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100% eCorporation: Identifying Issues of Concern in Pursuing an eSupply Chain Strategy

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100% E-CORPORATION: IDENTIFYING ISSUES OF CONCERN IN PURSUING AN E-SUPPLY CHAIN STRATEGY

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Abstract

It is now widely accepted in today's competitive business environment that E-Business standards are a critical part of conducting business electronically with trading partners, suppliers and customers. This paper presents a case study of an organisation in pursuit of becoming a 100% E-Corporation. This research study focuses on the Accounts Payable and Procurement functions of the organisations supply chain and documents the deployment of two E-Supply Chain initiatives undertaken by the organisation, highlighting the impacts, benefits and drawbacks of these initiatives to both the organisation and their suppliers. As a result, the findings of this study suggest that organisations need to ensure a common understanding and definition of what they are striving to achieve in undertaking an E-Supply Chain initiative, both in terms of their business objectives and the objectives of their suppliers. Issues of concern around tax and legal issues, supplier readiness, internal and external system and process changes, project ownership, knowledge of supplier layers, and measures of success are presented, illustrating the impact of E-Business on the supply chain.

Keywords: SCM, E-Business, E-Supply Chain

1 INTRODUCTION

Throughout the 1950s and 1960s the sharing of technology and information with customers or suppliers was considered too risky and little emphasis was placed on co-operative and strategic buyer-supplier partnerships. However, throughout the 1970s and 1980s with the emergence of MRP, JIT and other management initiatives (e.g. BPR) to improve manufacturing efficiency and cycle times, the potential benefit and importance of these strategic and co-operative relationships was identified. Therefore, the concept of SCM emerged as manufacturers experimented with strategic 'immediate supplier' partnerships (Tan 2001, Lejmi 2002); transportation and logistics experts incorporated the physical distribution and transportation functions, resulting in the integrated logistics concept (Tan 2001); and throughout the 1990s organisations further extended best practice in managing corporate resources through embracing a customer focused corporate vision, driving change throughout the internal and external dimensions of their SCM strategy. For example, Wal-Mart has helped jumpstart widespread adoption of barcodes, pushing its top 100 suppliers to start using RFID (Radio Frequency ID) to track inventory by January 1st 2005, with the remaining suppliers asked to follow suit by 2006. The Wal-Mart plan to adopt RFID technology within its supply chain, echo similar plans proposed by the US Department of Defense and the UK-based retailer, Tesco. The impact of the RFID mandate to its suppliers is enormous and will change the way manufacturers and suppliers track inventory.

2 THE 'E'VOLUTION OF SUPPLY CHAIN MANAGEMENT

Much of the literature surrounding Supply Chain Management (SCM) is replete with terminology such as: integrated purchasing strategy, integrated logistics, supplier integration, buyer-supplier partnerships, supply based management, strategic supplier alliances, and supply chain synchronisation, to address the various stages of this new management philosophy (Tan et al. 1998, New 1997). Despite the fact that there are numerous descriptions for these terms, with wide-ranging differences in interpreted meaning, there can sometimes be a confusing profusion of this overlapping terminology (Saunders 1995, New 1997). Having analysed a number of SCM definitions available in the literature from 1991 to 2003, it appears that a number of commonalities are shared among them, equating to what could be described as "a network of organisations undertaking the coordination and integration of internal and external key functions and processes associated with the added value delivery of products, information flows, and services from supplier to end customer". However, echoing the sentiments of Saunders (1995), attempts to pursue a universal definition of SCM may lead to unnecessary frustration and conflict.

We contend that more importantly from an operational point of view, there are a number of supply chain models in existence throughout organisations, including: integrated make-to-stock, continuous replenishment, build-to-order, and channel assembly, all of which embrace the notion of networks of organisations forming the supply chain (Patnayakuni et al. 2002), or inter-enterprise integration (Kalakota and Robinson 1999). Therefore, the management of an innovative and aggressive supply chain network, to achieve competitive success, depends on the competitive position of an organisations supply chain vis-à-vis other competing supply chains. This is a view shared by Lejmi (2002, p.725) who stated that: "the focus of this concept goes more and more beyond optimisation of the processes within the boundaries of a single company towards a holistic view of the supply chain. Modern models and standards for SCM are dedicated to consider whole value chains and many-to-many relationships. Thus, the supply chain is no longer seen as a sequential concatenation of suppliers and customers but as an entity itself". Therefore, SCM involves designing the supply chain network, planning the supply chain processes, and then executing the operation in a manner consistent with the overall strategy (Meixell et al. 2001).

On average an organisation can lose between 9% and 20% of its competitive value due to supply chain problems (Reddy 2001). These problems can be classified as supply chain uncertainties (e.g. demand

forecasts, delivery times, quality problems, coordination problems, etc.) (Turban et al. 2003). As a result, a major symptom of ineffective supply chain management exists, known as the bullwhip effect. This bullwhip effect (inaccurate information about customer demand becomes increasingly distorted as it moves upstream in the manufacturing process) can lead to poor customer service, high inventory costs on excess inventory, loss of revenues, additional warehousing and shipping costs, and procurement cost overruns. This variable and exaggerated demand can be caused by, unavailable data both upstream and downstream (Lee and Ng 1997, Lee et al. 1997, Whang 1999, Donovan 2001); sporadic batch ordering (Whang 1999); gaming (intentional provision of false consumer demand) (Lee et al. 1997, Whang 1999, Meixell et al. 2002); unforecasted and unknown sales promotions (Donovan 2001); and the duration of commission or incentive structures for sales and marketing personnel (Donovan 2001).

Organisations have developed many 'traditional' solutions as insurance against supply chain uncertainties, for example vertical integration supported by appropriate information systems (Turban et al. 2003). However, in the present time, organisations have a requirement to increase the level of integration in the supply chain, and by doing so, consider the use of e-business (Internet based technologies) as the key enabler to drive this supply chain integration (Lee and Whang 2001, Turban et al. 2003). While the integration of the supply chain can be conceptualised as the integration of material flows (Stevens 1990, Patnayakuni et al. 2002); information flows (Lee et al. 1997, Patnayakuni et al. 2002); and financial flows (Patnayakuni et al. 2002); to run effectively, it also requires effective governance mechanisms (Patnayakuni et al. 2002). Therefore, when organisations align their supply chain and E-Business strategies, what are the impacts of the resultant outcome, the E-Supply Chain?

This paper presents a subset of 'issues of concern' in pursuing the goal of becoming a '100% E-Corporation'. Two E-Supply Chain initiatives in particular (Intel Web Suite and Rosetta Net) are examined within Intel, highlighting the impacts, benefits and drawbacks of these initiatives to both Intel Ireland and their suppliers.

3 RESEARCH APPROACH

E-Supply Chain is the 'tsunami of change' that will 'wash away' the traditional supply chain models and transform business activity (Poirier 1999). Thus, organisations may not be able to avoid undertaking E-Supply Chain initiatives (Donovan 2001, Kazem and Ramalingam 2001) if they are pursuing seamless (end-to-end), low cost communication and collaboration with their customers and suppliers. However, E-Supply Chain is relatively new and immature, and therefore, an extremely important area for IS research. The objective of this study is to identify issues of concern in pursuing an E-Supply Chain strategy. To fulfill this objective, the researchers formulated a number of research questions, helping to focus on the issues on hand and prevent deviation from the objective (Miles and Huberman 1994). The questions address the impact that E-Business has on a supply chain, in terms of benefits and drawbacks to the organisation and its suppliers.

Given the need for the researchers to achieve an in-depth understanding of E-Supply Chain initiatives within an organisation, focusing on the impact of E-Business on the supply chain and the level of success of these initiatives, a single exploratory case study research design was chosen. The exploratory case study provides a well grounded picture of a phenomenon within its context (Stewart et al. 1999), allowing the researchers to become familiar with basic facts, people and concerns, in order to develop hypotheses or frame questions for further research, through incorporating survey questionnaires, in-depth interviewing, and document analysis (Marshall and Rossman 1989) as approaches to data collection.

3.1 Selection of the Case Study Organisation

According to Stake (2000), the primary criterion for case study selection must be the ability to maximise what we can learn, ensuring that there is a balance between uniqueness, resources and the ability to learn. Therefore, in the selection of a case organisation, there are a number of vital conditions that the selected organisation must adhere to (Stake 2000), and based on addressing these conditions, Intel Ireland was selected as the ideal site for this case study research, as illustrated in Table 1. Intel Ireland is an affiliate of Intel Corporation and the case study findings relate to the E-Supply Chain initiatives in Intel Ireland only.

Conditions for Selection	Intel Ireland
The organisation must be currently attempting to implement an e-supply chain initiative and preferably be well advanced in the process so that there is enough data available for analysis	Intel Ireland has been involved in e-supply chain initiatives since the late 1990s. They are a manufacturing organisation that relies heavily on the efficient running of its supply chain
The organisation must be undertaking the e-supply chain initiative in modular fashion. Ideally, there will be separate modules available for analysis, adopting differing implementation methodologies and at different stages in the implementation lifecycle	Intel Ireland have already implemented one aspect of its e-supply chain initiative (Intel Web Suite) and is currently working on the adoption of another aspect of its e-supply chain initiative (fully integrated B2B e-solution using Rosetta Net e-business standards)
The organisation must be open to having research carried out on their implementation projects	Intel Ireland is open to the possibility of research being conducted on their e-supply chain activities

Table 1: Conditions for Case Study Selection

The primary data collection methods used for the study were survey questionnaires, in-depth interviewing, and document analysis, in an effort to ensure triangulation in the data collection effort. A survey of 20 Intel personnel (Ireland and US) was conducted with a response rate of 80% (16 responses) of which 14 (70%) were usable. The two unusable survey responses addressed questions relating to the E-Business background within Intel but made no reference to the questions relating to the E-Supply Chain initiatives. Following this, semi-structured interviews were conducted over a six-month period in early 2003 with key decision makers and stakeholders in the E-Supply Chain initiatives of both Intel Ireland and Intel US. Two of the interviewees were also involved in the survey, namely the US Web Suite Deployment Manager (Project Manager) and the US Rosetta Net Deployment Manager. The other interviewees consisted of: the E-Business Group Manager (Intel Ireland), The Accounts Payable Manager (Intel Ireland), and an E-Business Systems Analyst (Intel Ireland). A limitation of this study relates to the fact that Intels suppliers were not interviewed as part of this research, although available supplier-related documentation was analysed. As a result, the impact of the E-Supply Chain initiatives on suppliers supply chain processes is based on the observations of Intel personnel. Each interview was semi-structured to facilitate an examination of the organisation's experiences in relation to the issues identified, as well as a consideration of other aspects of the organisations specific E-Supply Chain initiative. The main aspects of the supply chain examined in this paper are Accounts Payable and Procurement. These groups work in close partnership to deliver an E-Business solution to automate and streamline the associated supply chain processes.

3.2 Intel

For more than three decades, Intel Corporation has developed technology enabling the PC and Internet revolution that has changed the world. Founded in 1968 to build semi-conductor memory products, Intel introduced the world's first microprocessor in 1971. Today, Intel supplies computing and communications industries with the "ingredients" to create advanced systems, using silicon-based

products for high performance microprocessors, chipsets and flash memory components. Intel's mission is to be the pre-eminent building block supplier to the Internet economy.

Intel has established a competitive advantage through its scale of operations, agility of its factory network and consistent execution worldwide. It has twelve fabrication facilities and twelve assembly and test facilities worldwide. In recent years, Intel has placed a lot more focus in areas such as R&D and E-Business, and in 2002, Intel spent over €3 billion on R&D. The company's technology investments differentiate Intel from competitors and provide the foundation for future growth. The establishment of an E-Business group in all its major sites during the 1990's has been viewed as a clear shift by Intel to drive the utilisation of E-Business for more effective co-operation with its customers and suppliers. The Intel Ireland site is located in Leixlip, Co. Kildare. It is Intel's fourth largest manufacturing site and the largest Intel site outside of the US. Intel decided to locate its manufacturing facilities in Ireland in 1989, and production began in 1990. Since then, Intel has invested €3.2 billion in turning 360 acres of the Collinstown Industrial Park into the most technologically advanced industrial campus in Ireland. The planned expansion - Fab 24 - when completed in 2004 will add another €2 billion to this investment.

4 INTEL CORPORATIONS E-BUSINESS STRATEGY

Over the past few years, Intel has been building E-Business capabilities to conduct business with customers and suppliers. Intel's ultimate goal is to become a '100% E-Corporation' by marrying Internet technologies and critical business systems to increase productivity and competitiveness in the marketplace. Intel's E-Business Group is ultimately responsible for delivering this goal for the corporation. The E-Business Group's mission is as follows, "lead Intel to be a worldwide, world class 100% E-Corporation that maximises our profitability, responsiveness and innovation". To date, there have been three phases to Intel's E-Business strategy. In the mid 1990's, Intel began to recognise the power of the Internet as a corporate communication channel by using the Internet as 'brochureware', to share technical information and market Intel® products. In 1995, Intel formed the Internet Marketing and E-Commerce group (IM&E) to centralise online marketing efforts. In 1998, Intel launched a global online ordering system that reached a record US\$1 billion in product orders in the first month of operation. Today, Intel generates over 85% of revenue from online orders and virtually all Intel customers are transacting business with Intel over the Internet. In their pursuit of becoming a '100% E-Corporation', Intel is moving towards paperless purchase orders, shipment notification and deployment processes. In trying to achieve this, Intel now offers its suppliers two options, as follows: a web based solution known as Intel® Web Suite, and a system-to-system/business-to-business (B2B) 'E-Solution' known as Rosetta Net XML standards.

4.1 Web Suite

The next phase came in the late 1990's when Intel executives saw the potential of the Internet as a business tool. Intel changed IM&E to the E-Business Group to centralise all enterprise applications and put strategic focus on using the Internet to run the company more efficiently. In 1997, Intel launched a supplier extranet site (supplier.intel.com) to strengthen communication with its suppliers. Today, the site offers news, forecast information, shipment tracker, payment status and much more. In addition, Intel now conducts 90% of purchasing transactions with direct suppliers and 70% with indirect suppliers over the Internet. This suite of online applications, developed by Intel, is known as Intel Web Suite, positioned as the first step toward an E-Supply Chain and designed to eliminate paper throughout the supply chain network. The suite is comprised of four separate applications known as Intel® Web PO (Purchase Order), Intel® Web Invoice, Intel® ASN, and Intel® Payment Tracker, as illustrated in Table 2. These applications operate over a web portal (supplier.intel.com) to transfer data between Intel and its external suppliers and this is the first of the two E-Supply Chain initiatives which this research study examines.

Web Suite Applications	Functionality
Intel Web PO	Eliminates the need for Intel to fax hard copies of purchase orders to suppliers (available online)
Intel Web Invoice	Eliminates the need for Intel suppliers to submit hard copy invoices to Intel for payment (created and submitted online based on PO numbers)
Intel ASN (Automated Shipping Notice)	Allows Intel suppliers to submit material shipping to Intel via the web portal
Intel Payment Tracker	Provides the supplier with a view into Intels Accounts Payable system. It provides all vital information to the supplier regarding where exactly their invoice is, in the payment process

Table 2: *Web Suite Applications and Functionality*

4.2 Rosetta Net

In 1998, Intel became a founding member of the Rosetta Net consortium to help drive the adoption of E-Business standards in the electronics industry. Rosetta Net is a consortium of more than 400 major Information technology (IT), Electronic Components (EC), Semiconductor Manufacturing (SM) and Solution Providers (SP) companies working to create and implement industry-wide, open, E-Business process standards. Intel is one of the few organisations that have shown enough confidence in Rosetta Net to actually replace much of its EDI connections with Rosetta Net ‘Partner Interface Processes’ (PIPs). According to Wagner (2001, p.1) Intel “will replace EDI with Rosetta Net standards by 2006, making it the first company to publicly commit to retiring Electronic Data Interchange”. The B2B ‘E-Solution’ which Intel has developed utilises Rosetta Net E-Business standards and uses XML technology to give suppliers a completely touch-less Procurement and Accounts Payable process and real-time data transmission. The Rosetta Net standards offer a robust non-proprietary solution, encompassing data dictionaries, implementation frameworks, business message schemes and process specifications for E-Business standardisation. These E-Business standards form the second area of research focus in this study.

5 THE ROAD TO AN E-SUPPLY CHAIN STRATEGY AT INTEL

Intel adopted a phased approach to its E-Supply Chain strategy, adding additional applications as the strategy progresses. In order to understand the E-Supply Chain strategy pursued by Intel it is necessary to emphasise the relationship between Web Suite and Rosetta Net. A major consideration for Intel centres around whether Intel should try and get suppliers to deploy Web Suite first, or encourage suppliers to use the Rosetta Net application straight away. According to the Web Suite Deployment Manager in Intel US, “Intel looks at suppliers and evaluates where they should be. Should they be on Web Suite or Rosetta Net is based upon their level of transactions. If they have a high volume they are automatically shuttled over to the Rosetta Net road-map, if they are low volume they get lined up for Web Suite. However, it’s interesting because if you are a Rosetta Net candidate you automatically have to be capable of using Web Suite in case Rosetta Net goes down (for example, the XML servers), or if the supplier needed a paper copy of a PO or Invoice. Therefore, Rosetta Net is your primary means of communication and Web Suite is your secondary”.

5.1 Deployment of Web Suite and Rosetta Net

Prior to the E-Supply Chain initiatives within Intel, communication and ordering from suppliers was essentially a manual process, each site using different processes and often different systems to achieve the same results – order products and services from external parties and pay for these products and services. However, with the introduction of Web Suite and Rosetta Net, the new E-Supply Chain processes eliminate much of the manual intervention, of the ‘traditional’ supply chain, and automate the sending and receiving of real-time, up-to-date data, as illustrated in Table 3. Furthermore, the advantages of Rosetta Net over Web Suite are as follows: it offers suppliers touch-less transactions where no manual data entry is required. As a result, there is less chance of data entry errors and transactions can be automatically processed by the suppliers systems with no need to retrieve the data from the web site (supplier.intel.com).

Traditional Supply Chain Processes	Web Suite E-Supply Chain Processes	Rosetta Net E-Supply Chain Processes
A purchase requisition is filled out; this goes off to be approved by the relevant manager, where it is mailed/e-mailed to the purchasing buyer within Intel	The purchase requisition is filled out online and electronically routed to the buyer	The purchase requisition is filled out and electronically routed to the buyer
The buyer prepares the purchase order and mails or faxes this to the supplier	The buyer fills out the PO, which is routed via the web to the supplier	The buyer fills out the PO (internal system), which is converted to an XML message, sent over the Internet, and reconverted into format for supplier system
The supplier then keys in the order (into internal supplier systems) and arranges for the goods/services to be delivered to Intel	The supplier downloads the order, manually keys it into their internal systems, and arranges goods and services to be delivered to Intel	The suppliers system interprets the order and arranges goods and services to be delivered to Intel (the supplier may need to touch the order)
The invoice is then sent to Intel’s Accounts Payable group	The invoice is then manually entered, by the supplier, into Intel Web Invoice and routed to Intel via the web	
The Accounts Payable clerk audits the invoice and matches it to the receipt and keys it into the purchasing and payables enterprise system, e.g. SAP	The invoice is automatically loaded into the purchasing / payables (ERP) system where it is matched to the receipt	The invoice is sent to Intels purchasing / payables (ERP) system from the supplier system where it is matched to the receipt
Payment is then mailed or EFT	Payment is sent via EFT	Payment is sent via EFT
During this time, the vast amounts of queries are handled over the phone, some on web	Queries are no longer handled via telephone (for the most part) but are now handled over the web	Queries handled over the web (maybe via telephone also)

Table 3: A Comparison of Supply Chain Processes within Intel

Similar to the deployment procedure with Web Suite, the Rosetta Net B2B ‘E-solution’ is a global solution and therefore, is implemented in a variety of regions world-wide. Different sites throughout Intel experienced similar problems which caused minor setbacks in both the Web Suite and Rosetta Net project implementations. For example, Figure 1 highlights the challenges that Intel faced during the deployment of Web Suite.

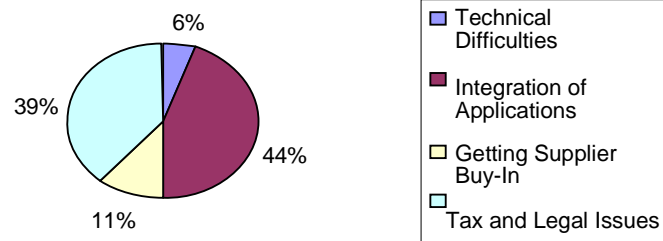


Figure 1: Challenges to Intel during Web Suite Deployment

In fact, our research revealed that, in relation to the Web Suite and Rosetta Net initiatives, deployment levels varied considerably. From the Intel Ireland perspective, two issues in particular were deemed the biggest challenges to Web Suite deployment, namely, government legislation regarding electronic invoices, and the issue of project ownership. In terms of Rosetta Net deployment, the researchers identified that only a limited number of Irish suppliers are dealing with Intel Ireland using Rosetta Net. In fact, the E-Business Manager in Intel Ireland commented that *“we do have some element of Irish customers dealing in some capacity with Rosetta Net but they are dealing in dollars and directly with the corporation in the US. As yet we do not have anybody using it with our currency”*. In fact, the main stumbling block to date in keeping Irish suppliers from deploying Rosetta Net is that they have not been technically ready to put the ‘E-Solution’ in place.

5.2 Impact of Web Suite and B2B ‘E-Solution’ using Rosetta Net E-Business Standards on Supply Chain

Overall, Web Suite is not a fully integrated B2B initiative, using standards for a ‘touch-less’, ‘system-to-system’ process, but simply a suite of ‘web-based’ applications setting Intel towards an E-Supply Chain. As a result, some of the drawbacks to suppliers relate to the need for manual intervention throughout the business process and the lack of an automated interface to supplier systems. For example, suppliers having to access supplier.intel.com to view purchase orders; manually keying invoice details into Intel Web Invoice; and manually entering shipping notices into Intel ASN. However, Web Suite has made Intel’s supply chain more efficient, a point highlighted by the E-Business Systems Analyst in Intel Ireland who claimed *“Web Suite on its own will have an impact of tidying up the supply chain process, getting rid of paper, hopefully reducing mismatches. Basically, the Intel Web Invoice has eliminated the amount of phone calls and queries”*. The Accounts Payable manager in Intel Ireland believes Web Suite has helped improve Intel relations with its suppliers, stating that *“Web Suite improves on-time payment to suppliers”*. It also provides them with a lot more visibility than before, *“it has basically given suppliers a two or three week window before the invoice is due”*. Therefore, it appears that Intel Web Suite has had a positive impact on Intel’s supply chain, and this point was further supported by the E-Business Systems Analyst in Intel Ireland, who stated that, *“the application definitely equates with the best available. In terms of competitive advantage Rosetta Net is where we want to be, but Web Suite is definitely a stepping stone”*.

While the Rosetta Net project is still in its early stages of deployment in Europe, it is becoming more popular in the US and Asia, however, Intel is still behind schedule with the Rosetta Net project, mainly because of large sums of capital investment required for the initial implementation. The solution itself is particularly appealing to large suppliers of Intel who have a very large volume of transactions; it is not feasible to expect these suppliers to manually key a large volume of invoices into Intel’s web portal on a regular basis. Intel’s rationale for utilising Rosetta Net E-Business standards revolves around collaboration with suppliers, providing a means to do business 24 hours a day; and it is a key project in getting Intel to a ‘100% E-Corporation’. The E-Business Manager for Intel Ireland

believes that the main advantage of using Rosetta Net is that *“it gives us a platform for the future, it goes a step further on the integration than Web Suite did. Basically, we now have a deeper link”*.

5.2.1 *Benefits of Intel Web Suite and Rosetta Net to Intel and Suppliers*

According to the E-Business Manager (Intel Ireland), the main benefit of adopting Intel Web Suite is as follows: *“a standardised, consistent method of working with suppliers will reduce the cycle time for processing the information, making the information more readily available to both suppliers and Intel personnel”*. Overall, the benefits of Web Suite relate to productivity improvements (less call volume resulting in improved efficiency, reduced paperwork, and less time spent on payment issues); increased on-time payments for suppliers and as a result early payment discounts for Intel; time savings for personnel (intelligent data storage, improved data integrity reducing PO/invoice mismatches, and enhanced transaction visibility), which allows personnel to move onto working on more value-added tasks and controlling the business. For example, time previously spent on the phone, trying to source a part that was shipped two weeks ago or identifying a payment that never arrived in the bank account, can now be spent analysing data and putting controls in place. Therefore, business processes are improved and hence managed more effectively. To reiterate this point, the Accounts Payable Manager at Intel Ireland stated that *“we have had some good feedback from suppliers in that it does make it easier because they don’t have to make all the phone calls and definitely our queries in relation to Accounts Payable have been reduced, so from that point of view its great because suppliers can see there Purchase Orders and the Intel Payment Tracker is an excellent application because suppliers can also see where their invoice is”*. Despite these benefits, the E-Business Systems Analyst in Intel Ireland claims that *“although there is certainly no monetary business value for suppliers, except maybe for productivity savings, they are getting paid quicker”*.

Based on our research a number of major benefits were identified regarding the adoption of Rosetta Net E-Business standards. For example, 100% of the survey respondents believed it provided Intel with a touch-less process which eliminates manual data entry; 44% stated that end-users were able to enjoy speed and uniformity in purchasing practices; 55% thought that it leads to an increase in on-time payment; and finally, 66% stated that it leads to time and money savings for Intel and suppliers. According to the E-Business Manager in Intel Ireland, *“the biggest benefit suppliers will realise after adopting Rosetta Net is that it should reduce the cost for the supplier on their on-going transactions. Although their initial investment is considerable, they should reap the rewards”*. According to the Director of E-Markets, Intel US, *“until recently there wasn’t much metrics available to measure Rosetta Net’s success because there wasn’t a significant enough amount of business being done this way”*. However, recent figures published at the end of 2002 showed that Intel is conducting 10% of its overall E-Business over Rosetta Net. In dollar terms, that is US\$5 billion worth of transactions with suppliers. In process improvement terms, Intel has reduced its purchase orders (PO) processing time with one of its distributors by 25%. Nearly one third of those orders, (30%) can be processed in less than four minutes and 50% is processed within 24 hours. Intel’s standard PO order processing agreement is two days. Consequently, these figures indicate that Intel is making progress in this area.

5.2.2 *Drawbacks of Intel Web Suite and Rosetta Net to Intel and Suppliers*

There are a number of drawbacks for both Intel and its suppliers in adopting Web Suite. Based on our research, 33% of survey respondents stated that there were some drawbacks to Intel of introducing Web Suite, while 67% of respondents comment that there are considerable drawbacks for suppliers also, as illustrated in Figure 2. The nature of these drawbacks differs for Intel and its suppliers and these drawbacks were further highlighted in the interviews conducted for this study. For the most part the drawbacks for Intel relate to achieving the required level of global adoption of Web Suite, whereas the suppliers are more concerned with the limitations of the ‘web-based’ applications in use. For example, double data entry of invoice to Web Suite and their internal systems, and the use of Web Suite by suppliers, makes it necessary for suppliers to adapt their applications and business processes

in order to be able to communicate with Intel. Although Web Suite is a very significant initiative towards achieving an E-Supply Chain, as it automates associated business processes, and ultimately leads to better supplier management and relationships, these drawbacks still exist for both Intel and suppliers. The Accounts Payable Manager for Intel Ireland stated that “*prior to Web Suite everything was on paper, with about 3,500 paper transactions a month, and 10 people working in Accounts Payable, processing invoices, dealing with all the queries of paper invoices coming in without purchase orders*”. However, according to the Accounts Payable Manager in Intel Ireland, “*from an Account Payable perspective at least there is less paper coming through. So there is reduced time keying in invoices, because the onus is back on the supplier, the supplier actually enters the invoice into Web Suite. So obviously we have been able to reduce head count over the last couple of years*”. However, the Accounts Payable Manager (Intel Ireland) further points out that “*the plans for the original project involved more head count reductions in Accounts Payable globally than actually materialised, however, it has brought to life that Accounts Payable do a lot more than just process invoices*”.

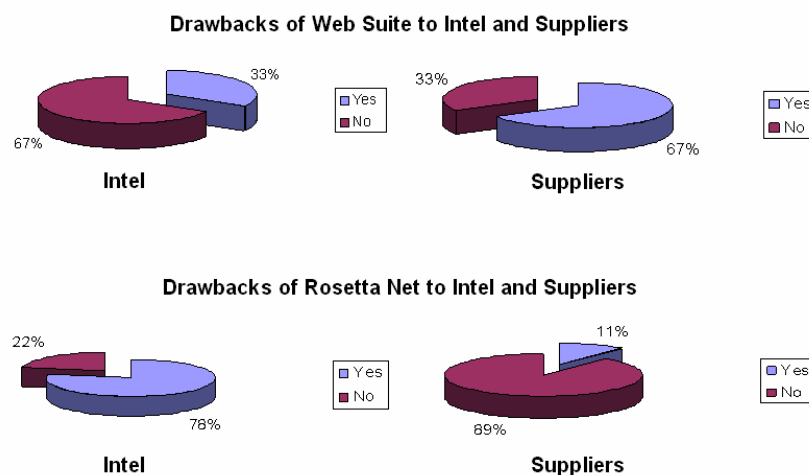


Figure 2: Drawbacks of Web Suite and Rosetta Net to Intel and Suppliers

Furthermore, a number of drawbacks were identified through our research, for both Intel and suppliers, in adopting Rosetta Net. Despite the initial cost of implementing, the ‘E-Solution’ offers huge benefits. However, 78% of survey respondents believed there were drawbacks for the suppliers in adopting and using Rosetta Net, as illustrated in Figure 2. The E-Business Analyst in Intel Ireland claimed that “*the biggest challenge for suppliers at the moment relates to the cost constraints attached to the project, getting people to spend money up-front has proved a problem*”.

In terms of drawbacks for Intel, our research shows that the majority of survey respondents and interviewees believed that there were no drawbacks for Intel in adopting Rosetta Net. In fact, the research shows that 89% believed Rosetta Net provides benefits rather than drawbacks, as illustrated in Figure 2. However despite this, 11% believed there were some drawbacks for Intel in adopting and using Rosetta Net. For example, the SPS Business Manager, Intel US commented that “*I have yet to see a compelling ROI for Rosetta Net. We are spending tons of money, without being able to demonstrate a real saving*”. Also the E-Business Distribution Manager, Intel EMEA believes that “*there is a great deal of pain to be gone through as we implement these systems, as people get used to new business practices, we end up changing it. I’m not sure we will ever get past this, we are always changing something*”.

5.3 Measuring the Success of an E-Supply Chain Initiative

According to the E-Business Manager in Intel Ireland, *“the biggest metrics which we use for measuring success is business value. Basically, we measure the business value by transaction”*. However, there are other market-type drivers which need to be taken into consideration, which may not be included in Intel’s net savings figure, these include, their ability to claim discounts for early payment and segment share.

Although the business value is a key metric used in Intel for measuring success, the researches found that success was in fact measured in a different way. According to the E-Business Systems Analyst in Intel Ireland, *“from an E-Business perspective we measure success by percent of transactions. We don’t use business value when we talk about these projects as much; our goal is percent of transactions, so for arguments sake we are given a target percent of 80% to strive towards. It’s a little different in other areas where we concentrate on business value. Basically we need to look at a lot more than just money with these projects”*. This view is supported by the Web Suite Deployment Manager in Intel US, who stated that, *“success was measured in the US on the number of suppliers utilising the tool, the number of transactions running through the tool and the number of E-Business transactions overall”*. However despite this, the researchers found that the Deployment manager was not overly satisfied with using this indicator, stating *“are those the correct measurement technique? I think you’ll find they’re not and business value may be more accurate, but we are using these for now at least”*. Despite this view, the E-Business Systems Analyst in Intel Ireland claimed that *“although somebody out there is probably trying to keep a check on the business value, we basically concentrate on the number of transactions and the number of suppliers that we have on board because our goal is 100%, our goal isn’t to deliver US\$10 million in business value to Intel. Our goal is to get all our suppliers on Web Suite”*.

Based on our research, the view of 89% of survey respondents is that Intel is on the right track and that the projects have been a success to date. According to the E-Business Manager in Intel Ireland, the projects have been a success, in that *“for the Web Suite project we already have the business value calculated and added, so we did get the business value that we had expected to get from this project. For Rosetta Net, the big saving to date, I believe, has been in the customer space”*. However, some reservations still exist concerning the success of the E-Supply Chain initiatives. In fact the SPS Business Manager in Intel US claims that *“yes and no in relation to its success. We are way ahead of many other companies in this space. However, there are still significant hurdles to jump, like tax and legal issues for instance, plus developing workable standard tools that are cheap to purchase and easy to use. So we are making significant progress, but we still have a long way to go”*. This view was also supported by the Rosetta Net Deployment Manager in Intel US, who stated that *“Intel has experienced huge benefits from Rosetta Net as we are now learning how to improve our processes, however, we still have a long way to go”*. However, due to the fact that Rosetta Net has not yet been embraced fully in Intel Ireland, determining whether the Rosetta Net project has been a success is a little premature.

In conclusion, it could be argued that the E-Supply Chain initiatives within Intel Ireland have been successful in transforming the companies’ business processes, in order for the company to become a fully fledged ‘100% E-Corporation’, however, there is still quite a way to go. In fact this point is also highlighted by several of the interviewees in this research study. When questioned as to how long it will be before Intel becomes a ‘100% E-Corporation’, even with Web Suite and Rosetta Net in place, the responses varied significantly.

6 CONCLUSIONS: THE GOAL OF BEING A 100% E-CORPORATION

If E-Supply Chain initiatives are a ‘must have’ in modern manufacturing environments, then the level of success with these project implementations must be determined, and whether the benefits of these initiatives are being fully realised, by the trading partners involved. Therefore, in the conclusions of

this study, we identify a number of ‘issues of concern’ extracted from the experience of Intel in deploying both the Web Suite and Rosetta Net E-Supply Chain initiatives.

The transformation to a ‘100% E-Corporation’ continues to be difficult, but the benefits have had a positive impact on Intel, its customers, suppliers and employees. Although Intel has developed methodologies to measure the benefits of E-Business and have realised gains in reduced inventory levels, operational efficiencies, market reach and time-to-market, uncertainties still remain as to the time frame within which Intel will become a ‘100% E-Corporation’. Within the survey, 67% of the respondents predict more than 5 years, 22% indicated it could be in the next 2-3 years, while 11% indicated it would happen in the next 3-5 years, as illustrated in Figure 3.

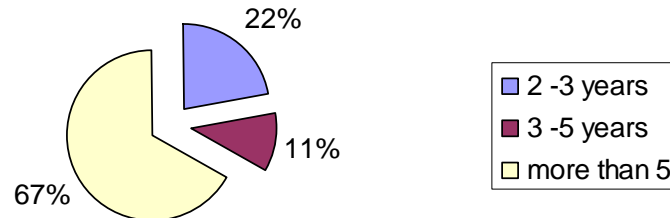


Figure 3: The Time Frame to become a 100% E-Corporation

According to the Web Suite Deployment manager in Intel US, “well we are not there yet. I think it depends on how you define ‘100% E-Corporation’, if you look at it saying we want all our transactions electronic, realistically I think we are 20 years away from that. You may ask why, well there will always be a supplier out there that doesn’t have the capability, or one that we need materials for tomorrow, that’s not able to execute on an electronic basis, and we are going to have to handle it manually. So if your definition of ‘100% E-Corporation’ is all electronic, we are a good bit away. If it is not, and some people use it in Intel that ‘100% E-Corporation’ means that all our standard transactions are electronic, I think we are probably closer, we are maybe 5 years away”. In fact this view was also supported by the E-Business Systems Analyst in Intel Ireland who claimed that “I don’t believe we are going to get there with Web Suite alone, it will have to be through Rosetta Net and I don’t think this will happen for at least two years. However, I think this question relates to Intel’s interpretation of what 100% is, is it 100% of everything?” Both these views suggest that no universal definition of ‘100% E-Corporation’ exists and the likelihood of achieving this goal of ‘100% E-Corporation’ is dependent on the implementation approach adopted and the environment pressures existing throughout Intel sites.

6.1 Issues of Concern in Pursuing the Goal of a ‘100% E-Corporation’

As a result of undertaking various E-Supply Chain initiatives within Intel, a number of ‘issues of concern’ have been identified around tax and legal issues, supplier readiness, internal and external system and process changes, project ownership, knowledge of supplier layers, and measures of success, in pursuing their ultimate goal of becoming a ‘100% E-Corporation’. These issues are presented in Table 4 along with a description of the nature of the concerns facing Intel throughout these E-Supply Chain initiatives. As a result, Intel is still quite a distance from achieving their ultimate goal of becoming a ‘100% E-Corporation’. From the researchers point of view, becoming a ‘100% E-Corporation’ is a total transformation of the way Intel runs their business. The Vice President of Finance and Enterprise Services explains that “100% E-Corporation means all Intels interactions with its customers, its suppliers, its employees, and its affiliates are through the Internet. It is a simple definition, but not a simple process”.

As an example of an ‘issues of concern’, Intels supplier base now consists of three different layers as follows: there is a top layer of suppliers which amounts to 20% of Intels suppliers and about 75% of their business, these are major players in the industry and have a full Rosetta Net E-Business standard

implemented; the second layer are suppliers that are able to use Web Suite and amount to 75% of Intel's suppliers but only 20% of its business. The nature of this relationship is simply an electronic link from Intel's back-end systems to their systems, however, their back-end systems are not capable of supporting the Rosetta Net standards; finally, the third layer of Intel's supplier base is comprised of suppliers who will never join the electronic age, and this amounts to about 5% of Intel's suppliers. According to the E-Business Manager (Intel Ireland) *"there will always be a small number of suppliers that will have to be supported on paper"*.

Issue of Concern	Nature of the Concern
Tax and Legal Issues	The legislation in many European countries does not support Intel Web Invoice for an 'E-Transaction'. To combat this Intel began lobbying in a variety of European countries, trying to get clearance for this 'web-based' application. However, this is still proving to be the most challenging road block which had not been forecasted when the E-Supply Chain initiatives were initially proposed.
Supplier Readiness	The unwillingness / inability of external customers and suppliers to deploy the E-Business solutions is a concern for Intel, in order to achieve its goal of '100% E-Corporation'
Internal / External System and Process Changes	Intel's inability to manage its supply base is a big concern. Without strict rules in place to manage this, Intel will continue to struggle to meet their goals. However, it is hard to change processes that have been around for along time and seemingly work fine.
Project Ownership	A lack of cohesion and communication between the relevant functional groups within Intel Ireland caused major difficulties in terms of taking responsibility for the deployment of the Web Suite initiative.
Knowledge of Supplier Layers	Intel's supplier base is now divided up into three different layers, the third layer, amounting to 5% of Intel's suppliers, are still using paper based resources.
Measures of Success	Business value is a metric widely used in Intel for measuring success. However, when measuring the success of the E-Supply Chain initiatives, Intel focus on the volume of transactions or 'E-Transactions'.

Table 4: *Issues of Concern in Pursuing the Goal of becoming a 100% E-Corporation*

6.2 Summary

To summarise, Intel will need to be more aggressive in overcoming the challenges they face in their E-Supply Chain initiatives, in particular the Rosetta Net B2B 'E-Solution', in order to achieve their goal of becoming a '100% E-Corporation'. The researchers believe that the complexity of this task should not be understated. With the large number of suppliers that are in business with Intel, there are many issues which will affect the success of their E-Business transformation. Many of the business process changes and technological changes are dependant on buy-in and commitment from Intel's suppliers. As this requires a major mind-set change and a substantial investment on the part of the suppliers, it is not a transformation that can happen overnight.

The 'issues of concern' identified in this research study, highlight difficulties that emerged in implementing an E-Supply Chain strategy. However, an obvious limitation of this study concerns the fact that these issues are based on the experiences of one organisation. To address this limitation further research is currently being undertaken to extend our understanding of these issues and examine their existence and impact in other organisations, and from the suppliers perspective.

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