

# An Analysis of E-Business Systems Impacts on the Business Domain

Norazlin Yusop, Didar Zowghi, David Lowe

University of Technology, Sydney

PO Box 123 Broadway 2007, NSW, Australia

[norazlin@it.uts.edu.au](mailto:norazlin@it.uts.edu.au), [didar@it.uts.edu.au](mailto:didar@it.uts.edu.au), [david.lowe@uts.edu.au](mailto:david.lowe@uts.edu.au)

## Abstract

In e-business systems, the business environment and processes not only drive the identification of system needs, but also are in turn fundamentally changed by the introduction or evolution of a system. This means that an e-business system that is under development will be highly volatile with a complex set of impacts on the various domain characteristics (and conversely, the changes in the domain impact on the nature of the desired system). We report on a detailed analysis of the literature related to these impacts. From this analysis we show how different facets of the domain of a system are impacted in different ways. As the scale and immediacy of these impacts increase we need to become more predictive of these impacts in taking them into account during the development. Our analysis will provide organisations with the basis for moving towards this increased level of predictiveness.

## 1. Introduction

A key characteristic of e-business is that the introduction of the system has a fundamental impact on the nature of the business processes and business models which are being supported by the system. In other words, the business environment and processes not only drive the definition of the system needs, but are in turn fundamentally changed by the system. These changes are such that not only are the system requirements changed, but the very nature of the problem that was being addressed is changed. In effect, the business "problem" defines the nature of the technical system "solution" that is desired, but the solution itself changes the characteristics of the problem space. This can be described as solutions and problems being "mutually constituted" – a concept well understood in the area of social informatics [40] and requirements engineering [9].

Whilst this concept of mutual constitution – or its expression as a technical solution leading to significant changes in the problem space – is typical of almost all systems development, it is particularly significant with e-business systems. This is because of the scale and immediacy of the impacts that e-business systems can have on their domain. Whilst most IT development exhibits these characteristics, either the process impacts are sufficiently obvious to be able to be taken into account easily, or their scale is sufficiently constrained to allow them to be initially ignored and to then be addressed once the system has been implemented. As the

scale of the impacts increases, we need to become more predictive of these impacts and take them into account during the initial development. Whilst there has been a significant body of work looking at specific impacts of e-business systems, these impacts have not been analysed in the way they impacted the organisation. This paper presents an analysis that encapsulates the dimensions of impact of both the domain of mutual influence and the domain of context. This analysis will provide the organisations with a framework for developing strategies for joint development of e-business systems and business processes. It will also serve as value-added knowledge for the companies in understanding the strengths, weaknesses, opportunities and threats that may affect their system, organisation and stakeholders (e.g. trading partners). These dimensions and their characteristics are derived from a comprehensive analysis of the literature across a wide range of disciplines.

In essence this analysis of the literature provides a basis for addressing the following research questions:

*Question 1: In the development of an e-business system, what are the characteristics that impact on the organisation's business environment (system and organisation)?*

*Question 2: Are different facets of the domain impacted in fundamentally different ways by the introduction of e-business systems, and if so then what are the differences?*

In the next section, **Section 2**, we will be discussing the e-business system types, the characteristics of the domain of mutual influence, domain of context and the taxonomy which we have developed from the analysis of the literature. In **Section 3**, we will be evaluating the facets of the domain that are being impacted by the development of e-business systems. In **Section 4**, we will conclude this paper and briefly present our future research plan.

## 2. Existing Literature

In analysing existing work on e-business systems impacts, we undertook a broadly-focused analysis of literature from diverse disciplines including: marketing, management, logistics, engineering, information systems, information technology, and manufacturing. Content analysis is used to identify web related factors and elements that impact organisations, the type of e-business systems they are related to, the extent of impact, what is being impacted and whether the impact is positive or

negative. Content analysis technique is used as it is a research method that uses a set of procedures to make valid inferences from the text, which in this paper is the literature [34]. In this paper, we have identified e-commerce systems and e-business systems as being a subset of the web systems.

## 2.1 Web system types

From the literature, there are several studies which identify various types of impacts and the applicability of these impacts to different types of web systems. Whilst the definition of Web system varies, a useful working definition is a system that is designed and developed using a web based technology. *"Web systems are different from conventional software systems. They are developed in shorter timeframes, and with smaller budgets, meet a more generic set of requirements, and generally serve a less specific user group. They are often developed very quickly from templated solutions, using coarse-grained authoring tools, and by the efforts of a multi-disciplinary team"* [31].

There is significant number of articles, which have discussed E-commerce and E-business systems. E-commerce is defined "as the buying and selling over digital media" [29]. E-business definitions often encompass e-commerce and include both front-and back-office applications that form the engine for modern business. E-business is not just about E-commerce transactions; it's about redefining old business models, with the aid of technology, to maximise customer value. E-business definition refers to a broader definition of E-commerce, which includes collaborating with business partners, and conducting electronic transactions within an organisation [46]. As there are various trading partners, e-business trade activities are categorised under business-to-business (B2B), business-to-consumer (B2C), consumer-to-business (C2B), consumer-to-consumer (C2C), people-to-people (P2P), government-to-citizen (G2C) and intra-business (organisation unit to organisation unit) [40]. Essentially these systems facilitate the inter- and intra-organisational flow of goods, services, information, coordination and collaboration.

## 2.2 Domain of Context vs. Domain of Mutual Influence

The domain of the system under development can be separated into two distinct sub-domains. The *Domain of Context* is those aspects of a systems (or organisations) which provide a context for (i.e. affect) the system, but which are not directly and immediately affected by the system (e.g. legal regulatory frameworks). The *Domain of Mutual Influence* is those aspects of the domain which affect the system, but which are in turn directly and immediately affected by the system (e.g. business processes, or – for most e-business systems – the external customers).

Table 1 outlines the characteristics of the **Domain of Mutual Influence** and the characteristics of the **Domain**

**of Context** that impact on e-business systems and the literature sources, which discuss these impacts. Characteristics identified in the Domain of Mutual Influence are characteristics that are impacted by e-business systems and organisations. Examination of existing literature highlights several facets of the domain that are impacted by the introduction or modification of e-business systems. These typically relate to the business processes, systems, operations, structure and communication between the organisation's employees and with the various trading partners, such as customers, suppliers and manufacturers. Within an organisation, e-business systems have a more direct impact. Studies that have been undertaken typically characterise impacts as either positive or negative (or strengths and weaknesses) for the organisation, depending on the types, effect and level of impact each has on the organisation.

## 2.3 Taxonomy

From the e-business systems discussed in the literature (and summarised in Table 1) it can be observed that the development of e-business systems have different impacts on the business environment. There are five dimensions of these impacts that form the taxonomy that we propose in this paper, which is discussed in detail in [49]. In table 1, *characteristic which affect* (labelled alphabetically) is identified as characteristic of a particular domain that affect the system or organisation domain. *Characteristic that are affected* (labelled numerically) is identified as characteristics of the system or organisation domain that are being affected. Let us illustrate the taxonomy with an example. As depicted at the top of Table 1, time and speed (of business operations) is a **characteristic** of the business environment that is affected by the introduction of an e-business system. This type of impact is typically most evidenced in e-business **systems** and most commonly affects the facets of the **domain**, which in this example, is the organisation and the system domain. The impact on time and speed has a generally positive **effect** and high **level** of impact on the organisation [8] [46].

## 3 Facets of the domain which are impacted by e-business systems

In this paper we have identified four different facets of the domain which can have impacts: the domain of mutual influence, the domain of context, the system itself and the organisation which hosts this system. In the facets of the domain column of Table 1, the facets are categorized according to the facets of the domain that is impacted, which are **System**, **Organisation**, domain that is **Mutually influenced** and the domain that form the Context. We explain these facets and their characteristics in detail below. For System and Organisation facets, we also discuss some of the characteristics that are mutually influenced, hence categorized as characteristics of the domain of mutual influence.

**Table 1. Characteristics of the organisation and its environment that impact and/or are impacted by e-business system**

Characteristics which affect	Characteristics that are affected	Facets of the Domain Impacted	Effect of Impact	Level of Impact	Sources
Goods and services delivery to market (A) Cycle time of product ordering and delivery (B) Ordering process (C)	Time and speed of org. decision-making process (1) Time of workflow process Speed of workflow process	OS/M	Positive Positive and Negative  Positive	High (all aspects)  High (all aspects) High (all aspects)	Byrne (2000)  Jones and Kochtanek (2002) Golicic et al (2002)
Supply chain intermediation and disintermediation (D) Access levels differentiation (E) Customer value (F)	Value Exchange (2)	OS/M	Positive Positive	Medium for all aspects EXCEPT High for value offering	Gordijn et al (2000) John et al (2002) Turban et al(2000)
Service personalisation (G) Robots to monitor promotion activities (H) Multiple response generations (I)	Scalability (3)	SS/M	Negative	High for System	Arlitt et al (2001), Arlitt and Jin (2000), Challenger et al (1999), Fielding and Taylor (2000)
Work processes streamlining (J) Spread of network infrastructure use (K)	Customer Expectation (4)	OS/M	Positive	Medium (all aspects)	Gaedke and Turowski (2000)
Real time access, easy to use interfaces (L)	Usability (5)	SS/M	Positive	Medium (all aspects)	Hansen (2002)
Collaboration and communication support (M) Interface between systems (N) Linking various stakeholders (O)	Communications interface (6)	OS/M	Positive	High (all aspects)	Peng (2002)  Fielding and Taylor (2000)
Unspecified system characteristics	Navigation structure (7)	S-S	Positive and Negative	Medium (all aspects)	Scharl (2001), Conklin (1987), Schwabe et al (2002)
Security threat to org. proprietary data (P) Internet infrastructure security threat (Q)	Security (8)	OS/M	Negative Negative Negative	High (all aspects)	Osmonbekov et al (2003) Chakrabarti and Manimaran (2002)
Unspecified system characteristics	Intra-organisational communication & collaboration (9)	S-S	Positive	High (all aspects) Low for all aspects EXCEPT Medium for organisation	Tang (2000) Michael (1996), Ciborra (1996)
Unspecified system characteristics	Business Process (10)	S-S	Positive	Medium (all aspects)	Fowler (1998) Coltman et al (2002) Giaglis (1999) Scheer and Habermann (2000) Swatman et al (1994)
Document routing, retrieval and approval process (R) Process of ordering (S)	Workflow process (11)	OS/M	Positive  Positive Positive and Negative	Medium (all aspects)	Miers (2001)  Ames et al (1997) Cunningham (1999)
Change from mass production manufacturing to demand-driven manufacturing (T)	Material purchase method (12)	O-S	Positive	Medium (all aspects)	Turban et al (2000)
Information accuracy, currency, output timeliness and relevance (U)	Information Quality (13)	S-S	Positive	Low for all aspects	Negash et al (2002)

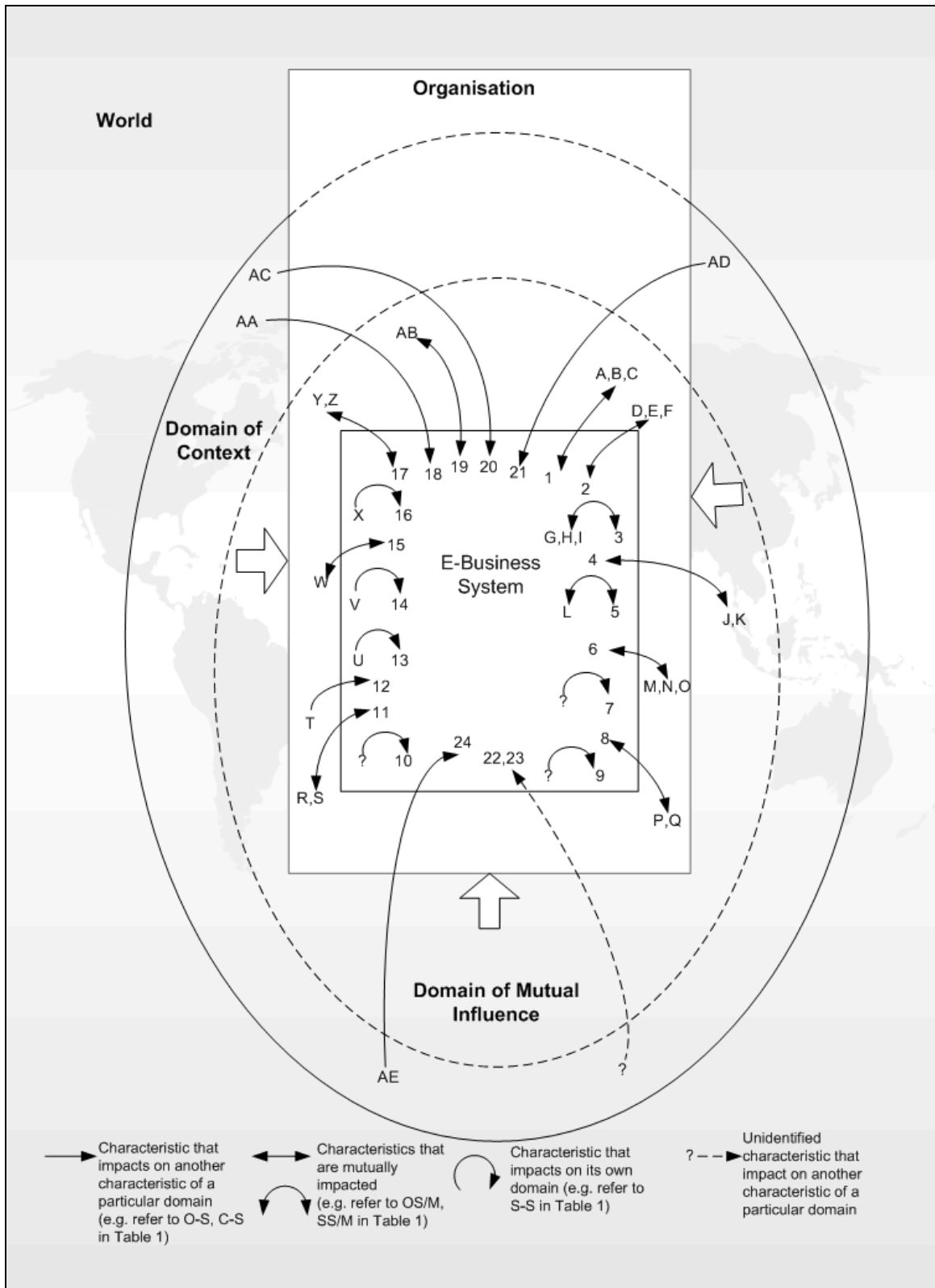
Continued from previous table

Characteristics which affect	Characteristics that are affected	Facets of the Domain Impacted	Effect of Impact	Level of Impact	Sources
Dynamic data, complex web page design (V)	System Performance (14)	S-S	Positive	High (all aspects)	Challenger et al (2002), Challenger (2000)
Management and improving org.'s relationship with customer and supplier (W)	Relationship Management (15)	OS/M	Positive Positive	Medium (all aspects) Medium (all aspects)	Dignum (2002)
Data accuracy, reliability, system flexibility, ease of use (X)	System Quality (16)	S-S	Positive	Medium for all aspects EXCEPT High for System	Negash et al (2002)
Web adoption cost, System acquisition cost (Y) Transaction cost (Z)	Cost (17)	OS/M	Positive	Medium (all aspects)	Osmonbekov et al (2002) Kalakota and Whinston (1996) Ardagna and Francalanci (2002)
Customers' need of viewing orders on own system (AA)	Integration of front and back-end office system (18)	C-S	Positive and Negative	High for System (medium organisation)	Dignum (2002)
Web applications and tools interoperability problems (AB)	Integration of different web system applications (19)	OS/M	Positive and Negative	High for System medium for organisation)	Bohner (2002), Jin et al (2002), (Bussler et al, 2003), Gaede and Turowski (2000)
Web application customisation and personalisation (AC)	Personalisation of service and product offering (20)	C-S	Positive	Medium for System	Schwabe et al (2002) Schwabe and Rossi (1998), Rossi et al (2001)
Competition from existing and new firms (AD)	Competition (21)	C-S	Negative Negative	Medium (all aspects) High (all aspects except System)	Wheelen and Hunger (1998), Chan and Peel (1998) Ing et al (2000)
Unidentified characteristics	Legal, ethical, govt regulation (22)	C-S	Positive and Negative	Low (all aspects)	Turban et al (2000), Mason et al (1995)
Unidentified characteristics	Web Technology Adoption (23)	C-S	Positive	Low for all aspects EXCEPT Medium for organisation	Jones and Kochtanek (2002)
Information visibility facilitated by speed and connectivity, evolving and changing business process (AE)	Uncertainty of business environment (24)	C-S	Negative Negative	Medium (all aspects) Medium (all aspects)	Golicic et al (2002) Achrol (1997)

#### Facets of the Domain Impacted explanations:

- 'S': System characteristics that impact or are impacted
- 'O': Organisation characteristics that impact or are impacted
- 'M': Characteristics identified in the Domain of Mutual Influence are characteristics that are impacted by e-business systems and organisations. The Domain of Mutual Influence is those aspects of the domain which affect the system, but which are in turn directly and immediately affected by the system (e.g. business processes, or – for most e-business systems – the external customers).
- 'C': Characteristics identified in the Domain of Context are those aspects of a systems (or organisations) domain which provide a context for (i.e. affect) the system, but which are not directly and immediately affected by the system
- OS/M: Organisation characteristic that impacts on the System characteristic but which is in turn directly impacted by the system. Hence the organisation and system characteristics are mutually influenced, thus identified as being the characteristic in the Domain of Mutual Influence
- SS/M: System characteristic that are mutually influenced by another system characteristic
- O-S: Organisation characteristic that impact on System characteristic
- S-S: System characteristic that impact on another system characteristic
- C-S: Characteristic that provides the context for the system which impact on the system.

**Figure 2: Impact and Domain Boundary**



### 3.1 System

Dynamic data, insufficient network bandwidth and poor network design impact on the system's **performance** [11]. Performance is a critical factor and impacts significantly on the organisation's system efficiency, particularly for websites that receive hundreds of thousands of hits per minute. It may also impact on websites that receive a moderate amount of traffic if most of the requests are for dynamic data, which are expensive to create. In improving performance of a Web site, multiple processors can be used to scale the CPU capacity of the system [11]. System developers need to be selective of the types of web servers deployed so as to service a high request rates and techniques for routing requests to servers. Web pages should be designed to convey useful information in a limited number of pages so that clients do not have to navigate through too many pages to obtain information that they looking for. Table 1, shows that dynamic data and complex web page design is a characteristic of a system that impact on the performance of the organisation's system (**S-S**). In Figure 2, it shows that System Performance (labelled 14) is being affected by the organisation's initiative to use dynamic data and complex web pages for its e-business systems (labelled 'V').

**Security** has a significant impact on e-business functions as the systems interfaces into business functions of a corporation. As a result of this, security of the business transactions and process need to be safeguarded. Security poses a high impact on the organisation and the system development as there is no security technology that can secure the system effectively. Limiting access to proprietary data and controlling the scope of information retrieval are major issues that organisation need to focus on [37]. Currently, web-based selling and purchase tools have yet to fully address the security concerns. Replacing paper documents with electronic documentation has an undesirable impact on the organisation security. This is due to the possibility of permitting open links to proprietary data, and that electronic document lacks permanency and legal legitimacy of paper. In Table 1, it shows that Security is a characteristic that is mutually impacted, hence is labelled as **OS/M** (refer to the Facets of the Domain Impacted column). This explains that security is a characteristic of the organisation which impacts on the system and in return it directly impacts back on the organisation.

Another critical characteristic is **integration of front and back-end office system**, and integration of different web applications and tools. It is critical that e-business system developers integrate processes and operations, such as integrating the catalogue with internal databases, the order information with users' profiles, and integrate the ordering process with the back office of the customer's system [18]. In Table 1, it shows that customers are a characteristic of the domain of context that affects the integration of front and back-end office system (labelled as **C-S** in the Facets of the Domain Impacted column). This explains that customers may

indirectly affect the organisation's system. This impact drives the changes within the organisation; hence indirectly influence the organisation to integrate its processes with the customer's back office systems. **Integration of different web applications and tools** can lead to significant problems for an organisation and its external stakeholders. It is therefore important that different systems are able to interoperate with each other. B2B e-business integration is a complex issue; hence web services are used as a solution for many significant integration problems [7]. There is currently little research or lessons learned that report on the deployments that could advance web services technology functionality and integrates different e-business systems. As shown in Table 1, deployment of web applications and tools (labelled 'AB') is a characteristic initiated by the organisation's that affect on the e-business system. Deployment of web applications and tools create interoperability problems. The system therefore needs to be able to effectively integrate the different web applications to determine that the organisation's and external stakeholders' system can seamlessly interoperate with each other. This characteristic mutually influence on the organisation and system domain, hence labelled as **OS/M** in Table 1.

The need to **personalise service and product offering** to customers, trading partners and employees lead to the system designer to personalise link, structure, content and behaviour of the web page [43]. E-business initiatives have a significant impact on the organisation's stability, as it increases competition thus pressuring system developers to develop web applications that offer distinct competitive advantage. The challenge is to build customisable Internet applications, such as developing a personalisable Internet application [43]. The result of this is that it might provide different navigation topologies to different users, recommend specific products according to a user's preferences, or implement multiple policies.

These personalisation tasks have an impact on the requirements of the system. An application is required to model the user and user preferences, build profiles, and find algorithms for best linking options and others. The critical issue is however, to integrate all the personalisation features into a single design. Link personalisation for example, is useful for an electronic store such as Amazon, who may wish to provide customers personal recommendations of products that they prefer. A result of this personalisation is that the product directly accessible for one user may be different from those available to a different user and that certain users will have more direct access to certain information than the others [43].

### 3.2 Organisation

In terms of the organisation, facets of the domain include things such as the organisational structure, communication process, operations and matters relating to people who work within the organisation context.

One of the characteristics of the organisation that is impacted by the e-business system is **business process**, where the e-business system is being integrated into the process. Business process performance is dependent on the optimisation of core and support business processes. It is fundamental that due attention should be paid to the core business processes, their linkages, which add value to customer's service and product delivery. In relation to this, both organisational and technical aspects are important for effective transformation by describing a synergistic method for integrating EDI (electronic data interchange) by means of Enterprise Analysis [47]. Enterprise Analysis has taken the shape of ERP (enterprise resource planning) and is being integrated with e-business concepts [42]. After various BPR (business process reengineering) and ERP lessons learned, organisations have a better understanding of the limitations of intra-organisational improvement and play an active role in the global e-business community.

Organisations have shifted their mindset in thinking that e-business is only about creating a web site. It is critical that the back-office processes are designed according to the new requirements of ERP. With e-business concept, ERP cannot remain inside organisational boundaries. Technically, ERP vendors are forced to move from a traditional client/server to browser/web server architecture so as to deliver e-business capabilities. This has direct impact on the systems used by the vendors. On the conceptual side, ERP vendors face a greater challenge to provide instruments for managing the increasing e-business complexity [42].

In Table 1, it shows that business process (labelled 10) is a characteristic that is affected by unspecified system characteristics (not identified by the literature). This unspecified system characteristic affects the way business process functions and operates on the e-business system. Business process, in turn impact on the unspecified system characteristics itself, hence business process is identified as a characteristic that is mutually influenced.

In terms of the impact of web systems on **time**, employees increasingly feel the pressure to get breakthrough ideas to market first [8]. Internet is a tool, whose most significant impact is speed. This is a positive impact to an organisation but have a profound impact on the employee as shrinking time demands may caused increased problems in other areas, for example employee stress. In an e-business system environment, orders will be fulfilled electronically and the 'virtual financial close' put real time sales and profit figures at fingertips via a wireless phone or voice command to a computer. By taking orders from customers online, orders can be quickly routed to the appropriate order-processing site [42]. This process has a positive impact on the organisation and work productivity of the employees as this saves time and reduces expenses so sales staff have more time to sell. In Table 1, time and speed is a characteristic of the organisation that impacts on the system, which is in turn impacted back (labelled as

**OS/M**). This explains that time and speed is a characteristic that have mutual influence on the organisation and system domain.

E-business generates a new way of **managing customers and suppliers' relationship** (refers to as Relationship Management in Table 1). This means a transformation from a company that is geared towards production excellence or innovation excellence into a company that is geared towards customer intimacy [18]. In e-business, there is no unique successful business model for companies. Just as in traditional business, e-business model depends on the products and services that the company delivers and also on the market structure [18]. The Internet and the WWW is used as a tool by companies to track the traffic through the sites for their marketing and promotion purposes. This type of tracking allows the companies to collect customers' data, such as their purchases, purchase intent, IP address, email address and others.

In a customer relationship management project embarked by a trucking company in Eindhoven, Netherland, DAF trucks use the Internet to get feedback from their customers on the product and on the transaction of performance [18]. This means that the feedback from a customer can be processed together with the customer's profile by the departments of the company that are most affected by the feedback. This has significant impact on the system, whereby the organisation's information systems that are used internally have to be connected and synchronised, for example through the use of an enterprise resource planning system throughout the company. In Table 1, it shows that Relationship Management is a characteristic that is mutually impacted, hence is labelled as **OS/M**. This explains that Relationship Management is a characteristic of the organisation which impact on the system and in return it directly impacts back on the organisation.

**Value exchange** is a characteristic that impacts on system as well as the organisation. In e-business, process of intermediation and disintermediation presents specific e-business risks for traditional sellers. For example, intermediaries such as brokers might easily disappear or re-appear in an e-business environment. This is because buyers might decide to use a middle person (intermediary) to increase their combined buying power and seek better negotiations with the sellers. Due to this issue, it is important to show who is doing what with whom as e-business is more flexible than traditional business. Actors in e-business can be of different entities but their value offerings may coincide. This will have significant impact on the e-business project if there is no differentiation in the value offered by the different entities [24].

E-business systems offer the customers a distinct customer service value, compared to traditional business systems. The types of customer service offered via the e-business systems include answering customer enquiries, providing search and comparison activities, providing technical information to customers and allowing

customers to track order status [46]. Most banks and financial institutions allow their customers to view their account balance, status of stock portfolio, loan application anywhere and at any time. FedEx for example allows their customers to track their packages. Amazon on the other hand, notifies the customer by e-mail the acceptance of their order, the anticipated delivery dates, and later on, the actual delivery date.

### 3.3 Domain of Context

As discussed in Section 2.2, domain of context has an indirect impact on the organisation, system and external stakeholders (eg. trading partners). The decisions and e-business initiatives have strong implication on how business activities will be conducted between the organisation and the external stakeholders. From the analysis of the literature (refer to Table 1 and Fig.2), the characteristics of the domain of context that impact on the domain of context are external competition, market structure, legal and ethical issues, web technology adoption and uncertainty.

**Competition** is a characteristic that impact on the industry. In a hypercompetitive industry, such as the computer software industry, competition plays an important role and has a strong impact on the corporation strength and existence in the marketplace [48]. In this industry, competitive intelligence comes from an up-to-date knowledge of environmental trends and competitive activity and a willingness to risk a current advantage for a possible new advantage. A company in current market needs to compete with domestic and global competitors in order to survive [13].

Competitors in the Internet evolve rapidly over night and this makes it difficult for organisations to keep developing and changing its competitive intelligence. It is therefore critical that organisations capture the value from customers [26]. In e-business, the value that the organisation creates and controls changes over time. Organisations therefore need to be vigilant in determining that the value they provide is not being eroded as competitors introduce new business designs, restructure their business models, and offer new value propositions [48]. In Table 1, it shows that Competition from existing and new firms has an indirect impact on the organisation's system. This characteristic therefore forms the **context** for the organisation's e-business system initiative.

Another domain of context characteristic is **legal, ethical and other public policy issues**, which form the legal framework for the organisations and indirectly affecting the system. The legal issues that relate to the e-business are privacy, intellectual property rights (copyrights and trademarks), free speech, consumer protection, and other legal issues (includes topics such as validity of contracts, jurisdiction over trades, encryption policies) and ethical issues [46] [32]. Ethical issues particularly are difficult to define as it is a branch of philosophy that deals with what is considered to be right and wrong [46]. In Table 1, it shows that an unidentified

characteristic affect the legal regularity framework of e-business system. The legal regularity framework is therefore identified as a characteristic that provides the context for the e-business system.

**Web technology adoption** impact on how suppliers and customers interact and do business with the organisations via the Internet. The network effect of e-business systems allows the suppliers and customers to interconnect and rely on the "system-to-system connection". The Internet also allows the companies to communicate and share information across the supply chain. Companies use Internet adoption as part of their business model to bring other companies to their network, which then let them achieve critical mass quickly. Web systems allow e-business technology to provide information visibility throughout the supply chain. The system allows supply chain members to view real time data via the Internet and it offers value for someone who can deploy solutions effectively, link someone to their trading partners, and allow them total visibility to the supply chain [23].

Dynamism of markets and the increased information visibility facilitated by the speed and connectivity of e-business present an **uncertain** environment [23]. With the Internet, every business process is evolving and changing. This leads to companies having to make decisions without complete information, thus making outcome more uncertain. Advances in technology leads to increased external uncertainty faced by firms [1]. This is due to the environments, which are being affected by an increasing pace of technological change, motivated by explosion of growth and the availability of knowledge. All these elements lead to the world moving towards a borderless marketplace. The impact of technological change is strengthened in global environments that are tightly interconnected and interdependent.

### 3.4 Impact and Domain Boundary

From the analysis of the literature, characteristics of domain of mutual influence and domain of context may impact on the same facet of domain. This explains that some of the identified characteristics do not belong exclusively to one domain. In order to identify where these characteristics lay in the boundary of different domains, we have developed the Impact and Domain Boundary Diagram (refer to Fig.2). The alphabets or numbers at the end of each arrow are characteristics that listed in Table 1 (not in any order of significance). Let us illustrate the diagram with an example.

Integration (characteristics labelled 18 and 19) is a characteristic that impact on both domain of context and domain of influence. For example, in developing an **e-business system** which manages customers' complex transactions, Dell Computer's customers' need their orders to be integrated to their own system. The customer therefore forms the **domain of context**, which impact on Dell's e-business system development initiative. This also impacted on the organisation as document management processes, which were previously managed solely on a



local database system by the employees, will now need to be fully integrated to the network and delivered to the customers via the Internet. As such, integration is a characteristic of **domain of mutual influence** as in this example, integration of different applications are **system** and **organisation**-related characteristics, which impact on each other.

With this e-business initiative, Dell made this database available to its customers' through customised Premier Web Pages, constructed and posted on the Internet by Dell [37]. As a result of this, the number of employees handling customers' transactions will also be significantly reduced. The Premier Web Pages are password-protected and are updated regularly to reduce the complexity of every purchase by showing detailed specifications of the customer's previous transactions. This function **impacts on the e-business system** itself, due to several factors, such as integrating the front and back-end systems, ensuring system security and providing and delivering fast information and services. As the transaction information is available mainly on the Internet, it is very critical that the e-business systems are reliable and has high system performance. Dell's readily accessible transaction information streamlines the procurement process thus increasing the ease and speed of the purchase [37] [18].

Conversely, system-related failure, such as network or server problems, change in government regulations and change in organisational structure may also impact on the e-business system that is in development within the organisation's function. The e-business system that is in development is therefore considered volatile whereby it is impacted by most of the characteristics, which also impact on other domains [37] [18].

#### 4. Conclusions and Further Work

The data that was collected from the literature will become the basis of questions to be used in the next stage of our research, which is a case study. This case study will be conducted in an organisation that has recently developed an e-business project. The questions for the case study will be formulated from the literature. It is the goal of the study to reaffirm from practice the type and level of impacts that are found from the literature. In addition, there may be more specific and fine-grained impacts and characteristics that will be discovered from the organisation that could complement the literature survey. Hence, the survey of the relevant literature provides a basis for focusing on developer and client attention on the characteristics that were found from the literature. From this study, we will also be able to discover which impacts are the ones that are most likely to need careful consideration

#### Acknowledgements

The authors wish to acknowledge useful discussions with of Ross Jeffery, Aybuke Aurum and Karl Cox, as well as

the support provided by the Australian Research Council under Discovery Grant no. DP0211461.

#### References

- [1] Achrol, R.S. "Changes in the theory of interorganisational relations in marketing: toward a network paradigm", *Journal of the Academy of Marketing Science*, 25, Winter, 1997, 56-71.
- [2] Ames, K.C., Burleigh, S.C. & Mitchell, S.J. "A web-based enterprise workflow system", *Proceedings of the international ACM SIGGROUP Conference on Supporting Group Work: the integration challenge*, Phoenix, USA, 1997, 214-221.
- [3] Ardagna, D. and Francalanci, C., 2002, 'A cost-oriented methodology for the design of web based IT architectures', *Proceedings of the 2002 ACM symposium on Applied computing*, pp. 1127 – 1133
- [4] Arlitt, M., Diwakar, K. & Rolia, J., "Characterising the scalability of a large web-based shopping system", *ACM Transactions on Internet Technology*, 2001, 1(1), 44-69
- [5] Arlitt, M. & Jin, T., "Workload characterisation of the 1988 World Cup Web site", *IEEE Network*, 2000, 14(3), 30-37
- [6] Bohner, S.A. "Software change impacts-an evolving perspective", *Proceedings. International Conference on Software Maintenance (ICSM' 02)*, 2002, 263-272.
- [7] Bussler, C., Maedche, A. & Fensel, D. "Web services: Quo Vadis", *IEEE Intelligent Systems*, 2003.
- [8] Byrne, J.A. "Management by Web", *Business Week*, Issue 3696, 2000, 84-96
- [9] Carroll, J. "Scenarios and Design Cognition", in RE'02, (Essen, Germany), 2002, 3-5.
- [10] Chakrabarti, A. & Manimaran, G. "Internet Infrastructure Security: A Taxonomy", *IEEE Network*, November/December 2002, 13-21.
- [11] Challenger, J., Iyengar, A., Dantzig, P. & Mills, N. "Engineering Highly Accessed Web Sites for Performance", *Web Engineering*, Y. Deshpande and S. Murugesan editors, Springer-Verlag, 2002.
- [12] Challenger, J., Iyengar, A., Witting, K., Ferstat, C. & Reed, P. "A publishing system for efficiently creating dynamic web content", *Proceedings of IEEE INFOCOM 2000*, March 2000.
- [13] Chan, P. S. & Peel, D. "Causes and impact of reengineering", *Business Process Management Journal*, 1998, 4(1), 44 – 55.
- [14] Ciborra, C. "Groupware and Teamwork", Wiley, UK
- [15] Coltman, T., Devinney, T.M., Latukefu, A.S. & Midgley, D.F. "Keeping e-business in perspective", *Communications of the ACM*, April 2002, 45(8).
- [16] Conklin, J. "Hypertext: An introduction and survey", *IEEE Computer*, 1987, 20, 17-41
- [17] Cunningham, M. "The case for comprehensive business change", *Inform*, 1999, 13(4), 43-48.
- [18] Dignum, F. "E-commerce in production: some experiences", *Integrated Manufacturing Systems*, 2002, 13(5) 283-294.
- [19] Fielding, R.T., Whitehead, J., Anderson, K. M., Bolcer, G. A, Oreizy, P. & Taylor, R. N. "Web-based development of complex information products." *Communications of the ACM*, 41(8):84-92
- [20] Fowler, A. "Operations management and systemic modelling as frameworks for BPR", *International Journal of Operations & Production Management*, 1998, 18(9-10), 1028-1056.
- [21] Gaedeke, M. & Turowski, K. "Integrating Web-based E-Commerce Applications with Business Application Systems", in *Netnomics Journal*, 2000, 2, 117-138
- [22] Giaglis, G. "Focus issue on legacy information systems and business process engineering: on the integrate design and

- evaluation of business process and information systems”, *Communications of AIS*, 1999, 2(5), 1-33.
- [23] Golubic, S.L., Davis, D.F., McCarthy T.M. & Mentzer, J.T. “The impact of e-commerce on supply chain relationships”, *International Journal of Physical Distribution & Logistics Management*, 2002, 32(10), 851-871.
- [24] Gordijn, J., Akkermans, H. & Vliet, H.V. “What is an electronic Business Model”, *Proceeding Knowledge Engineering and Knowledge Management*, 12<sup>th</sup> International Conference (EKAW 2000), Springer Verlag, 2000, 257-274
- [25] Hansen, S., “Web information systems:-The Changing landscape of management models and web applications”, in *Proceedings of Conference SEKE’02*, 2002, July 15-19
- [26] Ing, D., Arteaga, J. & Haekel, S.H. “The case for adaptiveness in e-business: Innovation adoption, economic scope, and value capture through the strategy of sense-and-respond”, *Proceedings of the World Congress of the Systems Sciences and ISSS 2000*, 2000, 1-21
- [27] John, I., Muthig, D., Sody, P. & Tolzmann “Efficient and Systematic Software Evolution Through Domain Analysis”, *Proceedings of the IEEE Joint International Conference on Requirements Engineering (RE02)*, 2002.
- [28] Jones, N. & Kochtanek, T. “Consequences of Web-based technology usage”, *Online Information Review*, 2002, 26(4), 256-264.
- [29] Kalakota, R. & Robinson, M. “*e-Business: Roadmap for Success*”, Addison-Wesley, Reading, 1999.
- [30] Kalakota, R. and Whinston, A., “Intranets: the SAP Killer”, *Computerworld*, 1996, March 11, 37
- [31] Lowe, D.B. & Eklund, J. “Client needs and the design process in web projects”, *Journal of Web Engineering*, 2002, 1(1), 23-36.
- [32] Mason, R. O. *Ethics of Information Management*, Sage Publishers, 1995
- [33] Michael, M. “Practical advice for implementing corporate intranets”, *Telecommunications*, April 1996, 34-37.
- [34] Michael, S. and Lewis, B. 1994. “*Research practice: International handbooks of quantitative application in social sciences*”, Sage, 1994
- [35] Miers, D. “Modern business strategies and process support”, 2001, Available Online: <http://www.e-workflow.org/White-Papers/index.htm>.
- [36] Negash, S., Ryan, T. & Igbaria, M. “Quality and effectiveness in Web-based customer support systems”, *Information and Management*, 2002, Issue.2029, 1-12.
- [37] Osmonbekov, T., Bello, D. C. & Gilliland, D. I. “Adoption of electronic commerce tools in business procurement: enhanced buying center structure and processes”, *Journal of Business & Industrial Marketing*, 2002, 17(2), 151-166.
- [38] Peng, Q. “A survey and implementation framework for industrial-oriented Web-based applications”, *Integrated Manufacturing Systems*, 2002, 13(5), 319 – 327.
- [39] Rossi, G., Schwabe, D. & Guimares, R. “Designing personalized web applications”, *Proceedings of 10<sup>th</sup> International Conference of WWW (WWW10)*”, 2001, 275-284.
- [40] Sawyer, S., & Rosenbaum, H., “Social Informatics in the Information Sciences”, *Informing Science*, 2000, 3(2), 89-96.
- [41] Scharl, A. “Explanation and exploration: Visualising the topology of web information systems”, *International Journal of Human Computer Studies*, 2001, 55, 239-258
- [42] Scheer, A. & Habermann, F. “Making ERP a success”, *Communications of the ACM*”, April 2000, 43(4), 57-61
- [43] Schwabe, D., Guimares, R.M., & Rossi, G. “Cohesive design of personalized web applications”, *IEEE Internet Computing*, March-April 2002, 34-42
- [44] Swatman, P.M.C, Swatman, P.A. & Fowler, D.C., “A model of EDI integration and strategic business reengineering”, *Journal of Strategic Information Systems*, 3(1), 41-60, Available Online: ACM
- [45] Tang, S.M. “An impact factor model of Intranet adoption: an exploratory and empirical research”, *Journal of Systems and Software*, 2000, 51(3), 157-173
- [46] Turban, E., Lee, J. King, D & Chung, H.M. *Electronic Commerce: A managerial perspective*, Prentice-Hall, 2000
- [47] Vogel, D.R. “EDI enterprise analysis” in Gricar, J 9ed) EDI: Business strategy for the ‘90s, *Proceedings of the 4<sup>th</sup> Electronic data interchange conference*, 1991, 196-207
- [48] Wheelen, T. L. and Hunger, J.D. *Strategic Management and Business Policy: Entering 21st Century Global Society*, Addison Wesley, 1998
- [49] Yusop, N., Zowghi, D. & Lowe, D. “Impacts of web systems on their domain”, Dept. of Software Engineering, *Technical Report*, 2003-1, University of Technology Sydney, 2003