

# DIGITAL BONDS IN BUSINESS RELATIONSHIPS

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## ABSTRACT

Business relationships and networks have been studied intensively in business marketing literature, however still little is known about the influence of information technology (IT) on business relationships. The purpose of this paper is to investigate the influence of IT on the bonds that exist in the business relationships. Especially this paper focuses on what types of digital bonds are formed in business relationships and how different types of digital bonds (formed between active interaction in the relationship) can be managed. Literature review, conceptual analysis and mini case studies are employed. Based on the research it is argued that as a consequence of IT deployment in business relationships digital bonds are formed. A digital bond is a special type of bond that is formed in IT mediated interaction between companies and these bonds should be managed accordingly. Four types of digital bonds and managerial balancing strategies were identified based on the IT used and the importance of the relationship. The developed digital bond typology can be used to identify digital bond types and their possible influences on business relationships. Managers' awareness of possible sources of digital bonding is increased and they are equipped with a digital bond typology which is a tool for balancing which can be used to make decision regarding different types of IT investment and development projects. The paper contributes to the business relationships literature in two-ways. First, it identifies different types of digital bond types that can be used to further understanding into how IT influences business relationships. Second, the paper shows how digital bonds can be balanced or even managed which is a pertinent for any business grounded research. Limitations and future research avenues are also discussed.

**Keywords:** business relationships, buyer-seller relationships, information technology, digital bond

## INTRODUCTION

It is a well known fact that economic exchange can be organized in multiple ways. Every day organizations are establishing, maintaining and sometimes ending business relationships. These are a quasi exchange mode between markets and hierarchies (Williamson, 1975). Business relationships are usually cooperative and long-term in nature. In today's business relationship research and practice the central managerial foci is value creation and capture. In brief, value is created by optimizing i.e. maximizing the benefits from one relationship and minimizing the costs related to that relationship (Cannon and Homburg, 2001; Ulaga and Eggert, 2006). It is noted, that relationship value is multidimensional concept and reaches beyond price versus quality trade-off (Gassenheimer, Houston and Davis, 1998). Besides aligning production processes, aggregating transportation and rationalizing finished goods inspections for value creation, also information technology (IT) is looked upon as a source of value creating advantage in business relationships.

Until recently only little academic research existed on the influence of IT on business relationships (Reid and Plank, 2000; Sheth, 2007). From 2000 onwards impacts of various IT solutions on business relationships have been studied (see Salo *et al.*, 2005 for review).

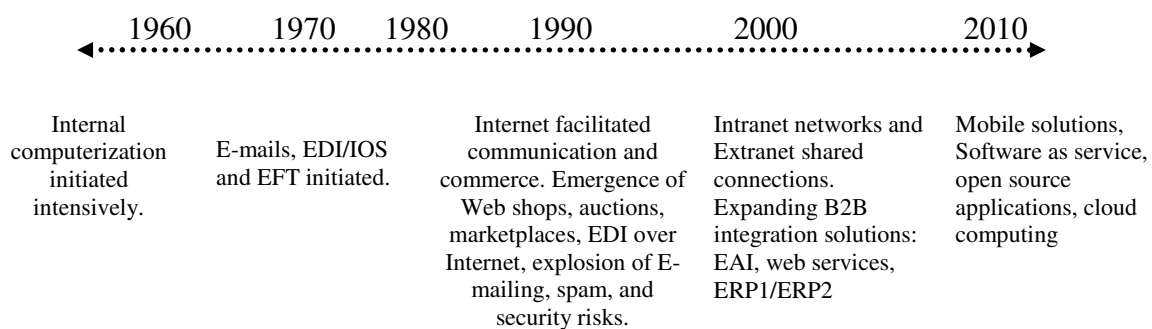
Especially electronic data interchange (EDI) websites, internet based EDI, electronic marketplaces, electronic auctions and extranets have been studied (Naudé *et al.*, 2000; Leong, Ewing and Pitt, 2002; Perry and Bodkin, 2002; Angeles, 2000; Hartmann, 2002; Jap, 2002; Jap and Haruvy, 2008; Vlosky *et al.*, 2000). Also more recent IT developments like mobile technologies and their influence on business relationships has been studied to some extent (Yang and Järvenpää, 2005; Salo, 2009). Most of these studies have remained in a rather general level as only one party (buyer or seller) has been studied. The purpose of this paper is to investigate what type of digital bonds exists in business relationships (dyadic perspective adopted) and especially how different types of digital bonds can be managed.

The paper is organized as follows. First, a brief literature review on value creation with IT is illustrated. Second, emergence of digital bonds is described and typology of digital bonds is presented. Third, case study methodology employed is presented. Fourth, mini case studies are employed to depict the different areas of the developed digital bond typology. Fifth, the managerial styles are presented for each digital bond type. Finally, a discussion of results and implications are presented.

### VALUE CREATION WITH IT IN BUSINESS RELATIONSHIPS

Managerial and academic discussion has identified a number of ways to use IT in business relationships. Initially in the late 1960s, IT was deployed within organizations to smoothen the inter-departmental communication processes and enhance procedures such as bookkeeping (Kaufman, 1966). With the widespread adoption of IT for internal communication and maturization of IT, rationalization of business activities in many industries has been achieved with IT.

First inter-organizational information systems used in the retail sector were EDI (Buzzell, 1985). EDI systems provide error free and fast communication between a retailer and wholesaler in the food industry. These were the first IT based tools that captive both seller and buyer to a particular technology and business party. This is where some of the first digital bonds appeared in the buyer-seller relationships. In those systems switching from one system to another is complicated due to lock-in that occurs when firms invest in expensive and tailored EDI systems. Nevertheless, early usage of EDI paved the way for information systems with less lock-in effects. Figure 1 illustrates the development of inter-organizational information systems.



**Figure 1: Maturization of the business relationship specific information technology**

As depicted in Figure 1, the underlying technology of inter-organizational information systems has matured which made IT facilitated commerce between business parties a reality. EDI systems advanced to Internet based EDI (I-EDI) after the conception of the World Wide Web. This made I-EDI connections possible between buyer and seller with less lock-in effects (Angeles, 2000). EDI and other private industrial networks (PIN) enable point-to-point connection in a business relationship to exchange simple standardized data.

In addition, extranet systems were developed which made more plug and play type of relationships between business parties possible, as with the extranet companies can rather easily change business parties or add new connections (Vlosky *et al.*, 2000). To compare, I-EDI extends traditional EDI, but extranet makes also other kind of activities possible by extending the amount and quality of information that can be changed between business parties.

Manufacturing resource and planning systems (MRP) were used in modern factories to create bill-of-material (BOM) and assist in the planning of production. These were internally orientated systems and trading partners were not considered due to the immature IT infrastructure (Möller, 2005). MRP systems matured to second generation MRP systems with additional strengths including planning, analysis and forecasting as added features. In the late 1990s and early 2000 MRPs were overtaken when enterprise resource planning systems (ERP) were introduced (Salo, 2007a).

Even with the advent of ERP with over 20 different modules that assists intra-organizational processes in many ways e.g. human resource management, trading partners and other third parties were still excluded from the company's information backbone. It is argued that second generation ERP systems which are currently underdeveloped will enable information infrastructure backbone in which trading partners and additional third parties are included easily to a company's IT infrastructure. This is done of course with secured and password protected manner in order to keep information in those hands and eyes that can handle the information in question. ERP systems are becoming widely adopted and more expensive and they are often crucial to the success of companies. Other means to connect business parties in a more cost effective manner with the help of IT have also appeared.

First, as ERP systems are provided by competing software houses and are often incompatible, ERP adapter markets have also appeared. These adapters are offered as easier solution to exchange data between business parties that have different systems. Still different types of adapters are needed since one adapter can only fit together two competing ERP software. Adapters are sometimes likened to enterprise application integration (EAI) and one type of application that can be integrated is ERP.

Second, third party integrators provide services (e.g. services labeled web services, software as service or cloud computing applications) in which two completely different systems with their own information protocols are made to understand each other with the help of a translator. Integrators provide this service to parties engaged in a relationship that are not willing to change their IT and commit to the extra costs e.g. investing to an ERP adapter (Salo, 2007a).

Third, simple radio frequency identification systems (RFID) systems are used to transmit the needed data between business parties (Yang and Järvenpää, 2005). This is cheap but functional system in some areas of business, however only a limited amount of information can be transmitted. Systems based on RFID are used in the retail sector e.g. by Wal-Mart to keep up with logistical flows in and out the department stores. RFID has many applications also in consumer markets e.g. paying tolls and small purchases (Near Field Communication (NFC) application in mobile phones).

Fourth, mobile communication technologies provide easy and cheap access to the internet as well as being used as effective information processing terminals. In business

relationships companies can exchange a wide variety of data ranging from mission critical steel processing information to calling for pick-ups of ready products (Salo, 2009). Mobile systems are cost effective and flexible systems that can be used in many ways in business relationships.

Fifth, intelligent agent systems have been developed to solve complex information handling processes (Liu, Turban, and Matthew 2000; Papazoglou 2001). Intelligent agents based systems follow preset rules and acquire information from other agent or systems based on those rules. For example, in the steel industry there are trials to use intelligent agent systems to follow the progress of multisite production. When a customer such as a big oil company requests information when their oil rig will be ready for installation, the steel company from which the oil rig was ordered can use intelligent agents to retrieve that information from its subcontractors. This of course supposes that subcontractors have sufficiently advanced IT systems in place and employees input the relevant data into their IT systems after each shift. Based on this information that is retrieved by intelligent agent the steel company can give a more accurate estimate of the shipment date. This is of course saves time and money as compared to if they had called and wait for each subcontractor's estimations how many months the job would take.

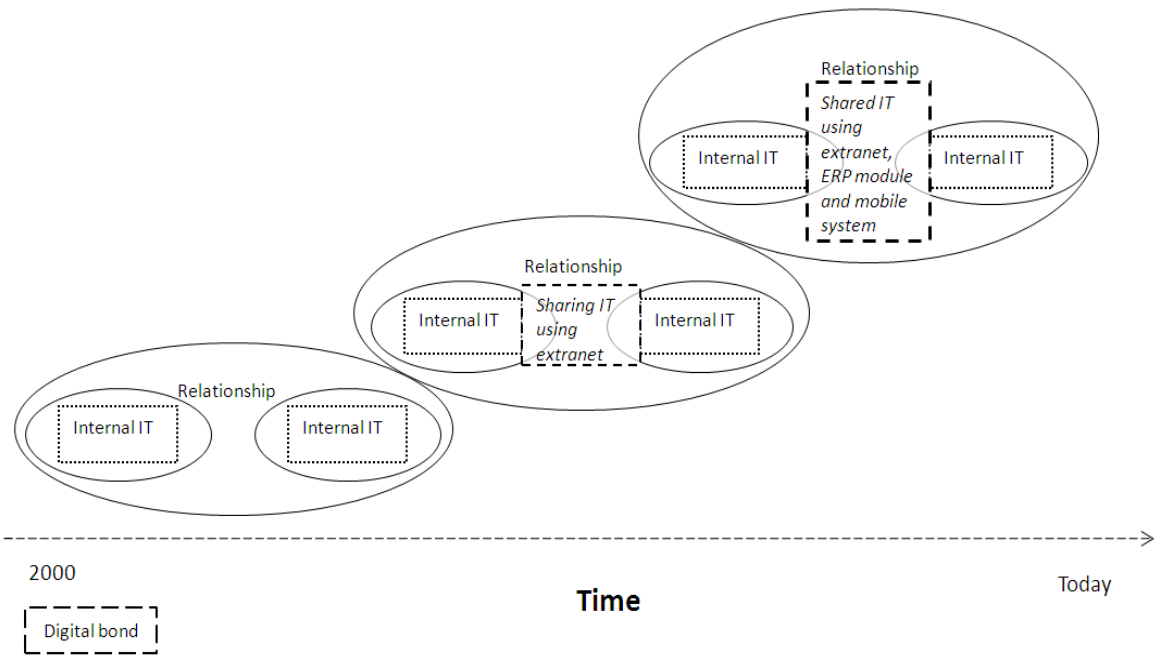
Sixth, are electronic markets and auctions which have also been used to help the buyer-seller relationships (Hartmann, 2002; Jap, 2002). These have been cited many times as good tools for the facilitation of business relationships, however it seems that these systems can hinder and even break existing business relationships since price is most important factors in those exchanges (Wise and Morrison, 2000). Flexibility provided by the relationship and R&D that occurs in those relationships cannot be given a price tag. It is noted that raw materials and other easily procured items such as office supplies can be effortlessly acquired with electronic auctions and markets.

Each of the systems mentioned above have their own specific impacts on both the buyers and the sellers' potential and actual value creation. Every systems enables new type of information coordination but at the same times binds companies to a certain technology or subset of technology which creates the digital bond in question.

## **EMERGENCE AND TYPES OF DIGITAL BONDS IN BUSINESS RELATIONSHIPS**

Researchers have identified 11 different types of bonds that have appeared in business relationships due to the need to reduce uncertainty and distance (Hammarkvist, Håkansson and Mattson, 1982; Johanson and Mattsson, 1987; Wilson and Mummalaneni, 1986; Liljander and Strandvik, 1995; Wendelin, 2004). Without going to details on each type of bonding it can be stated that in many cases bonding is described as gradually evolving process were two parties are tied together. The degree of the tie is dependent on many issues underlying the bonding process. These contingencies are particularly important in IT related bonds that are characterized as digital bonds (see Salo, 2007b; Salo, 2009).

A digital bond emerges when two parties in a relationship invest in IT in order to connect to another company or uses their current IT resources to connect to other party. Figure 2 outlays to the process how digital bonds are formed in business relationships.



**Figure 2: Digital bond formation in a business relationship**

Figure 2 depicts that in order for a digital bond to be formed between business parties a prerequisite is investment and the adaptation made to form the shared IT architecture (e.g. Extranet). This requires existing trust and willingness to invest in the relationship. In brief, parties of the relationship have mutually beneficial view of the future. It can be stated that the digital bond is formed when the internal IT systems of the parties in a relationship are shared and integrated in order to form a hybrid system, in which information exchange and transaction are possible.

A hybrid system is created by joining a company's internal systems within a relationship to another business party's IT system. In order for the digital bond to emerge firstly digital activities with the hybrid system must be conducted. This is because many companies acquire and open up joint connections but do not use these systems for activities. If digital activities are not formed then digital bond creation is not finalized. Thereby, the digital bond is a hybrid IT that is built out of two or more shared and integrated IT which is used for information exchange and transactions in the relationship or a network. A digital bond can be strengthened or weakened over repeated interactions (e.g. amount and quality of usage of IT, connections with other companies, organizational levels using the IT systems forming the digital bond) between companies. Figure 3 depicts the typology of digital bonds with two extreme cases, weak and strong bonds.

Figure 3 presents a matrix in which perceived importance of the relationship is divided into low and high. Perceived importance is the dyadic view of the relationships and does not solely represent view of one company. Type of IT employed depicts the IT systems that are used in that relationship and it can vary from simple to complex. Simple being different Internet based applications such as extranet and I-EDI while more complex being ERP.

		Perceived importance of the relationship	
		Low	High
Type of IT employed in the relationship	Complex	Cell 1: <b>Over sized</b> digital bond	Cell 2: <b>Strong</b> digital bond
	Simple	Cell 3: <b>Weak</b> digital bond	Cell 4: <b>Strategic</b> digital bond

**Figure 3: Typology of digital bonds**

Over sized bonds are formed in a relationship when non important relationships are coordinated and managed with overly complex IT systems. Usage of ERP systems to handle e.g. simple invoice data or orders is an example of this over investing.

Strong bonds (Cell 2) are formed though sequential multi-level IT integration conducted purposefully in the relationship. Wal-Mart and many other retail companies are operating in this manner with their strategic suppliers. Similar behavior is observable in auto industry with Toyota as well.

Weaker bonds (Cell 3) are formed when looser IT is employed. For example, there exist third parties that provide middleware type of software or other plug and play type of IT that is leased from the third party. Untying of these digital bonds is much easier as data is restored and shared by the third party rather than business parties own servers. In the Figure 3 it should be noted that the perceived importance of the relationship is from the perspective of a buyer or seller but the type of IT is concerned with the actual IT used in the relationship therefore is relationship level concept.

Where the strategic digital bond (Cell 4) is weak but importance of the relationship is high it suggests that this imbalance should be managed by additional IT investments in the relationship. In similar line, an over sized digital bond is typified by a high IT investment but this investment should be rethought since relationship itself is perceived either by buyer or seller as economically or otherwise unimportant.

These interactions between companies weaken or strengthen the digital bond depending on the underlying IT used, relationships context and relationships purpose. Also the antecedent conditions i.e. what type of relationship and systems are connected impacts on the strength of the bond. Furthermore information exchange that occurs at organizational levels and a high intensity of exchange further strengthens the digital bond. Strong bonds as opposed to weak ones are formed over time when IT systems are adopted and continuously modified according to company specific needs. Intensive use of IT to solve problems in the relationship is pursued as it provides real benefits to the relationship. In practice, as there may be several IT systems in place that support communication in the relationship thus, it may be difficult to assess the existence, weakness, and even strength of a digital bond. When an extensive amount of information is shared there is a risk of losing critical information, when

changing partner or IT. Therefore, the security and the privacy of shared information are key issues to be solved when forming digital bonds.

Furthermore, in a relationship with strong existing digital bonding security is a complex process due to two main reasons. Firstly, information shared in the relationship stays in the server of the counterpart organization and can be used for many purposes. Second, after untying a bond a new supplier or buyer must be found and tied into an existing IT system to gain the benefits.

## **METHODOLOGY**

The aim of this study was to expand existing knowledge on buyer-seller relationships and how IT influences a relationship by focusing on bonds and bonding processes. This research employs systematic combining as research strategy and case studies and in-depth interviews as more practical data collection and analysis level tools.

Systematic combining were the research framework, collection of data and analysis evolve at the same time has been used as the method for the empirical research in this study. Systematic combining is based on the logic of the abductive approach (Dubois and Gadde, 2002). Abductive research is probably in reality the most used method when it comes to case study research (Coffey and Atkinson, 1996). The method is a combination of inductive and deductive research. Gummesson (2000) argues that all types of research become a blend of deductive and inductive research after the initial stages. During the process the empirical material is gradually developed when unanticipated empirical findings are made and the theory is refined and adjusted when used in reality (Dubois and Gadde, 2002). In other words the abductive approach is a repeated process of going back and forth between empirically saturated theory and theoretically saturated empirical material in order to increase understanding and modify research framework (Yin, 1994; Coffey and Atkinson, 1996).

The case study approach is used in different areas such as sociology, psychology, history, anthropology, economics, management science, and political science (Yin, 1994). Yin (1994, p. 13) defines a case study in the following way. "A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident". Since research on IT usage in business relationships is an emerging study area, in which the researcher has only some or no control over the events that are occurring in real-life, a case study is a very appropriate method (Stake, 1995). Furthermore, a case study can be applicable to situations in which researchers require deeper understanding, solid contextual sense, and provocation toward theory building (Bonoma, 1985).

The case selection is a pertinent stage in case research and advice on case selection is therefore extensively provided in the literature (Eisenhardt, 1989; Pettigrew, 1989; Perry, 1998). The business relationships were selected based on theoretical sampling, in which the cases are selected so that they represent the problem of the study. Eight companies formed four relationships that are the cases studied in this research. Neither the identities of the companies nor the respondents are revealed for reasons of confidentiality. The perspectives of both parties in the business relationship are studied in order to be sure of the value of the findings (John and Reve, 1982).

### **Data collection**

The main data source through which digital bonding and bond formation is described consists of interviews (Kumar, Stern and Anderson, 1993; Arksey and Knight, 1999). The interviewees were accordingly asked to describe the history and current state of the

relationship as accurate as possible. After that, they were asked to highlight the key people and events in the relationships. Finally, they specifically discussed the IT employed and how it has shaped the relationship. The choice of informants was premised on the principle that information is best elicited from people who have knowledge of the phenomenon and who have been involved with the relationship. Towards the end of the interviews, respondents were repeating rather similar things about the relationships and it could be said that data saturation according to Yin (1994) occurred and thus interviewing was ended.

Altogether 16 semi structured qualitative interviews have been done, each interview lasting an average of 2 hours. Interviews have been conducted with personnel from logistics, product development, sales managers, buyers, suppliers and other people involved in the cooperation between the companies. Key informants are critical for the success of case studies (Yin, 1994). The questions of the interviews were semi structured in order to get the interviewee to answer the questions as completely as possible. The interviews were taped and transcribed in order to get as much use of them as possible. Qualitative data analysis was employed in order to thematize the material (Miles and Huberman, 1984). Field notes of the reactions of people have also been made. Taping and transcribing data and using field notes helped to achieve validity in qualitative research (Eisenhardt, 1989).

The researchers had in some cases also access to confidential internal and external documents regarding the cooperation between case companies. In addition to interviews, documents, minutes of meetings, industry reports and company visits were also used to triangulate the respondents' answers, as suggested in literature (Patton 1987; Yin 1994). The validity and reliability of the research was increased with the use of data triangulation (Denzin, 1978, Eisenhardt 1989).

The researchers have crosschecked selected different cases in order to improve the understanding in accordance with the abductive approach. Going back and forth between theory and empirical material leads to a better understanding of both theory and empirical material (Coffey and Atkinson, 1996; Dubois and Gadde, 2002).

This was also the case in this study, having been going back and forth between theory, framework, the empirical cases and the analysis. Dubois and Gadde (2002) argue that it is important in systematic combining to use different sources of data and use data collection methods that complement each other. In this paper both open-ended interviews have been used and the researcher has also had the possibility to examine the internal documents, letters regarding the cooperation as well as technical documents.

## **ILLUSTRATION OF DIGITAL BOND TYPES AND THEIR MANAGEMENT WITH MINI CASES**

### *Steel mill – Workshop business relationship: Over sized digital bond – attempts to Downsize the employed ERP*

The Steel mill is large European steel producer with hundreds of off-the-shelf and tailored information systems. Besides producing steel, they are also focused on further processing in an attempt to be more effective and competitive. Steel hardening is one of the further processing activities as hardened steel can be used for multiple purposes e.g. in military vehicles. Currently, their steel is hardened by a relatively small workshop. From the workshops perspective the steel mill is large customer and they have adjusted their IT systems to serve their big customer better. The Steel mill has also re-configured their ERP system to match the needs of the workshop. In a year or two the steel mill will significantly increase the volume of steel to be hardened and due to the limited capacity of the workshop it

seems that it might be more cost effective to do it elsewhere. These adaptations in the relationship and changing business climate have led to a situation in which the steel mill must evaluate the strength of the digital bond and importance of the relationship with the workshop. Most likely, they will downsize the ERP system and move to a more simplified system and thereby rationalize the oversized digital bond into a strategic digital bond from the workshop's perspective. This of course requires modification to steel mill's IT infrastructure but also to the workshop's IT infrastructure which has been fitted to the needs of the steel mill.

*Sawmill- Logistic company relationship: Strong digital bond – attempts to Simplify the employed mobile system*

The Sawmill is a European based company operating in the global sawn goods industry. The Sawmill acquires raw-material (logs) from individual forest owners and governments. Currently, logistical companies have trucks and they use mobile tracking systems to track their trucks and pick-up raw-material. Logistical companies use the information for effective route planning. Most of the critical information, from the sawmill perspective, is on the computers in the trucks and in logistical companies servers. This makes it complicated for the Sawmill to coordinate their production since the amount of warehoused raw-material is kept at its minimum level. To close current orders and be able to find capacity for new orders is a tedious task. The currently IT employed is excellent for the logistical needs of the company but not for the Sawmill production coordination. From the Sawmill's perspective the system is too complex, since they have to wait while each truck checks in to a mill area before they know the amount of raw-materials arriving. Attempts are being made to simplify the mobile system in use.

*Service provider – Subcontractor relationships: Weak digital bond – attempts to keep the Status Quo using the extranet*

The service provider operates from Finland and has specialized over the years to provide companies various services relating to company events, meetings, trade shows and conferences. The service provider organizes transportation, accommodation, facilities, catering and entertainment for their customers. They have a network of hundreds of smaller companies that provide the services they need for their customer. Only the biggest of the subcontractors are connected to the service provider via the extranet connection. Basically, the weak digital bond is currently sufficient but as new players are entering the market occupied almost solely by the service provider. In this changing market the service provider is aiming to keep the status quo in their relationship with the subcontractors. Most of the subcontractors are satisfied with the current business volume but some want to increase their revenue. However, forming a tighter digital bond with each of them is too expensive and complicated so the service provider relies on their existing strong relationship and attempts to keep volume of business high.

*Manufacturer – Customer relationships: Strategic digital bond – attempts to Upgrade the third party provided internet platform*

E-auctions and marketplaces provide a convenient way to find new customers however, these markets are global and price is often the factor that closes the deal. The manufacturer participated to some e-auctions and marketplaces to test if they could win some deals. They won a number of big deals using these systems. E-auction and marketplace customers share

in the manufacturer's customer portfolio rose rapidly and they became vital for their business due to investments in extra manufacturing capacity. Currently, intensive price competition and overcapacity is causing manufacturer to lose deals to foreign competitors. It is in the manufacturer's best interest to establish more enduring relationships using other channels than digital ones. First step is to establish a face-to-face relationship and after that both parties can start to consider what type of digital bond is most appropriate for the relationship.

### MANAGING DIGITAL BONDS IN BUSINESS RELATIONSHIPS

The digital bond typology depicted in Figure 3 and illustrated in the case studies suggests that there are four distinctive types of bonds based on two dimensions. These dimensions are the importance of the relationships perceived by either buyer or seller or both of them and type of IT employed in the relationship. The typology is used as starting point to introduce different types of balancing or coping strategies within different types of bonds. These strategies are based on the inherent assumption that the simple (e.g. EDI, extranet, internet) and more complex (e.g. ERP, ERP2, Intelligent agents) IT systems presented earlier require different types of strategies when facing different type of relationship importance. Figure 4 details the managing strategies for each digital bond type based on their own unique characteristics.

		Perceived importance of the relationship	
		Low	High
Type of IT employed in the relationship	Complex	Cell 1: <b>Downsizing</b> Over sized digital bond	Cell 2: <b>Simplifying</b> Strong digital bond
	Simple	Cell 3: <b>Status Quo</b> Weak digital bond	Cell 4: <b>Upgrading</b> Strategic digital bond

**Figure 4: Balancing strategies for managing digital bonds**

The cell 1 *Downsizing*, presents a situation in which over sized digital bond with complex IT employed in the less appreciated relationship by either or both a seller or a buyer. Downsizing refers to a management process where management after realizing the unnecessary IT systems are being used takes measures to downsize to most appropriate IT systems. Practically speaking it might be difficult to increase the importance of a particular relationship so it might be more justified to adjust the IT systems used accordingly to the relationship importance. Furthermore, managers can take action before digital bond formation

is initiated by being aware that of the importance of a relationship and complexity of IT systems. For example, attempts to integrate overwhelmingly popular ERP systems in order to coordinate multiple interfacing and overlapping tasks in the relationship might cause over sized digital bond to appear.

The cell 2 *Simplifying*, presents a situation in which strong digital bond with complex IT employed in a highly appreciated business relationship by either or both by the seller or buyer. The simplifying act refers to a management process where management after realizing that the IT systems in use are too complex takes measures to simplify the hybrid system. Moreover, IT and business relationship managers might proactively attempt to balance the company's portfolio of digital bonds by avoiding formation of strong digital bonds. In highly appreciated relationship parties may have over invested in IT systems thus making IT infrastructure management expensive and inefficient. For example, a mobile systems used in business relationships are rather expensive to tailor to each relationship and the benefits gained from such a customization are small. In addition, usage of multiple systems for same purpose is another strategy that causes unnecessary complexity of IT.

The cell 3 *Status Quo*, presents a situation in which weak digital bond is formed with the employment of simple IT and with low perceived relationship importance. The status quo strategy refers to actions to preserve the current state in the digital bond. In the weak digital bond both parties are satisfied with the benefits that the IT employed brings. Practically, speaking new IT investment opportunities and development plans should be carefully planned and evaluated in order to avoid over investing in IT since it is most likely that importance of the relationship is not going to increase without tremendous sales efforts or changes in the end product and market demand. A weak digital bond is formed for example, when parties are using extranet systems to coordinate the activities in the relationship.

The cell 4 *Upgrading*, presents a situation of a strategic digital bond with simple IT employed in the relationship and high perceived importance of the relationship. Upgrading refers to managerial activities to increase the IT investments in an important relationship where current IT infrastructure does not meet the demand. In practice in this situation either the buyer or seller or sometimes both of them acquire significant returns on their IT investment due to the high importance of the relationship. The return itself might be monetary but also be something else like reference value, pertinent information or spring board for developing new products and services. A strategic digital bond is formed for example, when the parties in the relationship have simple internet based systems that might be leased from a third party, used for extensive transactions and information exchange.

Besides looking each digital bond type separately a digital bond portfolio can be used to evaluate the amount and quality of digital bonds a company has with its counterparts, in order to manage digital bonds more effectively. When managing a portfolio instead of an individual bond a more holistic picture can be formed and managerial and IT resources can be directed to those digital bonds that deserve most attention and action. Furthermore, when moving a focus from an individual bond to a bond portfolio both managers and academics can more easily take into consideration the dynamic nature of digital bonds. Digital bonds change when business a relationship evolves and also when investments to IT are undertaken. Thus, a weak digital bond may be transformed to an over sized digital bond through unnecessary IT investments or to a strategic digital bond if the importance of a relationship increases for some reasons.

Thereby, it can be concluded that although the typology of digital bonds and following managerial balancing strategies may seem to be a simple tool the underlying phenomena that it is attempting to describe is extremely complex. Practically speaking, identification of most of the different types of digital bonds that company has is difficult

since many companies have hundreds of IT systems, let alone be managing those in a portfolio.

## CONCLUSIONS AND IMPLICATIONS

This research aimed to increase our current knowledge on digital bonds, by identifying what type of digital bonds exists in business relationships and especially how different types of digital bonds can be managed. Based on a literature review the paper presented a typology of digital bonds. The typology described four digital bond types and their emergence due to the employed IT type and perceived importance of the relationship by either seller or buyer or by both. After defining each digital bond type balancing strategies or managerial coping strategies were presented. For each digital bond type there is a specific managerial strategy depicting managerial action required; downsizing, simplifying, status quo or upgrading. Furthermore, for each type a mini case study was provided to depict the balancing strategy in action. The paper also discussed the importance of the multiple business relationships in which companies are involved. These can be evaluated and managed with relationship portfolios that include digital bonds in order to manage the interdependencies in the most effective manner. Additionally, the dynamic nature of digital bonds and the need for constant evaluation and adjustment was also illustrated. The paper contributes to our understanding of business relationship bonding by depicting digital bond formation process due to the IT investments and relationship adaptations. The paper also illustrated how information technology is shaping business relationships through the proposed digital bond typology and proposed managerial actions. Additional cases studies and surveys could be used to further develop the typology including the portfolio, digital bond dynamics and managerial actions required.

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