argue that a strategy can be planned or can emerge as a pattern, which can be seen retrospectively. They consider that it is important for the organisation to recognise emergent strategies, as the emergent strategy will have an impact on how the organisation manages its performance, because an emergent strategy will have played an important part in the formulation of current behaviours and values held within the organisation. Research by Acur and Bititci [2001] demonstrated that, in order to maximise the performance of their enterprise, managers are continuously making strategic decisions in response to internal and external impulses.

In our view, in the 21st century where the operating environment (i.e. internal and external) of an organisation is continuously changing, the calendar driven approach to strategy and performance management is no longer appropriate. A dynamic process for managing strategy and performance is required which continuously monitors its internal and external operational environment, identifies events of significance and triggers actions which may change: the direction of the business, the way a business unit competes in its market or the priorities of an operate or support process. One key message emerging from the practices of good successful companies and from the literature is that the speed of this process, i.e. its ability to rapidly make, deploy and implement decisions, is of paramount importance [Childe 1998, Jagdev and Browne 1998].

So far the above discussion has focused on the need for a dynamic and agile strategy and performance management process for a single enterprise. In a collaborative enterprise, there is a need for a similar process to manage the strategy and performance of the extended enterprise. It is therefore critical that the manage processes of individual organisations are co-ordinated to ensure that the whole value system representing the collaborative enterprise creates and sustains competitive advantage.

3.2. CUSTOMER VALUE

Other trends [Porter M. 1985, Richardson 1985 and Treacy and Wiersema 1996] are also showing that companies are becoming more focused on their marketing and business strategies. Figure 2 illustrates this trend where during the 80s companies were trying to be good at everything but failing in all counts. Porter [1985] recognised the pattern that companies with focus and differentiation were succeeding, consequently in the 90s we have seen a shift towards focus and differentiation. Treacy and Wiersema

[1996] have taken the concept of focus and differentiation one step further and argued that the market leaders build their strategies on one of three value propositions:

- **Operational excellence:** These companies provide middle of the market products at the best price with the least inconvenience. Low price and hassle-free service.
- **Product leadership:** These organisations offer products that push performance boundaries. The proposition to customers is an offer of the best product in the best time. Moreover, product leaders don't build their propositions with just one innovation; they continue to innovate year after year, product after product.
- **Customer intimacy.** These organisations focus on delivering not what the market wants but what specific customers want. Customer-intimate companies do not pursue one-time transactions; they cultivate relationships. They specialise in satisfying unique needs. Their proposition to the customer is: we have the best solution for you and we provide all the support you need to achieve optimum results.

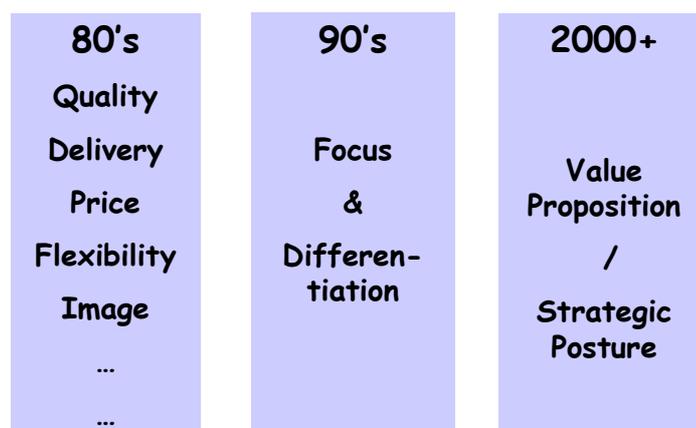


Figure 2. Trends in Marketing and Business Strategies

In our research, which was instituted to investigate the value propositions proposed by Treacy and Wiersema, we have taken these propositions one-step further [Martinez and Bititci, 2000 and 2001]. We have mapped several companies against the three value propositions and we found that some of the companies did not fit. One of these is Highland Spring, a famous Scottish natural mineral water producer. On the one hand, Highland Spring could be classified as a product leader because it is a leader in the market, the brand is recognised worldwide and the margins are healthy. On the other hand, it is not a product leader because it does not introduce continuous innovations. These findings led us to extend Treacy and Wiersema's original value propositions in to a Value Matrix by adding Hard and Soft dimensions to value, thus creating six value propositions. The hard and soft dimension of this matrix referees to tangible and intangible dimensions of value. For example, continuous innovation of technological products, customisation of existing products to meet a particular customers specific needs and cost minimisation are considered to be hard value offerings as they are tangible. Where as, brand image, interpersonal relationships/trust and easy-to-do business-with are considered to be soft value offerings as they are comparatively intangible.

This matrix was then extended into a Value Cube (Figure 3) by the addition of the third dimension, which summarises the underlying characteristics an organisation must have in order to succeed in one of these six value propositions. These are:

- **Innovators:** Organisations who continuously innovate and invent the next generation of technologies. Their value proposition to their customers is: technologically and functionally most advanced and innovative products - e.g. Intel.
- **Brand Manager:** Organisations who develop a brand image based on style, quality image, etc., making a lifestyle statement. Their value proposition is: products that make you feel better, get you recognised, will help you to make a lifestyle statement - e.g. Nike and Highland Spring.

- **Price Minimisers:** Organisations who produce and/or sell good but ordinary products and services at most competitive prices. Their value proposition is: value for money - e.g. Nissan, Price/Costco, Tesco.
- **Process Simplifiers:** These are organisations who are extremely easy and simple to deal with. They remove complexity and hassle from their customers, making life simpler and more productive for their customers. Their value proposition is: if you deal with us your business/life will be more productive and hassle free - e.g. ScrewFix Direct, Houston Warehousing, DHL.
- **Technological Integrators:** These organisations provide specialist technological solutions to their customers. Their value proposition is: we understand your business and we have the capability of tailoring our products to make your business more efficient and/or effective - e.g. Alcan Specialist Chemicals.
- **Socialisors:** These organisations develop interpersonal relationships with some key customers. They know the customers' business, personalities and sensitivities and they can provide personalised services in a style acceptable to the customer. Here, the value proposition is: Familiarity, trust, interpersonal relationships - e.g. most small management consultancies and trades-men work on these bases.

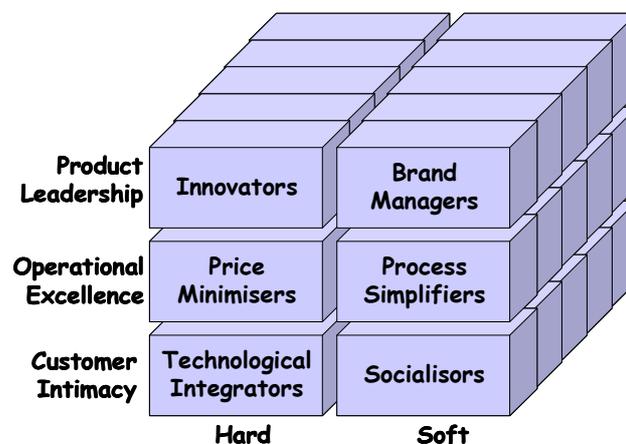


Figure 3. The six value propositions of the Value Cube [from Martinez and Bititci, 2001].

These value propositions serve to create focus within an organisation to create a value strategy within the business.

Our prediction is that in the 21st century there will only be a few companies who compete by being Innovators or Price Minimisers. The majority of the companies will have to pursue one of the other four value strategies.

In fact, these value propositions are not mutually exclusive. In the future, companies will have to demonstrate excellence in more than one area, to add value. For example, the primary strategic focus of an enterprise could be *technological integration*. But, in order to provide innovative products that are tailored to meet individual customers needs, they also have to demonstrate some of the key competencies associated with *innovators* as a secondary priority and they have to underpin these through certain characteristics of *process simplifiers*.

The question is, although the value propositions make sense in articulating the strategic direction of an enterprise, what role do they have in collaboration? and how do collaborative systems effect the value proposition of enterprises who are trying to work within a collaborative system?

3.3. EXTENDED BUSINESS PROCESSES

The IFIP WG5.7 conference that was held in Troon, Scotland, in 1998, concluded that: "*In the millennium, competition will not be between individual companies but will be between individual value systems*" [Bititci and Carrie, 1998].

Figure 4 illustrates a typical supply chain where a number of suppliers are involved, such as multinationals, SMEs, transportation and distribution companies, warehouses and so on. Traditionally, the focus has been on the supply chain in order to manage the movement of materials from suppliers to end-customer. However, towards the end of the 90s we have seen emphasis being placed on the management of the demand system. Nokia presents an excellent case study [Eloranta, 1999] where they manage and balance the supply and demand systems so that they have an efficient and effective value system. However, the value system is not just a matter of a balanced supply and demand system. There are a series of other providers and suppliers into this system. There is equipment suppliers, service suppliers, consultancies, research and education institutions, banks and other financial institutions, government agencies and so on. All of these organisations represent pieces of the jigsaw within the total system. Unless all the bits of the jigsaw actually work effectively, not to optimise their own operation but to optimise the whole system, then the whole system will fail to generate sufficient value.

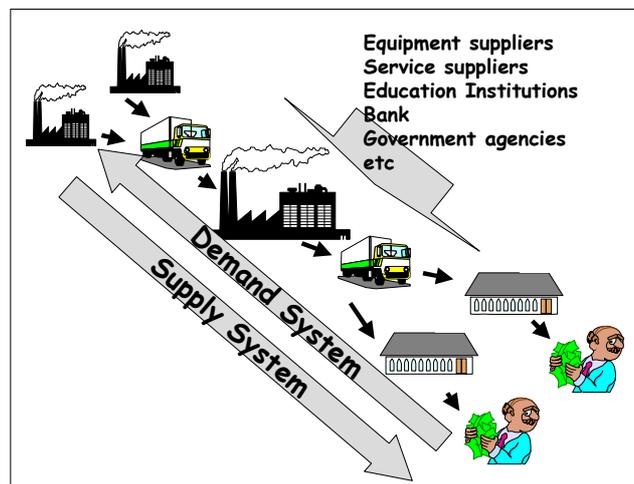


Figure. 4. The Value System [adapted from Eloranta 1999].

The implication of this is that we need to extend all of our business processes (not just the order fulfilment process) beyond the boundaries of our organisation into our suppliers and customers businesses (Figure 5). Hammer [2001] reports that re-engineering and streamlining the business processes within the boundaries of the organisation is not sufficient to achieve super-efficiency. Super-efficient companies have their business processes extending beyond their organisational boundaries. Our own research suggest that in extending the processes into the customers and suppliers, the processes also need to be supported by other peripheral providers and suppliers to achieve super-efficiency, and e-business technologies and models have a significant contribution to make in facilitating the extension of these business processes in to customer and supplier enterprises.

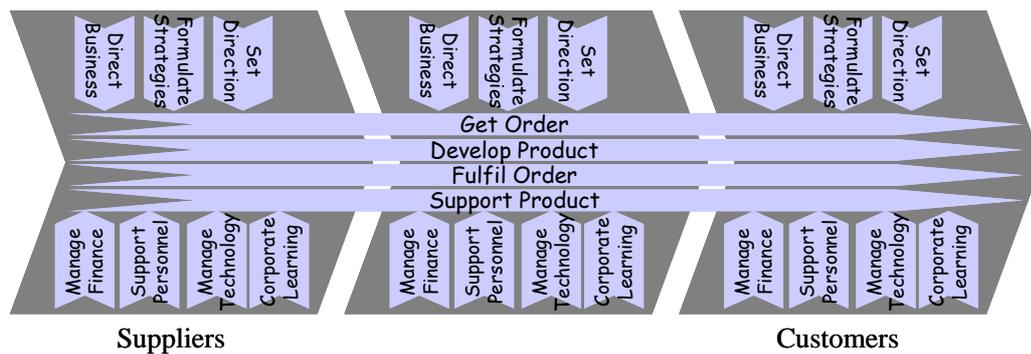


Figure. 5. The extended business processes.

4. THE WHAT? AND THE HOW?

Taking these trends and analysing them in the context of the competitive business structure presented earlier in Figure 1b, we could conclude that:

- Although, at a superficial level, collaboration between firms may appear to take place at enterprise level, in reality collaboration takes place at business unit level. In fact, in complex organisations, which may have several business units, each business unit may be part of a different collaborative system. Figure 6 illustrates this concept where enterprise E1 has three business units (BU1, BU2 and BU3). Each business unit is part of a different extended enterprise and, therefore, a different collaborative system - depicted by arrows with different patterns.

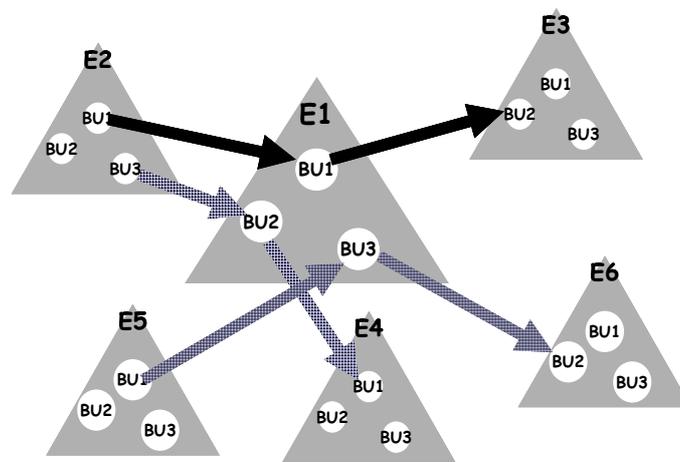


Figure 6. Architecture of collaborative systems between enterprises.

- Within the architecture presented in Figure 6, any one collaborative system (extended enterprise or extended business unit) has to ensure that the operate processes are extended across to enterprises within that collaborative system. Figure 7 illustrates the business process architecture of an extended enterprise where three business units of three different enterprises are joined to create an extended enterprise with extended operate processes and local support processes.
- The literature on value proposition suggested that enterprises need to make their value propositions explicit. Research by Martinez and Bititci [2001] identified that value propositions arise at business unit level as each business unit within and enterprise may have a different value proposition. It is

our proposal that the extended enterprise should have a value proposition, that defines the strategic posture for the entire extended enterprise. This value proposition can then be deployed down to value propositions for each individual business unit. Indeed, the value proposition/strategic posture of each business unit may be different, but it is essential that they remain complementary (Fig. 7).

- In order to ensure that the strategic posture and associated performance objectives remain complimentary across individual business units within different enterprises a meta level performance management process is proposed to integrate and co-ordinate the individual performance management process within each enterprise (Figure 7).

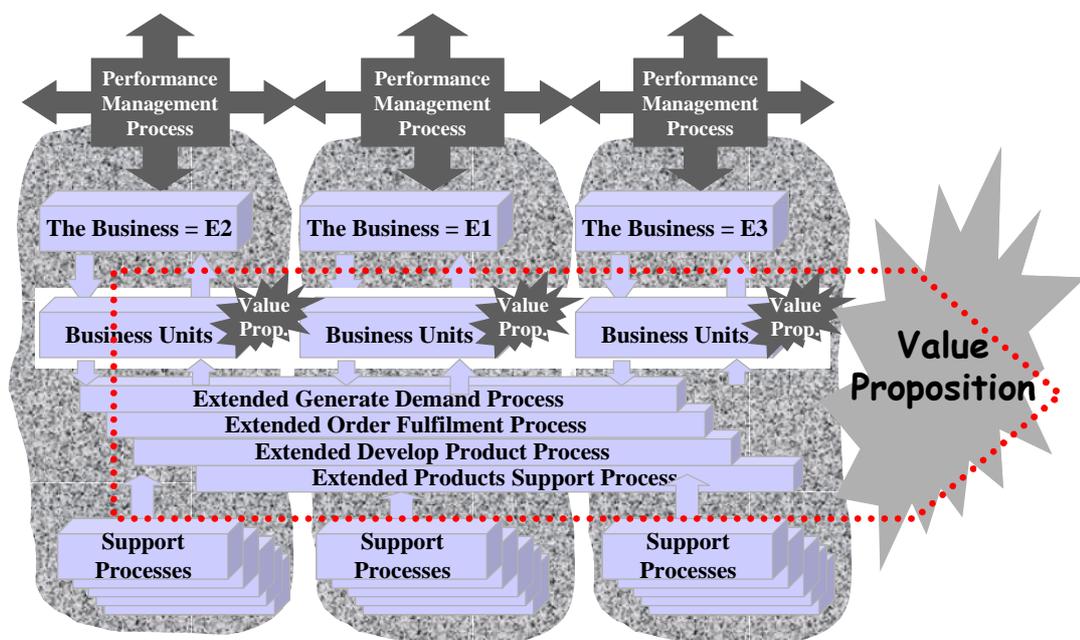


Figure 7. The proposed architecture for an extended enterprise.

The next section outlines the research conducted, based on a single case study, to explore the validity of this structure. This research whilst confirming that this structure is valid, also illustrates that, in reality, this structure is significantly more complex than that illustrated in Figure 7.

5. CASE STUDY: Daks Simpson Limited

The case data presented in this section was collected through a series of semi-structured interviews and workshops with the management team of the case study organisation.

Daks Simpson is an apparel manufacturer specialising in ladies' and gents' suits, jackets and trousers. The manufacturing facilities are based in Scotland with product design based in London. The products are sold in a global market. Daks is a globally recognised brand name with a significant presence in the Far-East market, particularly in Japan.

In practice Daks has two business units, These are:

- **Brand Business** which specialises in the design, manufacture and sales of products under the Daks brand. These products are tailored garments produced to high specifications in limited quantities. Typically, a gent's suit may sell at £400 - £600 in one of Daks' stores or through one of their retailers, such as Fraser, Slater or Harrods in the UK and through Nordstrom in the US.
- **Contract Business** which specialises in the design, manufacture and sales of products either under customers own labels, such as the St Michaels label for Marks and Spencer, or for corporate wear under a customer's name such as Bank of Scotland. Compared to the garments produced for the Daks brand these are much simpler products sold in larger volumes. These are mass-produced rather than tailored in contrast to the Daks product range.

Table 2 below illustrates the nature of the extended enterprise for each one of the business units. The empirical data presented in this Table confirms the existence of two different extended enterprises (or collaborative systems) within one enterprise.

	Suppliers	Daks Simpson	Customers	Overall Value Proposition
Daks Business	<p>Fashion designers and design houses.</p> <p>Innovation in materials and new designs in materials (i.e. patterns)</p> <p>Flexibility of supply, quality of materials.</p> <p>Flexibility of supply, quality of products.</p> <p>Flexibility of supply</p>	<p>Designer-led product design with emphasis on style, look and feel. Garments can be customised to individual customers requirements.</p> <p>Complete new product ranges for every season.</p> <p>High variety low volume manufacturing in manufacturing cells - small tailoring units responsible for complete manufacture of a garment</p> <p>A significant accessories business, such as belts, ties, shirts, jackets, caps, etc., designed by Daks and manufactured by subcontractors.</p> <p>High degrees of uncertainty and complexity requiring frequent changes to production schedules</p>	<p>Fraser, Slater, Harrods, Nordstrom, Daks shops, etc</p>	<p>Brand Managers/ Product Image</p>
Contract Business	<p>Customers influenced by fashion, influencing product style and specification.</p> <p>Cost of materials and manufacturing methods</p> <p>Reliability and continuity of supply. Price.</p> <p>Reliability and continuity of supply</p>	<p>Customer led product development in volume designs with emphasis on minimising the work content.</p> <p>New product introductions fairly rare - mostly minor modifications to existing designs.</p> <p>Low variety and high volume manufacturing in manufacturing lines.</p> <p>No accessories business</p> <p>Low uncertainty and complexity makes planning and scheduling simpler requiring little or no changes to schedules</p>	<p>Marks and Spencer, Bank of Scotland, etc</p>	<p>Price Minimisers/ Value for money</p>

Table 2. The collaborative structure of Daks Simpson Limited.

Further analysis of the Daks' "Order Fulfilment" and "Product Development" processes illustrate that the overall picture is quite complex, as shown in Figures 8 and 9. Here, for both Extended Business Units, the two processes have been mapped in their extended forms to illustrate the value chain of each extended process, whilst the details of the processes internal to Daks have been suppressed. Figure 8 shows that the two extended processes have enterprises/organisations that are both specific and common to both processes. For example, cloth suppliers, such as Arthur Bell, Nobles, Moon, etc., have a role to play in both the Product Development process and the Order fulfilment process. Whereas catwalks are specifically part of the extended product development process, the equipment suppliers and subcontractors are specifically part of the extended order fulfilment process.

Figure 9 on the other hand illustrates a much simpler picture for the Extended Contract Business Unit; this is not a surprised as this is a much simpler business unit where product variety is low and volumes are high with relatively low product development activity. Although this is a much simpler extended business unit, structurally it demonstrates the same characteristics as the Extended Daks Business Unit.

However, further analysis (not illustrated in Figures 8 and 9) also revealed that the organisations common to both extended processes are split internally. For example, in the case of the extended Daks Business Unit, in one of the cloth suppliers (Nobles) there is a team of people who work closely with the designers in Daks on product development whilst another team in Nobles is working closely with the order fulfilment team in Daks. Furthermore, the product development and the order fulfilment teams in Nobles are in continuous communication with their counterparts in Daks but they rarely communicate with each other within Nobles. Our research established that this was a common occurrence in all those suppliers and customer who are involved in both order fulfilment and product development processes.

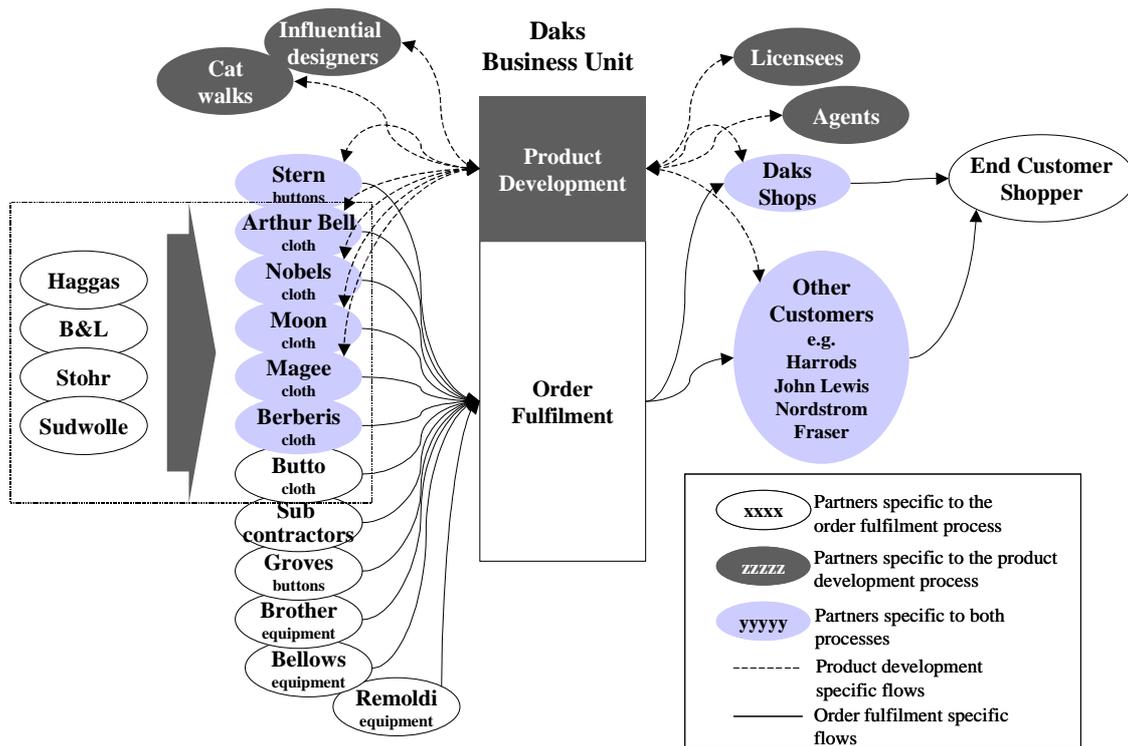


Figure 8. The configuration of the extended business processes in the extended Daks business unit.

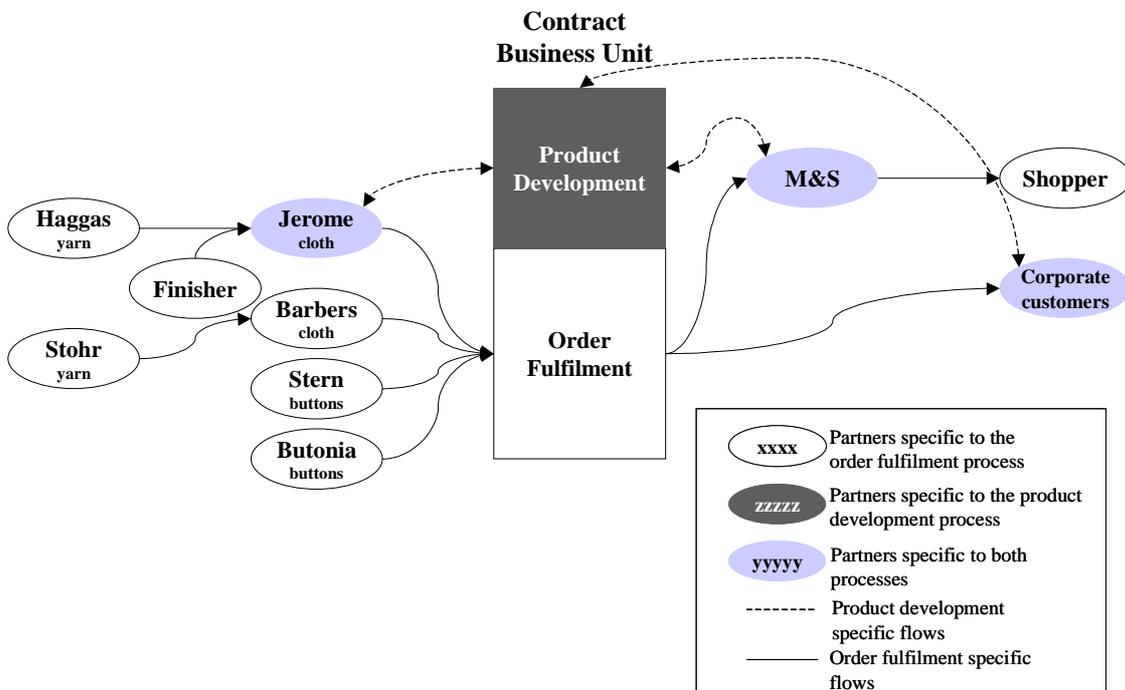


Figure 9. The configuration of the extended business processes in the extended Contract business unit.

From this case study we can conclude that:

- The two extended business units are exclusive.
- The two extended business processes are exclusive.
- Although some organisations may be common to both extended business processes, the internal split within these organisations is such that the two processes remain exclusive.
- There is a continuous flow of information and knowledge between enterprises along each one of the extended processes.
- However, the flow of information and knowledge between the two extended processes is intermittent.

This case study strongly supports the architecture proposed in Figure 7 and it suggests that, in developing collaborative systems, attention needs to be paid to:

1. Flow of information and knowledge along each extended business unit
2. Flow of information and knowledge between two different extended units
3. Flow of information and knowledge along each extended process
4. Flow of information and knowledge between two different extended processes

6. DISCUSSION

We started this paper by asking two questions; In order to create and sustain competitive advantage through collaborative systems WHAT should we be managing? and HOW should we be managing it?

We started with introducing the Competitive Business Structure (Figure 1b) and reviewing some of the global trends in manufacturing and business, which led us to focus on Manage Processes, Value Propositions and Extended Business Processes. We then went on to developing a model of the collaborative architecture for extended enterprises and demonstrated the validity and complexity of this architecture through a case study.

From a methodological perspective this research is based on Kaplan's (1998) and Meredith's (1993) innovative constructivism. Here the researcher starts with an observation of the limitations of the current knowledge and practices and goes on to develop innovative ideas to address these limitations either through documentation of innovative practices (Kaplan 1998) or through logical deduction from the existing literature. The researcher then collects cases, teaches and speaks about the innovation, writes articles and books and then implements the new concept. The researcher goes through this loop in order to achieve initial, intermediate and advanced implementations, which continuously informs theory (Meredith, 1993). This approach was used to develop the Balanced Score Card (Kaplan and Norton, 1992 - 1996 - 2000a -2000b)

The research presented in this paper can be seen as:

- An initial deduction, from literature, of an architecture (Figures 6 and 7) for managing extended enterprises.
- Initial testing and description of the validity of this model through a case study.

- An initial set of hypothesis with respect to systems requirements of

The validity of the model was tested through a single, but in depth, case study, focusing on two distinct business units within the organisation. It is therefore realistic to state that, in this case, the architecture presented is valid. Therefore, it should be applicable in other cases. However, because the validation is based on a single case study, we cannot claim that the results are universal. Thus we would propose the following as hypothesis for further research.

6.1 THE WHAT?

In our view, to create and sustain competitive advantage through collaborative systems, it is the following structure that needs to be understood and managed -

- An extended enterprise is an integration of business units of various enterprises - i.e. the extended business unit. In this context one enterprise can be part of several extended enterprises (Figure 6)
- Within each extended enterprise the operate processes extend beyond the boundaries of an enterprise along the extended enterprise
- The structure of the business process architecture is complex - in an extended enterprise, different operate processes may extend into different enterprises, as illustrated in the case study (Figures 8 and 9).

6.2 THE HOW?

In managing the collaborative architecture of an extended enterprise the following critical factors should be taken into consideration.

- The strategic posture and objectives (or the value proposition) of the extended enterprise needs to be identified and deployed to the individual business units along the extended enterprise. Indeed,

the strategic posture and objectives of each business unit may be differ. The critical issue here is that the these should be complementary to one another and to the overall strategic posture. Otherwise we will be sub-optimising the performance of the overall extended enterprise.

- Each enterprise should have a process for managing its strategy and performance. This process should continuously monitor the internal and external environment of the enterprise and make decisions leading to actions which may effect; the priorities of a business process; the way a business unit competes within its market; the value proposition of a business unit; or the number or the scope of business units a business chooses to operate with.
- In order to maintain compatibility between the business units of different enterprises operating along an extended enterprise, it is essential for the strategy and performance management processes of each enterprise to co-ordinate with the others through a meta manage-process.
- Collaborative systems are required which facilitate information and knowledge flow within each enterprise and within each extended enterprise capable of operating at various levels concurrently. At extended enterprise level collaborative systems should ensure that the appropriate knowledge and information flows from the performance management process of one enterprise to another. More specifically to create and sustain competitive advantage through collaborative systems, information systems are required which are capable of:
 - Facilitating the concurrent management of the extended enterprise as well as the individual enterprises within the value system.
 - Differentiating between different business units of an enterprise where each business unit may be part of a different extended enterprises which.
 - Facilitating flow of information and knowledge across the meta-manage process for each extended enterprise. Including information and knowledge flows relating to:

- The strategic posture of the extended enterprise and the strategic role of each member enterprise.
- The performance objectives, targets and achievements of the external enterprise and the individual enterprises.
- Differentiating between different operate processes whilst ensuring that critical interactions between different extended operate processes are maintained.
- Facilitating flow of information, knowledge and work between the meta-manage process and the individual extended operate processes.
- Facilitating flow of information, knowledge and work along the extended operate processes as well across these processes to ensure that critical linkages are maintained.

6.3 FURTHER RESEARCH

So far in this paper we have built a model (i.e. the architecture of an extended enterprise) based on previous work and literature, and demonstrated, to a limited extent, that this theory is valid. The model presented in this paper raises a number of issues which require further analysis. These are:

- An organisation may be part of more than one value system, that is, as it operates a number of business units, one of its business units may be part of one value system and another business may be part of another value system with each business unit having a different value proposition. Research by Martinez and Bititci [2001] demonstrated that a business can have more than one value proposition and that sometimes having different value proposition within one enterprise can lead to conflicts and inefficiencies within that enterprise, depending on the interdependence of the value propositions. However, the exact natures of these conflicts are not well understood. It is therefore essential to develop better understanding of strategic coordination between enterprises operating as part of an extended enterprise.

- The model suggests that the collaborative architecture of the extended enterprise is WHAT needs to be managed (i.e. the business, business units, the extended operate processes, the support processes and the activities within these processes). The implication of this is that, if we are to manage these extended processes we need to manage our people along these processes [Hammer, 1999]. However, a majority of enterprises today are still functionally organised and people are still managed in functional silos. To date we do not fully understand the methods, tools and techniques required to facilitate management and operation of process-based teams within an organisation [Mendibil and MacBryde, 2002]. The management of process-based teams for extended processes is an area that requires significant amount of research.
- Since the seminal paper by Hammer [1990] introducing the concept of business processes, there has been a lot of research and development in the field of business process management. However, it is the manage processes that sustain competitive advantage by recognising and responding to changes in their internal and external environment either through maintaining and developing a winning formula or through identifying and changing to a winning formula. Whilst there has been significant research done to document the operate processes [Childe et al, 1995] and to develop performance measures for these processes [Bititci and Carrie, 1998, Bititci, 2000, Bourne et al, 2000 and Neely 1999], little or no work has been done to identify the manage processes or indeed to develop models of these processes. Thus, the manage processes required to support extended enterprises needs to be better understood.

7. CONCLUSIONS

This paper is about the competitive structure of collaborative/extended enterprises and implication of this on management systems. The paper is not about seeking competitive advantage through collaborative systems. We realise that globalisation of commercial and industrial activities are a symptom of collaboration between enterprises for economic advantage. In this paper we do not question this and take it as a given. The paper is about the structure of a collaborative/extended enterprise (The What?) and how this structure needs to be managed (The How?) if the collaborative enterprise is to create and sustain competitive advantage.

In our view this paper makes a contribution in three areas:

- It makes the complex structure of collaborative enterprises explicit from two points of view:
 - a. From the point of view of the extended enterprise
 - b. From the point of view of the individual enterprise who has to manage its participation in one or more collaborative/extended enterprises
- It proposes an initial management systems architecture that would facilitate efficient and effective management of the collaborative enterprise from both of the viewpoints described above.
- It outlines an initial set of requirements for management systems that would be needed to support this architecture.
- It also raises further research questions on the management of the collaborative enterprise.

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