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## Ten Concepts for an eBusiness Collaborative Project Management Framework

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### Abstract

*Theory and frameworks that apply to ebusiness projects undertaken within a single authority are inadequate when organizations need to collaborate. Collaboration demands additional management effort. Project management needs to coordinate the three levels of participating organizations, virtual teams and representatives. Three project lifecycle management functions, which relate to collaboration formation, initiative development, and the take-up and implementation of ebusiness, create extra management challenges. Project management needs to focus on four “meta factors” derived from the critical success factors used by practitioners and identified by researchers. These “meta factors” are motivation, capability, communication and coordination. This summary paper proposes that these ten concepts (three levels, three lifecycle management functions and four “meta” factors) need to be addressed in a theoretical framework capable of supporting effective management of ebusiness collaborative projects, providing an understanding of outcomes and reducing failure.*

### 1. Introduction

Awareness of the strategic benefits of information and communication technology (ICT) across multiple organizations, industries and national borders is spreading. As a result increasing numbers of ebusiness<sup>1</sup> projects are initiated as “collaborative projects”.

eBusiness has strategic importance to government and business internationally. eBusiness is considered so important it is measured by national statistics organizations using standard indicators developed by the OECD (Organization for Economic Cooperation and Development) (de Graaf & Muurling, 2003; OECD, 2001). Provided ebusiness implementation is successful, benefits include increased international competitiveness, reduced costs, improved profitability, and enhanced quality of service. Additional

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<sup>1</sup> The United States Census Bureau (October 2000) defines ebusiness as “any process that a business organization conducts over computer-mediated network channels.” In order to reflect current and emerging developments this definition of “ebusiness” is expanded to include “all business activities utilising all forms of ICT and digital technology” (eg automated voice response; video streaming). eBusiness includes collaborative commerce which uses ICT to enable collaborative relationships along a value chain and knowledge flows among distributed participants engaged in various joint activities.

benefits arise because errors and delays are reduced, and data and knowledge are shared through trading and value chains.

Collaboration benefits participants because of shared development costs and risks, and opportunities for increased credibility, new learning and knowledge, increased capability and capacity, and access to skills and resources. (McGrath & More, 2002). New inter-organizational operations are created (Lee, Pak, & Lee, 2003). McGrath & More found 69% of interviewees reported that ebusiness collaborative project outcomes were achieved mainly due to the efforts and contribution of the participating organizations.

## 1.1 Definitions

An ebusiness collaborative project is “a project undertaken by a group of independent organizations, with no single authority, that have made a commitment (whether formally or informally, and with or without equity sharing) to work together to develop and implement an ebusiness initiative in order to achieve mutually agreed outcomes” (Cameron, 2004; Cameron & Clarke, 1996). With current ICT this normally implies use of the internet or some other electronic network (eg Virtual Private Network).

"Collaboration is an interactive, constructive, and knowledge-based process, involving multiple autonomous and voluntary participants employing complementary skills and assets, with a collective objective of achieving an outcome beyond what the participants' capacity and willingness would allow them individually to accomplish" (Hartono & Holsapple, 2004). Collaboration is a process that goes on within an ebusiness project.

Although many of the characteristics mirror those of other business collaborations, ebusiness collaborative projects differ because of the project management context. The collaborating participants aim to develop ebusiness initiatives and implement complex ICT across trading and value chains, comprising diverse organizations, within a given timeframe. This goal imposes specific management challenges not associated with other types of collaboration. If systems are integrated and processing is automated, business operations and practice are transformed (Cameron, 1993; Clarke, 1994b; Hirst & Robertson, 1997). A typical ebusiness collaborative project involves developing and implementing industry wide standards for electronic messages for use throughout and across trading chains.

All ebusiness projects are “boundary spanning” (Emmelhainz, 1990; Kinni, 1994) but many are undertaken within a single organization (eg business to consumer implementations involving web-based transaction processing). Some ebusiness projects are based on compliance and not collaboration. Organizations may participate because of regulatory and buyer-supplier relationships. In collaborative projects each participating organization is a volunteer and normally a separate legal entity. Independence and authority is not relinquished.

eBusiness projects differ from other ICT projects because they include integrating diverse data, IT systems, architectures, protocols and standards across disparate organizations. The ICT used for ebusiness is an add-on to existing technology (Lyytinen & Damsgaard, 2001). Organizations are required to interface their internal ICT systems and interoperate with partners via communications infrastructures that often include the internet. The nature of the ICT involved means that ebusiness cannot be implemented without cooperative effort.

## **1.2 The Business Problem**

The problem with all ebusiness projects is the high failure rate. Comparable statistics are not available, but industry sources estimate the failure rate of ebusiness projects to be as high as 80% of all projects initiated. The failure rate for ebusiness collaborative projects in Australia is thought by practitioners (interviewed in 2004) to be as high as 90% of all projects initiated (Cameron, 2004). eBusiness project failure is frequently caused by inadequate project management processes and lack of essential project management skills (Fear & Barnett, 2003; NOIE, 2002).

Australian practitioners report that currently formal project methods are often not used for collaborative projects because they are considered inappropriate for use by multiple organizations when there is no single authority. In many formal methods the amount and type of documentation required is not practical for use by all participants (eg small business). Larger participants may already use a variety of methods. Assumptions incorporated into the processes (eg “sign offs” required at the completion of activities) are not valid for collaborative projects. Some ebusiness collaborative projects are “managed” on an “ad hoc” basis (Cameron, 2004). Only 31% of the 67 Australian Information Technology onLine (ITOL) funded projects studied, had established clear written agreements delineating roles and responsibility, and 17% did not document processes even though they were required to report to government (McGrath & More, 2002).

“Across a broad range of [*ebusiness collaborative*] projects, many project participants have come to realise that managing people, relationships, and business processes is harder than managing technology” (McGrath & More, 2002) (page 4). A report into the challenges of complex IT projects concludes that “The importance of project management is not well understood and usually under-rated” ... “Basic research into complexity and associated issues is required to enable the effective development of complex, distributed IT systems” (Engineering & Computer Society, 2004). eBusiness collaborative projects are examples of complex IT projects but have added complexity arising from collaboration. The collaboration management issues are not well understood.

“Project management methods and theories relating to ICT projects carried out within a single organization, where formal power structures apply, are inadequate for projects comprising independent enterprises...where interpersonal and inter-organizational relationships, trust and communication replace formal power and authority structures (Cameron & Clarke, 1996).” For this reason the ultimate aim of the author’s research programme is to provide transparent, logical and consistent guidelines for a project management method that is capable of reliable application and use by practitioners across ebusiness collaborative projects. In order to achieve this aim, a framework that provides a set of principles and theories capable of supporting effective management of ebusiness collaborative projects and providing an understanding of outcomes is required. This framework needs to be substantiated by a sound theoretical base and empirical evidence (Clarke, 2001).

As the first step in this research programme the author identified key concepts that need to be addressed to ensure the framework is complete. Research was undertaken from a project management perspective. The questions addressed and reported in this summary paper are:

1. What concepts need to be addressed in a theoretical framework that is capable of supporting effective management and providing an understanding of the outcomes of ebusiness collaborative projects?
2. Is there an existing theory or framework that incorporates these concepts?

The research method adopted to identify the concepts that need to be addressed in the framework is described in the next section. These concepts are derived from the:

- Characteristics of managing ebusiness collaborative projects and the project life cycle (Section 3).
- “Meta factors” which are the key factors distilled from the process of categorising the critical success factors (CSFs) used by practitioners and identified by researchers (Section 4).

The ten concepts identified for managing ebusiness collaborative projects, set out in Section 5, provide criteria for assessing the completeness of existing theory and frameworks identified during the literature review. Gaps in existing theories and frameworks are discussed in Section 6. The insights this paper contributes to research and practice are summarised in the conclusion.

Yin’s “three principles of data collection” were used to improve the validity of the research (Yin, 1994). Multiple data sources were used, a case study database was constructed and a chain of evidence was maintained to link information from different sources. The author used data, method and construct triangulation (Bloor, 1997). Multiple sources of evidence support the development of converging lines of inquiry (a process of triangulation recommended by Yin, 1994 and Bloor 1997).

## 2. Research Method

The research undertaken to address the problem of managing ebusiness collaborative projects followed the methodology shown in Figure 1. Steps 1-6 are reported in this summary paper. A conceptual theoretical framework has been developed (Step 7) and is currently undergoing validation.

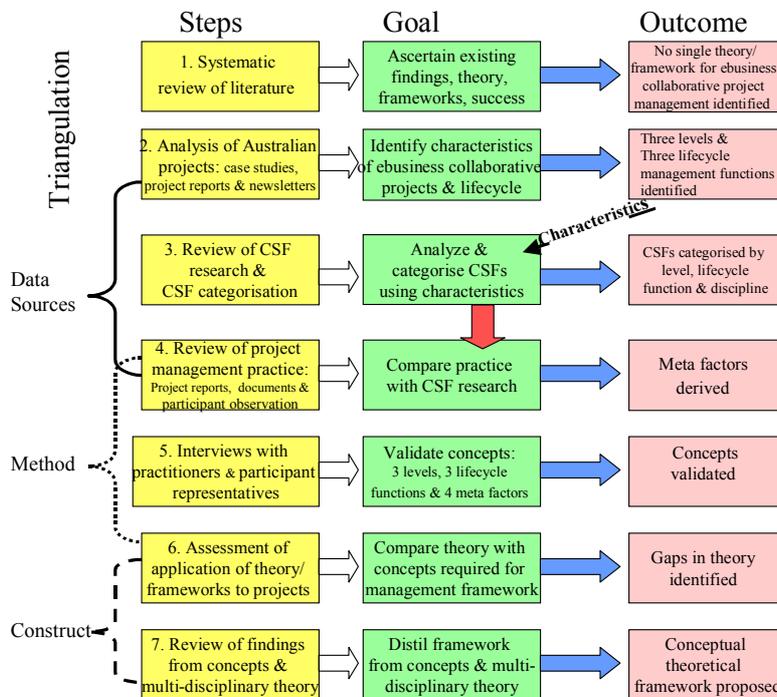


Figure 1: Research Method

**Step 1** of the methodology was a systematic review conducted using a standard methodology (Kitchenham, 2004). This review identified a significant body of literature pertaining to:

- Research related to existing practice, theory and frameworks focussing on ebusiness and collaboration. This literature summarised the current status of research and provided the background information for Step 6.
- Research from industrial psychology, management, inter-organizational systems (IOS), and project management focussing on issues relevant to ebusiness collaborative projects. This was used to inform all the subsequent research steps.
- Identification of case studies of ebusiness collaborative projects that contributed to Step 2.
- Research related to critical success factors (CSF) in ebusiness projects. This supported the research undertaken in Step 3.

**Step 2** involved a detailed review of eight Australian projects. Four case studies were associated with international trade and transport (Cameron, 1996; Clarke, 1994b, 1994c; Hirst & Robertson, 1997; Tradegate, 1994-97, 2003; Tradegate-ECA, 1997-2002). The other four case studies were in the book trade (Cameron & Clarke, 1996), the food export industry (Wilkins, Swatman, & Castleman, 2001), funds management (mFundEC, 2001-2003) and the superannuation industry (Cameron, 2002; SuperEC, 2001). This research led to identification of the characteristics of ebusiness collaborative projects (see Section 3.1) and the specification of an appropriate project lifecycle (see Section 3.2).

**Step 3** analysed reports of international studies in order to identify and classify a wide range of CSFs for ebusiness projects (see Section 4).

- Eight case studies were reviewed. Five projects were Australian (Clarke & Jeffery, 1994; Gregor & Elliot, 2002; Gregor & Menzies, 2000; McGrath & More, 2002; Schware & Kimberley, 1995). Two projects were undertaken in the UK (Allen, Colligan, Finnie, & Kern, 2000; Mitev, 2000). One project was from New Zealand (Fear & Barnett, 2003).
- Three papers reporting studies of CSFs were also reviewed. These authors researched US manufacturers (Gossain, 2002), SME's in Northern Ireland (Shiels, McIvor, & O'Reilly, 2003) and organizations in Thailand (Esichaikul & Chavananon, 2001).

The author constructed an integrated list of the CSFs identified from these sources and then categorised them by the characteristics identified in Step 2:

- Level (ie participant, team or representative).
- Lifecycle management function (ie collaboration formation, initiative development, take-up and implementation).
- Discipline (eg business, project management, collaboration, organization).

The validity of categorisation was assessed against the following criteria:

- Characteristics of ebusiness collaborative projects identified in Step 2.
- "Participant observation" (Jorgensen, 1989), in accordance with "practice-driven" research (Zmud & Price, 1998). This was based on the author's personal experience over 10 years as a manager of ebusiness collaborative projects. The author mitigated

the risk of biased interpretation by comparing her analysis with that of other researchers and then by interviewing other practitioners.

- Relevance from a project management perspective, since this is the prime focus of the current research.

**Step 4** used primary documentation prepared by practitioners from four Australian projects (AirEDI (McKittrick, 1995), EXTEDI (Cameron & Jeacle, 1995), EDIMI (Assenza, 1995) and SuperEC (SuperEC, 2000-3)) to “corroborate and augment evidence from other sources” (Yin, 1994). These sources captured the richness of the management context, reported key events and factors that influenced project outcomes, and described “best practice”. The author analysed these documents to find the CSFs reported by practitioners, compared the findings with the CSFs found in Step 3, and consequently identified four “meta factors” that affect the outcome of ebusiness collaborative projects (see Section 4).

**Step 5** validated the concepts identified in Steps 2, 3 and 4. The author undertook in-depth interviews with five practitioners and three representatives of participants involved in five separate ebusiness collaborative projects. The interviews confirmed the importance of the ten concepts identified (see Section 5).

**Step 6** reviewed the theories and frameworks identified in Step 1 and compared them with the concepts identified in Steps 2, 3 and 4. This assessment confirmed the presence of gaps in the ability of existing theoretical research to support effective management and to provide an understanding of ebusiness collaborative project outcomes (see Section 6).

## **2. Characteristics of eBusiness Collaborative Projects**

eBusiness collaborative projects combine the complexity associated with other forms of collaboration with the challenges of ebusiness projects. In addition, the project lifecycle differs from that of other ICT and ebusiness projects because of the need to initiate and establish the collaboration and then maintain it throughout the development phases of the project until the take up and implementation across the trading and/or value chain is complete.

### **2.1 eBusiness Collaboration Project Management**

Most research into ebusiness management has concentrated on the level of participating organizations. The characteristics of **participants** that affect the management of all forms of collaboration (Gray & Wood, 1991a, 1991b; Hardy, Lawrence, & Grant, 2005), include the following:

- Interactions among independent, volunteer organizations result in complex inter-relationships.
- Participants are volunteer organizations, and if dissatisfied, may become inactive or leave.
- Benefits must be dispersed “fairly” among all organizations.
- Tension occurs among some participants because of the need to cooperate with competitors - a phenomena of ebusiness known as “coopertition” (Loebbecke, Fenema, & Powell, 1998).

- Formal power cannot be imposed on participating organizations so that decisions cannot be enforced.
- The management structure, roles and responsibilities are more complex than those within a single organization and/or authority.
- Resources are not centrally controlled and participants choose what they provide and when they provide it.
- Resources, skills, expertise and size of each organization vary.
- Organizational culture within participants differs and internal processes and procedures (eg for decision-making) vary.

These characteristics are confirmed by ebusiness collaborative project case studies and other research. They need to be acknowledged as “assumptions” in the theoretical framework.

eBusiness collaborative project reports provided rich insight into the additional complexity of managing participants, teams and representatives and the inter-relationships within the ebusiness context (Cameron, 2004). From a management perspective, key differences from managing ebusiness projects within a single authority to managing collaborative projects were illustrated in the management structure, reporting requirements, decision-making and coordination processes, and in the amount of communication and consultation required.

Management structures documented by project management described the separate roles and responsibilities at the levels of participant, governance body (eg steering committee), project team and representative. The governance body established teams and appointed representatives to undertake the agreed development activities. The project structure was often mirrored within the organizational structure of each participant.

Project managers reported to a governance body comprising numerous representatives from independent participating organizations, each with their own priorities and motivation for joining the project. Some project managers reported to, and were accountable to, several “authorities” with different agendas (eg head of an industry body; chairman of the governance body who also represented a participant).

Decision-making was complicated because decisions were made independently both within the collaborative project and within each participating organization. Most reports emphasized the importance of facilitating agreement with the separate decisions of participants, teams and representatives. Decision-making processes within and among teams were complex and lengthy. For example, although ICT professionals developed the technical solutions and separate teams (normally comprising representatives from business units) developed new business rules, the ICT and business decisions were interrelated. Because ebusiness is a transformative technology with broad impact, these decisions impacted on existing internal ICT systems and business processes of participants across the trading or value chain. Therefore, decisions made in the project teams were subject to review and ratification within each participating organisation. Delays and uncertainty about decision outcomes in collaborative projects increased risk.

Management processes and procedures adopted for coordinating activities stressed the need for consultation at all three levels of the project. The project manager, without formal authority, had to coordinate all the activities required to develop and implement the complex ICT initiatives across all participants within a given timeframe.

Formal and informal communication was considered very important because it was normally the main means of coordinating, motivating and influencing the three levels

involved in the collaboration. Regular meetings were held separately within each participating organization and among project teams to give and receive feedback for decision-making purposes. Formal and informal communication among representatives and project management was used to build trust and maintain collaboration.

Practitioners reported that the characteristics of collaborative **project teams** (including the governance body) differed from that of projects undertaken within a single authority. Project managers needed to coordinate the activities of ICT and business members of geographical dispersed teams (ie “virtual” teams) from diverse organizations. Team members had differing expertise, organizational roles and seniority.

At the **representative** level, individuals remained accountable to their own organization and were rarely allocated to the collaborative project on a full-time basis. The necessity for representatives to continue supporting activities inside their own organizations while completing project tasks in accordance with requirements and schedules was noted in several reports. This often resulted in role conflict and the way it was resolved affected the performance of project teams. For example, representatives needed to get approval from their own organization about changes to business practice and ICT. They also needed to negotiate within the collaborative project teams to ensure their organization’s interests were protected. This affected the timeliness of completion of project activities, often severely.

In summary, analysis of Australian projects confirmed that the interdependent activities at the levels of participants, teams and representatives, undertaken separately and together, are key determinants of project outcome. Therefore, these three levels are key characteristics of managing ebusiness collaborative projects that need to be included in a management framework.

## 2.2 eBusiness Collaborative Project Lifecycle

Collaboration adds management functions to those required by the traditional ICT and ebusiness project lifecycle (Cameron, 2004). The “eBusiness Collaborative Project Lifecycle<sup>TM</sup>” shown in Figure 2 was validated by industry and practitioners (Cameron, 2004).

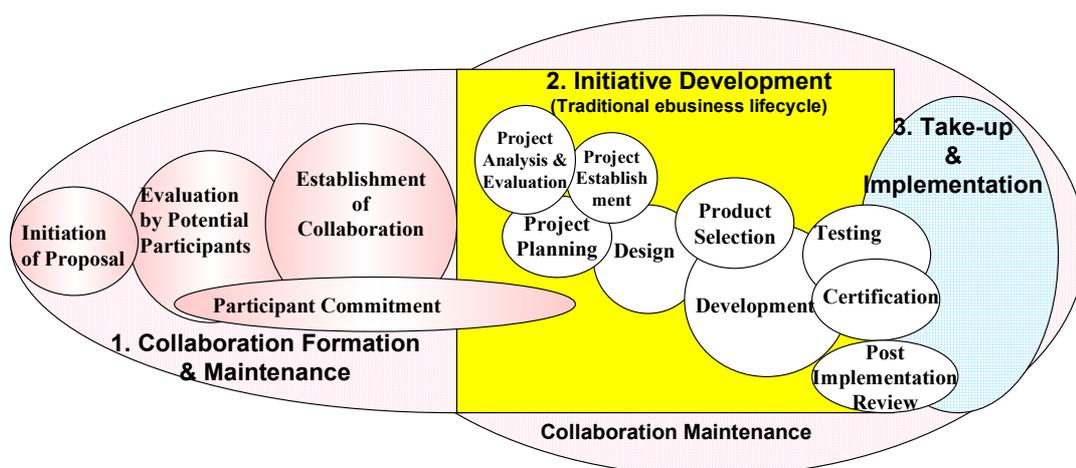


Figure 2: eBusiness Collaborative Project Lifecycle<sup>TM</sup>

As illustrated in Figure 2, collaborative project phases can be separated into the following three distinct functions:

1. Collaboration formation (which incorporates the processes of initiating and establishing the collaboration before the ebusiness project can begin) and collaboration maintenance (which is ongoing throughout the ebusiness collaborative project lifecycle).
2. Initiative development (which follows the traditional ebusiness project lifecycle).
3. The take-up and implementation throughout the trading or value chain.

The new function of **collaboration formation**, not required for projects undertaken within a single authority, is shown on the left in Figure 2. Initiation, Evaluation (by participants considering the benefits of joining the collaboration), Commitment and Establishment Phases are added to the beginning of the lifecycle. The associated management functions and the related processes and activities carried out in these phases are additional to those undertaken in the traditional ICT project start-up phases.

Collaboration formation incorporates the development of what is known in collaboration literature as “collective identity”. During the **Initiation Phase**, leaders concentrate on recruiting participants. As in other collaborations, leaders aim to establish and communicate a shared understanding of the problem and market the advantages of collaborating. During the **Evaluation Phase**, each potential participant assesses the benefits of joining the project. The lengthy **Commitment Phase** is crucial. The project cannot be established and will fail unless sufficient numbers of organizations (including key trading partners) agree to collaborate. Project reports note the extensive time taken to persuade and motivate participants to join the project. Long delays often occur before sufficient organizations agree to contribute resources. Even successful collaboration may take years to achieve. Commitment of new participants continues into the initiative development function. At the time of the **Establishment Phase**, the “rules of engagement” and roles are agreed. Joint action is negotiated and then the collaborative project enters the first phase of initiative development, the Project Analysis and Evaluation Phase.

The management functions associated with **initiative development** (shown within the rectangle in Figure 2) are common to most ICT and ebusiness projects. However, as discussed, collaboration creates extra coordination and motivational activities for project management (eg balancing competing interests, facilitating shared and consensual decision-making, synchronizing the activities of multiple virtual teams). Development procedures adopted and the tools employed in traditional ICT projects need to be adapted for use by multiple organizations. The differences in data, ICT systems, standards, protocols and architectures already implemented within the independent participating organizations makes development more complicated. Because different participants implement at different times, the Testing and Compliance Phases are drawn out.

Difficulties associated with **the take-up and implementation** of collaborative project initiatives are frequently reported by practitioners and researchers. Coordinating implementation is very challenging. Benefits for participants are linked to the take-up rates of key trading partners but, as in collaboration formation, each organization separately makes its own decision about when and if to implement the initiative. Participants need to agree to commit resources. They need to be capable of implementing the initiative with trading partners within an accepted timeframe. Smaller organizations may need to be assisted with implementation in order to achieve critical mass. Long delays in implementation are normal. It took seven years after the collaborative projects were completed, plus the provision of electronic translation services, before 80% of

transactions required to freight goods to and from Australia by sea were conducted electronically.

In summary, the ebusiness collaboration lifecycle differs significantly from other ICT and ebusiness projects. Collaboration adds management functions. Consequently, the three ebusiness collaborative project lifecycle management functions related to collaboration formation and maintenance, initiative development, and the take-up and implementation need to be addressed in the management framework.

### 3. Critical Success Factors

CSFs are activities, processes and behaviours that need to be addressed by project management in order to achieve successful project outcomes (Esichaikul & Chavananon, 2001). The author therefore reviewed the CSFs reported in the literature in order to identify concepts that need to be addressed to manage collaborative ebusiness projects successfully. It is acknowledged that the list of CSFs may not be complete.

The majority of CSFs identified in Step 3 relate to **participants** (Allen et al., 2000; Cameron, 1996; Cameron & Jeacle, 1995; Clarke, 1994a, 1994b, 1997; Emmelhainz, 1990; Esichaikul & Chavananon, 2001; Fear & Barnett, 2003; Gossain, 2002; Gregor & Elliot, 2002; Gregor & Menzies, 2000; McGann & Lyytinen, 2002; McGrath & More, 2002; NOIE, 2002; Schware & Kimberley, 1995; Shiels et al., 2003; SuperEC, 2000-3; van der Heijden, 2000). At the **participant level** the CSFs, discipline (eg business) and the meta factor to which they related, are:

#### **Motivation** (“meta factor”)

- Business - Linkage of initiative with business strategy or urgent business issues; enterprise and operational integration.
- Economic - micro-level economic and market concerns of individual organizations throughout the trading chain including return on investment; appropriate business model; rapid take-up to achieve critical mass.
- Collaboration - Continued commitment and involvement of an adequate number and mix of participants in the project.
- Organization - Learning for participating organizations; executive support and championship from all participants throughout the project life.

#### **Capability**

- Business - Understanding of ICT and ebusiness benefit.
- Technical - ICT capability of participants; readiness of participants for ebusiness; availability of technical infrastructure including security standards.
- Environment - Macro-level inhibitors and constraints (eg legal requirements); industry association support (for projects comprising industry networks).
- Organization - Change management; organizational ability to change.

#### **Communication**

- Management of partner expectations.
- Marketing the project.

### **Coordination**

- Collaboration - Preparation and relationship management; power sharing and participation; a win-win approach; partner compatibility; trust among project partners and beneficiaries; independent or trusted mediation; establishment and maintenance of cohesion and cooperation; establishment of confidence; fair distribution of risk costs and benefits.
- Business - Risk management (relationship and project risk).

These CSFs reveal the additional management functions and activities required by collaboration.

At the **team and representative levels**, CSF research focused on project management (Allen et al., 2000; Cameron, 1996; Cameron, 2002; Cameron & Jeacle, 1995; Clarke, 1994a, 1994b, 1997; Clarke & Jenkins, 1993; Esichaikul & Chavananon, 2001; Fear & Barnett, 2003; Gregor & Elliot, 2002; McGrath & More, 2002; Rafaeli & Ravid, 2003; Shiels et al., 2003). At the **team level** the CSFs identified by the listed researchers are:

### **Motivation**

- Establishment and commitment to objectives, performance measure and fulfilment of responsibilities.
- Completion of activities within specified time periods and budgets.
- Quick and visible results.

### **Capability**

- Appropriate allowance of staff time and effort for activities; allocation of sufficient suitably skilled staff, equipment and other resources to the project.
- Learning for participating organizations.

### **Communication**

- Effective and frequent communication, and social and people skills.

### **Coordination**

- Choice of project manager and alliance leadership.
- Participative leadership, decision-making, and power sharing.
- Appropriate, transparent, structures and management systems.

At the **representative level** the CSFs for ebusiness collaborative projects identified from the author's research are:

### **Motivation**

- Motivation of representatives to contribute to the project and the team.

### **Capability**

- Learning and acquisition of new expertise by representatives.

### **Communication**

- Effective and frequent communication.

### **Coordination**

- Effective social and people skills.

Capability and readiness for ebusiness were recognised by practitioners as indicators of participant ability to contribute to a project and their likelihood of implementing the initiative. However, technology and capability were not frequently reported as CSFs by researchers. It may be that researchers were focussed on finding the key differences between collaborative projects and other types of ebusiness projects.

An independent categorisation of CSFs associated with “best practice” from practitioner reports (Step 4) led to the recognition that CSFs could be grouped under the meta factors of “motivation”, “capability” “communication” or “coordination” (Cameron, 2004). These meta factors (branded as MC<sup>3</sup>) were applicable to both the three levels of participant, team and representative and to the three lifecycle management functions.

In summary, the author proposes that the four “meta factors” (MC<sup>3</sup>) form a pattern that need to be addressed by management framework because they:

- Describe ebusiness collaborative project management practice and experience.
- Incorporate CSFs identified by empirical research.
- Apply to the characteristics of ebusiness collaborative projects.

## **4. The Ten Concepts**

Based on the evidence presented, the answer to the first question posed in this paper is that a theoretical framework for managing ebusiness collaborative projects needs to address the following ten concepts:

1. Three levels of the collaboration - participant, team and representative.
2. Three management functions of the lifecycle - collaboration formation and maintenance, initiative development, and the take-up and implementation.
3. Four meta factors that need to be monitored in order to understand project outcomes - motivation, capability, communication and coordination (MC<sup>3</sup>).

These ten concepts were validated by interviews with practitioners and representatives experienced in various roles in ebusiness collaborative projects. Analysis of their responses demonstrated that project outcomes were affected by the joint and separate actions at the levels of participant, team and representative. They considered the ability of project management to facilitate these inter-relationships to be important. Practitioners acknowledged the lifecycle management functions required by the collaborative nature of the project. All respondents were able to distinguish the extent of motivation and capability at the participant and team level over time, and were prepared to disclose their own level of motivation and knowledge. All rated communication as very important or essential. The project management style and use of formal and informal means of coordination appeared to impact outcomes and affect the quality of collaboration (Cameron, 2004).

Practitioners also identified the following six issues they believed affected project outcomes that were not encompassed directly by MC<sup>3</sup>:

1. Lack of trust - “fear” of dominance and self-interest of other participants.
2. Organizational culture - “isolationism”.
3. Politics - inter and intra organizational politics and interpersonal relationships.
4. Changes in the business environment - organizational disturbances within companies (including takeovers and mergers), changes in key personnel, lack of funding due to other priorities.
5. Professional culture - differences in understanding and priorities between business and ICT management and staff.
6. Lack of realism in project planning and management expectations.

The first four issues apply to all forms of collaboration. Professional culture and lack of realism affect other ICT projects. Because none of the six issues are specific to ebusiness collaborative projects, they were not added to the list of meta factors.

These ten concepts, derived from empirical research and practice, form the criteria against which the completeness of theory and frameworks applied to the management of ebusiness collaborative projects were assessed.

## **5. Discussion of Existing Theory and Frameworks**

The appropriateness of theory in the ICT management discipline depends on the type of project and its technical and social environments (Olle et al., 1988; Sibley, 1986), as well as on the nature of the problem and its context (Lyytinen, 1987). There is growing recognition by ebusiness researchers of the importance of considering multiple levels of analysis in order to explain the interactions, complexity and outcomes of ebusiness collaboration (Lyytinen & Damsgaard, 2001; Mitev, 2000; Reimers, Johnson, & Klein, 2004; Riemer, 2004; Shiels et al., 2003).

Researchers have most frequently applied theory to the **participant level**. Most research focussed on **organizational motivation for joining** collaborative projects and for **implementing** ebusiness initiatives.

The following theories are most commonly cited as explaining the **organizational motivation** for joining collaborative projects:

- Strategic Theory - the need to ensure organization’s business and ICT strategies are aligned and implemented. (McGrath & More, 2002).
- Micro-economic Theory - the need for cost benefit, operational efficiency and effectiveness, and reduced transaction cost (Cameron & Clarke, 1996).
- Transaction Cost Theory – the need to reduce transaction costs (Kambil & Short, 1994; McNichols & Brennan, 2004; Rossignoli & Lapo, 2004; Watson et al., 2004).

Some researchers argue that theories based on economics (eg cost reduction) are not adequate explanations of participant motivation. These theories assume “rationality” and do not address social or business relationships, or the network and interaction aspects associated with ebusiness.

Two theoretical approaches suggest that business relationships affect motivation. Resource Dependency Theory postulates that collaboration will not occur unless a

condition of high stakes and interaction occurs (Baskerville & Pries-Heje, 1998; Kambil & Short, 1994). Strategic Network Theory proposes that resources gain value through interaction and relationships (Rossignoli & Lapo, 2004). It focuses on network effects. The third motivational approach relates to the organizational desire to increase “**capability**”. Organizational Learning (McGrath & More, 2002), Knowledge (Loebbecke et al., 1998) and Knowledge Alliance Theories (Baskerville & Pries-Heje, 1998) propose that participants are motivated to collaborate by the opportunity to learn through cooperation.

Diffusion of Innovation Theory utilises aspects of **communication** theory. Rogers (1995) proposes that delivery of relevant messages about the uses and benefits of ebusiness to decision-makers within organizations via key individuals (“champions”) influences evaluation outcomes by participants especially during the take-up and implementation.

**Coordination** of ebusiness collaborative projects relates to managing the collaboration (among participants) and the project (eg team activities). At the participant level, researchers have considered two main theoretical approaches to explain why organizations cooperate. The first approach suggests that participants are motivated by self-interest. Organizations cooperate to gain access to the power and influence required to ensure benefit from changes (Political Theory) and will regulate behaviours so that collective gains are achieved (Strategic Management Theory) (Cameron & Clarke, 1996). Social Capital Theory more altruistically proposes that organizations value group membership and the benefits derived from social relationships (Riemer, 2004). Theory was not generally applied to how best to coordinate participants. However, in the case of industry wide ebusiness collaborative projects, Strategic Bridging Theory was used to explain that collaboration may be assisted by industry bodies acting as “honest brokers” (Cameron & Clarke, 1996; Gregor & Menzies, 2000).

Because of the high numbers of ebusiness collaborative projects that fail to be implemented, the take up and implementation has often been researched. Researchers propose that a participant’s decision to implement an ebusiness initiative, and the time they choose to take it up, are explained by Micro-economic (Cameron & Clarke, 1996), Transaction Cost (Kambil & Short, 1994; Rossignoli & Lapo, 2004) and Critical Mass Theories (Somasundaram, 2004). Again, this approach assumes “rationality” based on cost/benefit. Resource Dependency Theory may explain why participant decision-making processes are not necessarily rational (Wilkins, Swatman, & Castleman, 2000).

Diffusion of Innovation Theory (Rogers, 1995), which combines theory from various disciplines to explain the processes for adoption and diffusion of innovation, is most frequently considered by researchers examining ebusiness adoption (Chan & Swatman, 1998; Gregor & Menzies, 2000; Mitsufuji, 2001; Mustonen-Ollila & Lyytinen, 2003; Wilkins et al., 2000; Woodside, Gupta, & Cadeaux, 2004). Conversely its validity in the ebusiness context is debated (Larsen, 2001; Lyytinen & Damsgaard, 2001; McMaster, 2001). Researchers agree that adoption of ebusiness is a dynamic process (Woodside et al., 2004) involving continuous interplay of content, process and context (Kautz & Henriksen, 2002) and capability. Rogers (1995) also considered diffusion as a social process. He uses Social Learning Theory (developed by Bandura in 1977) to describe how individuals learn by observing and imitating (with variations) and to explain why individuals are more likely to adopt an innovation if others in their personal network accept it previously.

At the **project team management level**, practitioners report that traditional project management methods and processes based on socio-technical theories are useful in planning and monitoring activities but do not address the need to ensure cooperation among participants and members of virtual teams. Web Theory (Kling, 1987) emphasises the social, interdependence, competitive and political aspects of IT (Cameron & Clarke,

1996). This theory also recognises the dynamic environment of ICT project management and advocates the use of participative management principles. However, it does not describe or explain outcomes for ebusiness collaborative projects.

The author did not find research that related theory to the **representative level** of ebusiness collaborative projects.

A review of IOS frameworks identified the theoretical perspectives adopted for ebusiness (McNichols & Brennan, 2004). Six of the twelve frameworks identified used the transaction cost approach. Two frameworks used diffusion of innovation (one in combination with transaction cost) and two adopted a resource dependency perspective. Value chain and competitive analysis approaches were each used in one framework. Although this review focused on adoption and implementation of collaborative technology in the supply chain, it recognised the complexity of collaboration relationships. The perspective McNichols & Brennan considered best incorporated organizational elements and inter-organizational relationships with environmental and implementation factors, combined the competitive advantage and embeddedness approaches. However, these frameworks apply only to participants.

Figure 3 maps the theory and frameworks applied to ebusiness collaborative projects to the ten concepts established as the assessment criteria and illustrates the gaps especially at the team and representative levels<sup>2</sup>. This figure shows that most theory in ebusiness collaborative project research has been applied to the participant level. Theories based on three different approaches have been used to explain participant motivation for collaborating. Theories associated with the capability of participants (eg learning) have been examined in the context of collaboration formation and the take-up and implementation. Although communication theory is not specifically applied to participants, it is an important part of the Diffusion of Innovation Theory. Project management theory has been applied to project coordination at the team level but not to address participant coordination throughout the collaborative project lifecycle.

META FACTORS			
	Motivation	Capability	Communication
	Yes	Yes	Yes
	Yes	Incomplete	Yes
	Incomplete	Incomplete	Incomplete
	Incomplete	Project - Yes	Incomplete
LEVEL			
Participant	MC <sup>3</sup> -Yes		MC <sup>3</sup> -Yes
Team		Coordination - Yes	
Representative			
FUNCTIONS	Formation	Development	Implementation

Figure 3: Gaps in theory and frameworks applied to ebusiness collaborative projects

<sup>2</sup> Since this paper was written, a paper has been published in 2004 by E. Hartono and C. Holsapple which provides some support for the ten concepts and does not conflict with the author’s findings. A detailed comparison of their framework will be published in a future paper.

In answer to the second question posed in this paper, the author did not find a single theory or framework within the collaboration or ICT management literature that incorporated all of the ten concepts required for managing ebusiness collaborative projects. Nevertheless, the author concluded that, with the addition of theory from other disciplines identified in subsequent research, aspects of existing theory and frameworks can be utilised to develop a theoretical framework capable of supporting effective management and providing an understanding of the outcomes of ebusiness collaborative projects.

## 6. Conclusions

Inadequate project management processes and lack of essential project management skills are one cause of the high failure rate of ebusiness collaborative projects. Collaboration management issues are not well understood within the ebusiness project context. The collaboration process requires additional research aimed at providing guidance for management and helping to reduce failure.

The literature search, case study investigation, and review of “best practice” have identified ten concepts (three levels, three lifecycle management functions and four “meta” factors) that need to be addressed in a theoretical framework for managing ebusiness collaborative projects. The author used the ten concepts to assess the completeness of the theories and frameworks applied to ebusiness collaborative projects. The resulting gap analysis provides focus for researchers and indicates additional opportunities for research.

Identification of the characteristics of ebusiness collaborative projects provides practitioners and researchers with new insight into why the additional management complexity of ebusiness collaborative projects occurs. In addition to managing the challenges arising from the lack of single authority, the boundary spanning environment of ebusiness projects and the voluntary nature of participation, project management needs to coordinate the three levels comprising participating organizations, virtual teams and representatives and their complex interactions. The impacts of these characteristics on the project (eg on decision-making) identified in this research have important implications for practitioners who need to ensure appropriate management processes are adopted. For researchers the findings imply the levels of participant, team and representative all need to be considered.

The “eBusiness Collaborative Project Lifecycle<sup>TM</sup>” developed by the author reveals a distinctive lifecycle. The description of this lifecycle contributes to practitioner and researcher understanding of how and why the management functions, which relate to collaboration formation, initiative development, and the take-up and implementation of ebusiness across a trading or value chain, vary in emphasis throughout the project. There is a need to focus on managing the collaboration as well as on the project activities.

The author’s distillation of four meta factors (motivation, capability, communication and coordination or MC<sup>3</sup>) from the numerous critical success factors used by practitioners and identified by research advances practice. Project management can use these meta factors to monitor project “health” throughout the ebusiness collaborative project lifecycle. They provide practical guidance to practitioners seeking to avoid failure.

And finally, the ten concepts enabled the author to conclude that, with the addition of theory from other disciplines identified in subsequent research, aspects of existing theory and frameworks can be utilised to develop a theoretical framework capable of supporting effective management and providing an understanding of the outcomes of ebusiness collaborative projects.

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