

DIALOGUE

Dawson Dialogue

Extending the supply chain horizon:
'Developing a collaborative IT strategy'

DAWSON CONSULTING

a Dawson Group company



About the authors

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Nick Capp, a Principal Consultant with Dawson Consulting, has significant experience in various industries, both in line-management roles and in providing management consulting services. In addition, Nick has had both academic and professional exposure to best practice supply chain operations, systems and processes and the change management practices critical to their success. Nick has led recent assignments in the transportation, pharmaceutical and apparel industries in strategic planning, process re-design, supply chain planning and collaboration.



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Executive Summary

From the emergence of the Internet, to Y2K and the dotcom era, most organisations have whizzed through the last decade without checking their rear view mirrors. Many companies have committed millions of dollars to supply chain management (SCM) tools, including implementation, consultancy and systems integrations to install the software. Now with the onset of collaboration, senior management is faced with the challenge of not only 'getting their IT houses in order', but also opening up their businesses to their trading partners to reap further costs savings and efficiency improvements.

Collaboration can leave an organisation open to further inappropriate expenditure on technology, exposure to 'systemic' risk or risks associated with the failure of external systems and potentially divergent (and even conflicting) corporate goals. Hence, whilst technology vendors have been 'spruiking' the capabilities of their collaborative applications, actual delivery has been far less impressive with many organisations still trying to understand the collaborative IT environment and ways in which they can best position themselves for the long-term.

Furthermore, SCM applications are constantly in flux because new technologies are fundamentally redefining the realm of what is possible (Kalakota and Robinson 1999). Predicting what new capabilities technology will provide to support business needs is the key to making solid investment decisions. In addition, organisations need to understand exactly what is available in their markets and what actually works in their environment so as to avoid overexposure to technology risk. In reality, most successful collaborative programs to date have focused on addressing principal supply chain processes, such as, demand planning, physical distribution and order management, and the relationships that support them. This captures significant benefits through a combination of physical, informational and human factors.

Jeri Dunn, Nestle USA's CIO sums up the situation succinctly after their US\$210 million SAP implementation; if Nestle were to do it all over again, she'd focus first on changing business processes and achieving universal buy-in, and then and only then on installing the software. "If you try to do it with a system first, you will have an installation, not an implementation," she says. "And there is a big difference between installing software and implementing a solution" (Worthen, 2002).

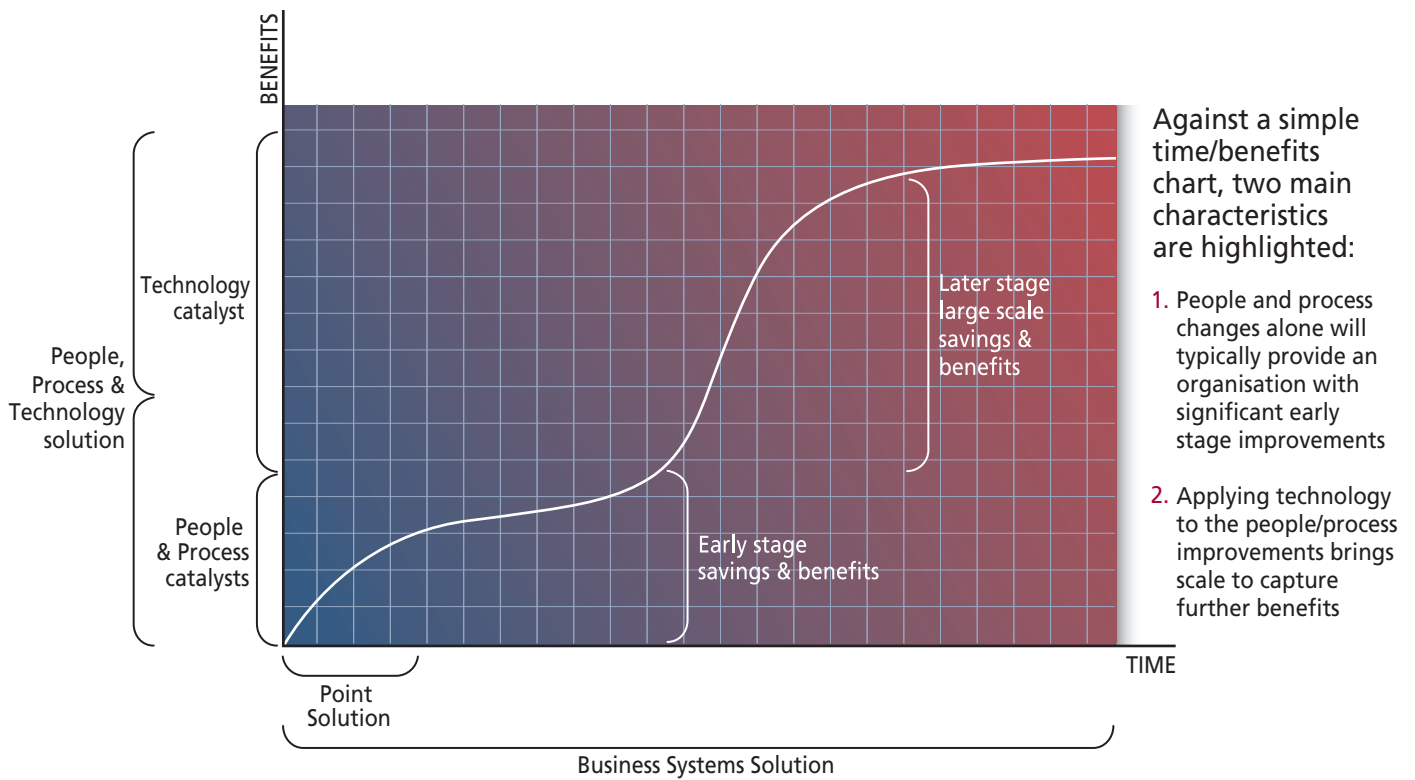


Figure 1: High-level picture of collaborative development

Introduction

In the last decade, demands have been placed on organisations to focus on integrating and streamlining internal business processes with the emergence of organisational systems such as CRM, SCM, MRP II and ERP, and new business concepts such as BPR and TQM coined by management gurus. We have seen over the past two years, a significant shift in focus from internal to external integration, and as a result collaboration is a hot topic for most organisations in today’s business environment. Since our initial collaboration white paper, ‘Sleeping with the Enemy’ (Dawson Consulting, 2001), identified collaboration as the next fundamental shift in the evolution of supply chain relationships, advances have been slow but steady.

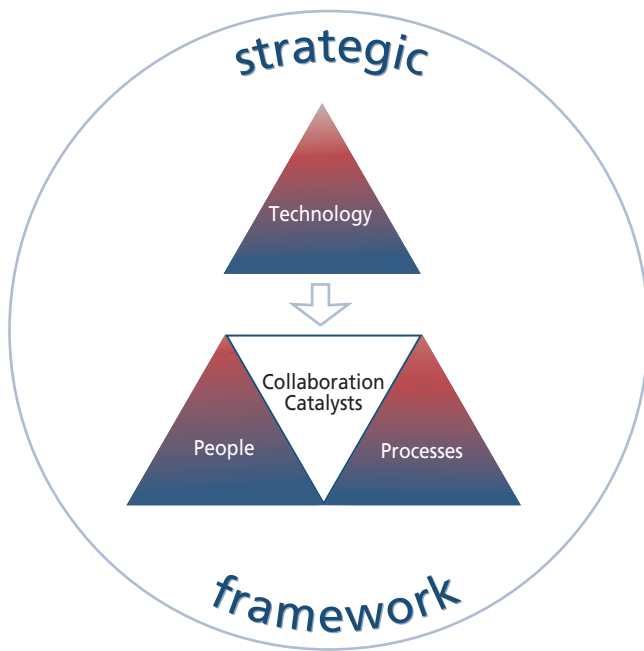
Developments to date have brought significant change and with it significant benefits. Cost savings have been the primary focus for most of the organisations participating in collaborative programs, along with establishing a closer relationship with trading partners. Put into the correct context, these economic benefits signify the early stage benefits available through collaborative programs. The ability for partners to learn to trust and work together is critical. Trust establishes the

necessary framework for expanding the opportunities available when information systems and technologies are introduced into the collaborative environment.

Collaboration has changed relationships. The process of actually engaging with suppliers along a dimension other than ‘price’, has changed the way organisations, and more specifically the people who run them, perceive what collaboration represents and what it can generate.

Our experiences in assisting clients with numerous collaboration programmes have taught us several key principles that underline their success. We have learnt that there are three core collaboration catalysts: people, processes and technology. These are commonly referenced when implementing solutions/programs within an organisation, and take on special significance when implementing amongst organisations. Although this trio may appear simple and somewhat obvious, they represent a whole facet of potential focus points for any collaborative initiative, and differ in their leverage capabilities to impact organisations over varying timeframes.

To date, most collaborative efforts have been strongly focused on people and processes because, these days, concepts have to be proven and early stage returns realised



Typical characteristics of successful collaborative programs

- Scale in systems & technology brings disproportionate returns
 - Reduced friction to change
 - No fixed boundary on change 'horizon'
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- An organisation's introduction to collaboration
 - Significant early stage benefits in cost savings and service improvements
 - Fixed boundary on change 'horizon'

Figure 2: Technology brings disproportionate potential to collaboration

before significant investments are made (Figure 1). It is clear though that in order to generate returns on a larger scale, technology enablers will become essential. Technology allows the organisation to leverage the improvements achieved in early stage developments, providing a strong base for greater benefits (Figure 2).

Reasons For Our Approach

Strategic planning for IT has typically been inward facing, i.e. with a core focus on the internal requirements of the business with little, and sometimes no regard to the requirements of customers or suppliers. IT strategic planning in a collaborative way requires a different approach.

Dawson’s recent ‘Foresight Survey’ (Dawson Consulting, 2002) reinforces this new environment by identifying that the next stage of collaborative development is focused on the application of information technology in its various forms. In particular, by extracting greater leverage from existing IT investments. In addition, a majority of respondents signalled their intentions to increase the percentage of their IT budgets allocated to supply chain issues.

Where specifically are IT dollars to be spent for the next

12 to 18 months? In line with key goals, companies are most determined to completely change or enhance their planning and forecasting systems. The second most important area was in extracting more value and visibility from warehouse operations. Connecting with trading partners through EDI and other forms of electronic or web-based communications, including supply chain event management, were identified as the type of supply chain technologies that would need to be considered.

These results highlight the complex decisions confronting IT executives in developing an IT strategy that supports the overall needs of the wider supply chain, not just supply chain specific requirements for their organisations. This is compounded by the need to align any decision to business strategy and recognising that an organisation’s future requirements are becoming ever more connected with major trading partners and the industry in general.

The sheer number of specialised solutions can make it difficult to differentiate between what is required compared to what is ‘nice to have’. Dawson Consulting has conducted significant analysis of the SCM solutions market (Figure 3) to allow us to best determine the needs of our client base.

Predicting what new capabilities technology will provide to support business needs is the key to making solid investment decisions

This is supported by the growing requirement from our clients to provide assistance in each of the three core catalysts of collaboration. There are huge untapped reserves available through collaboration, which is dramatically clear when referring to PRTM's 2001 benchmarking study in the US, which followed a segment of companies across industries for three successive years and found that best-in-class collaborators – defined as the top 20 percent – operated their supply chains twice as efficiently as median companies. The study found that best-in-class companies carried half as much inventory (35 days versus 74), completed the cash-to-cash cycle more than twice as fast (36 days to 84), and were prepared to meet a sustainable 20 percent rise in demand in nine days compared with 20 days for median companies (Worthen, 2002). Driven by the ever-increasing complexity of cross-enterprise relationships, Dawson Consulting has developed an approach to collaborative IT strategy development. The approach assists an organisation in drawing together all required facets of the broader IT environment and determining how that environment can best support the organisation's long-term goals.

Collaborative IT Strategy Development – A New Approach

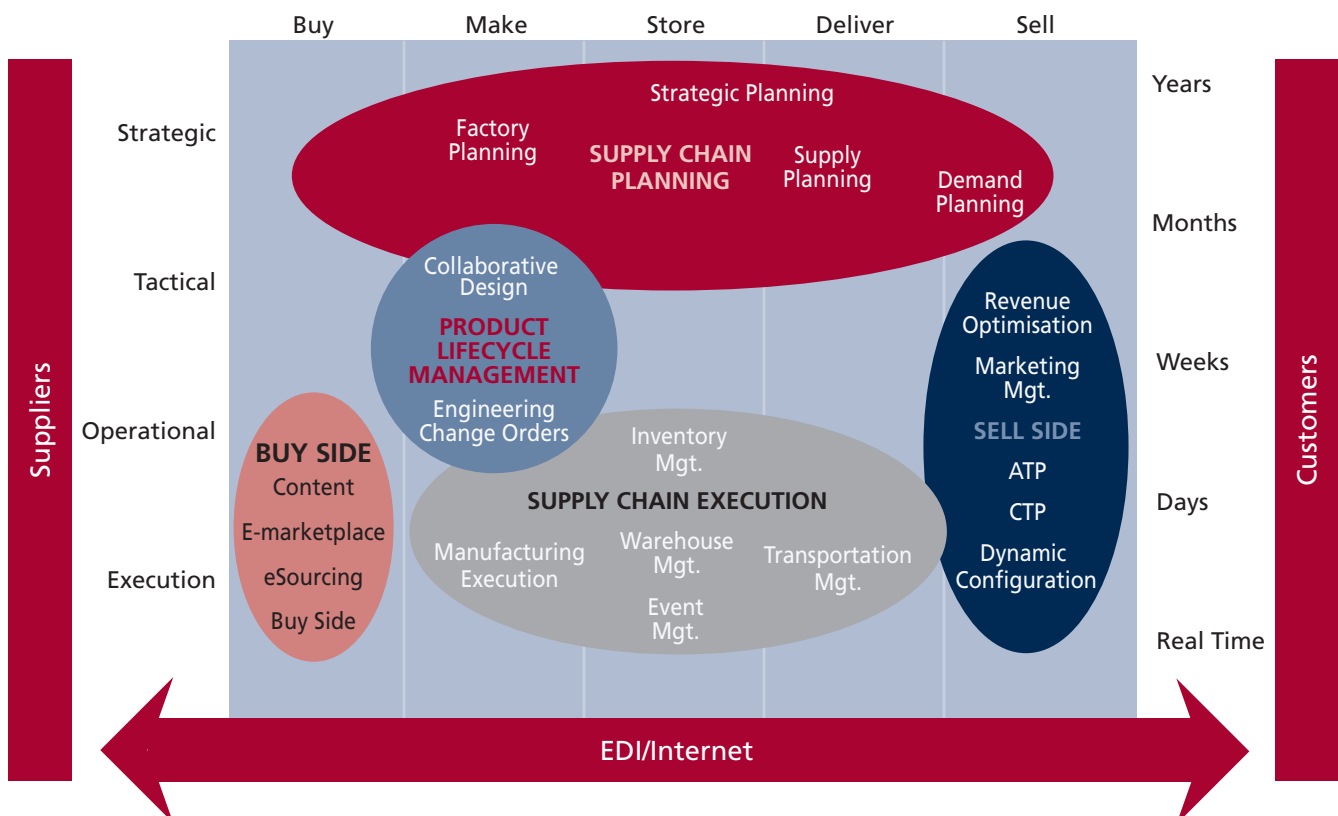
Establishing the Current Environment

To date, much of the thinking on collaboration has been restricted to the organisation and its direct interaction with trading partners. Whilst this focus is by no means flawed, it is limited in its scope, because it does not effectively address the merits and threats of other external trading relationships and their potential impacts on the organisation. In fact, the focus of collaborative strategies should be broadened to:

1. better equip the organisation in working closer with its trading partners, its partners' partners and the global community, and
2. better define the association between the processes conducted within and amongst the organisation(s) and the IT applications that support/enable them.

To begin with an organisation's key business drivers must be identified. This can be determined by analysing the industry in which the organisation competes and

Figure 3: SCM Applications – Where they fit



recognising the trends affecting the industry. Key business drivers can range from government regulations in the pharmaceutical industry to the weather in the agricultural chemical industry. The next fundamental step is to conduct a holistic assessment of the current supply chain processes and the enabling IT portfolio. This provides a solid foundation in determining a sustainable and scalable technological architecture for an organisation's back and front end supply chain processes. It is also necessary to maintain relevance and avoid an uncoordinated approach to IT investments. The future roadmap cannot be designed without understanding the core processes that interconnect within the organisation and those that connect the organisation to its trading partners. Furthermore, a comprehensive understanding of these processes will highlight the indirect linkages with trading partners' partners. To help in understanding how the organisation is positioned, it is necessary to examine the myriad of processes that operate within an organisation that are customer and supplier facing. These processes need to be identified and appropriately classed to allow management to understand how they impact the organisation and to distinguish leverage points. Processes can be segmented into three main classes: In-house, Cross-enterprise and Outsourced processes (Figure 4). These 'process class' distinctions have been adapted from James Champy's approach to classification (Champy 2002). It is important to remember that classification of processes will depend on the industry that the firm competes in.

In-house Processes

In-house processes are best described as those that are 'proprietary' to the organisation. Typically, these processes and their associated functions are considered as either core competencies or are instrumental in providing a core competency. Examples of these include the merchandising process in a national grocery retailer, research and development in fast moving consumer goods (FMCG), pharmaceutical companies and brand management in a clothing retailer.

Cross-enterprise Processes

Cross-enterprise processes support the core competencies and are viewed as distinct linkages between the firm and its trading partners. A distinguishing characteristic of these processes is that they cannot be performed without the input or participation of the firm's trading partners. Examples include order management and accounts receivable and payable.

Outsourced Processes

Outsourced processes facilitate and support the in-house and cross-enterprise processes. These processes can be wide-ranging and can include such functions as transport, warehousing, packaging or printing.

This framework allows us to properly associate IT applications to the process classes that exist within all industries, providing companies with the necessary decision-making tools to more effectively prioritise IT development and the allocation of budget funding. Budget allocation has become an even more sensitive issue after the deep splurges of the tech-boom (and subsequent crash) period.

Figure 4: Process classes

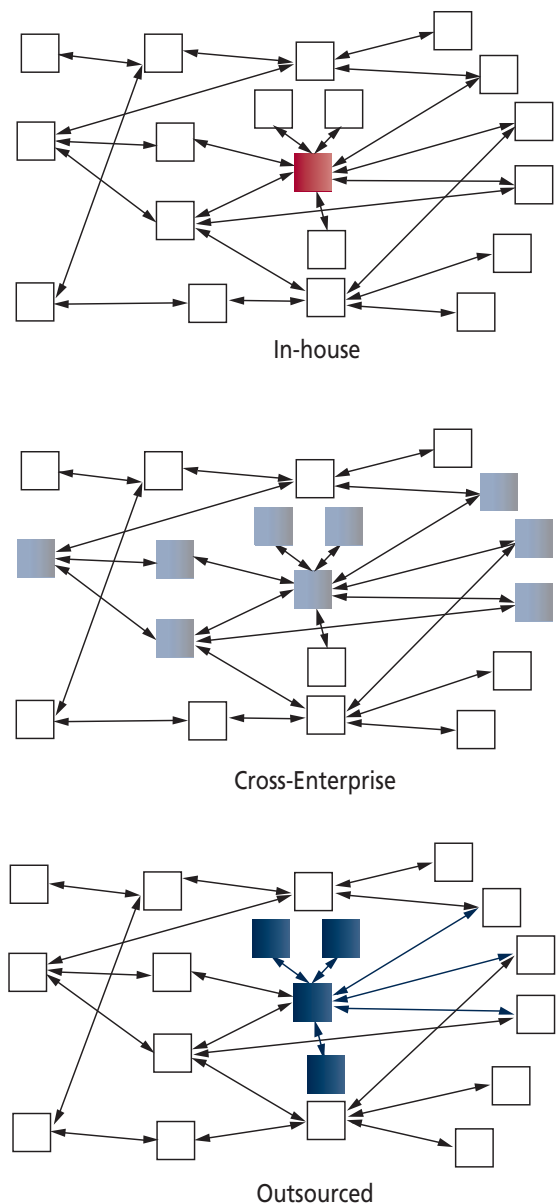




Figure 5: IT strategy development perspectives

Leveraging the Current Portfolio

Once the processes have been classified, we can determine how well the organisation is currently using its IT portfolio. Before investing in new technologies, the current organisational capabilities need to be reviewed, in order to leverage what it is already in place.

Hence the next major step in understanding an organisation's position in the supply chain or network of supply chains is the need to evaluate the aforementioned

processes (In-house, Cross Enterprise and Outsourced) from 3 perspectives: internally, externally (direct trading partners) and globally (indirect trading partners). Analysis from these three perspectives (Figure 5) provides an all-encompassing approach that is necessary in designing a robust, yet flexible IT strategy primed for collaboration.

These process classes and business perspectives need to be combined to provide the organisation with the right strategic planning platform. This process/perspective mix provides clear strategic horizons (Figure 6).

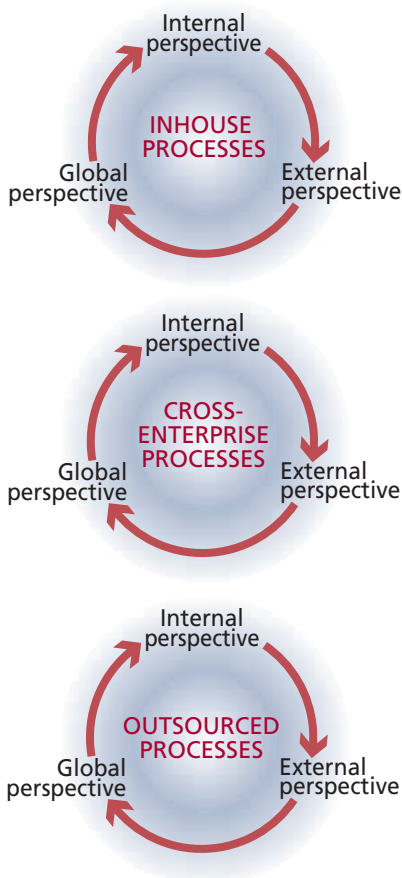


Figure 6: The process/perspective mix

Perspective (Illustrative)

- Internal – Does the process provide competitive advantage?
- External – How do our partners do the same processes?
- Global – What is best practice and does it relate?

Perspective (Illustrative)

- Internal – Are we holding up our end of the cross enterprise processes?
- External – How are our partners handling the cross enterprise processes?
- Global – How are other companies and industries approaching cross enterprise processes?

Perspective (Illustrative)

- Internal – Are there any processes we are still doing internally that could be outsourced (to our advantage)?
- External – How do our partners approach outsourcing? Are there potential synergies?
- Global – How are other companies and industries approaching outsourcing and how does it relate to our organisation?

We believe that as the future becomes more and more collaborative in its structure and operation, IT strategy needs to account for relationships both direct and indirect. Analysis from a global perspective attempts to address the issue of implementing applications that are only applicable to a direct trading relationship. Greater value from IT connectivity applications can be extracted if their functionality can be applied across a broader range of firms. Furthermore, we would assume that organisations would be less averse to investing in the application if a higher uptake rate could be demonstrated.

This global perspective will also determine the organisation's role within its industry (vertical) and its greater community role across industries (horizontal). We have termed the relationships that an organisation possesses as an organisation's 'spheres of influence'. More specifically, it refers to the organisation's ability to

Greater value from IT connectivity applications can be extracted if their functionality can be applied across a broader range of firms

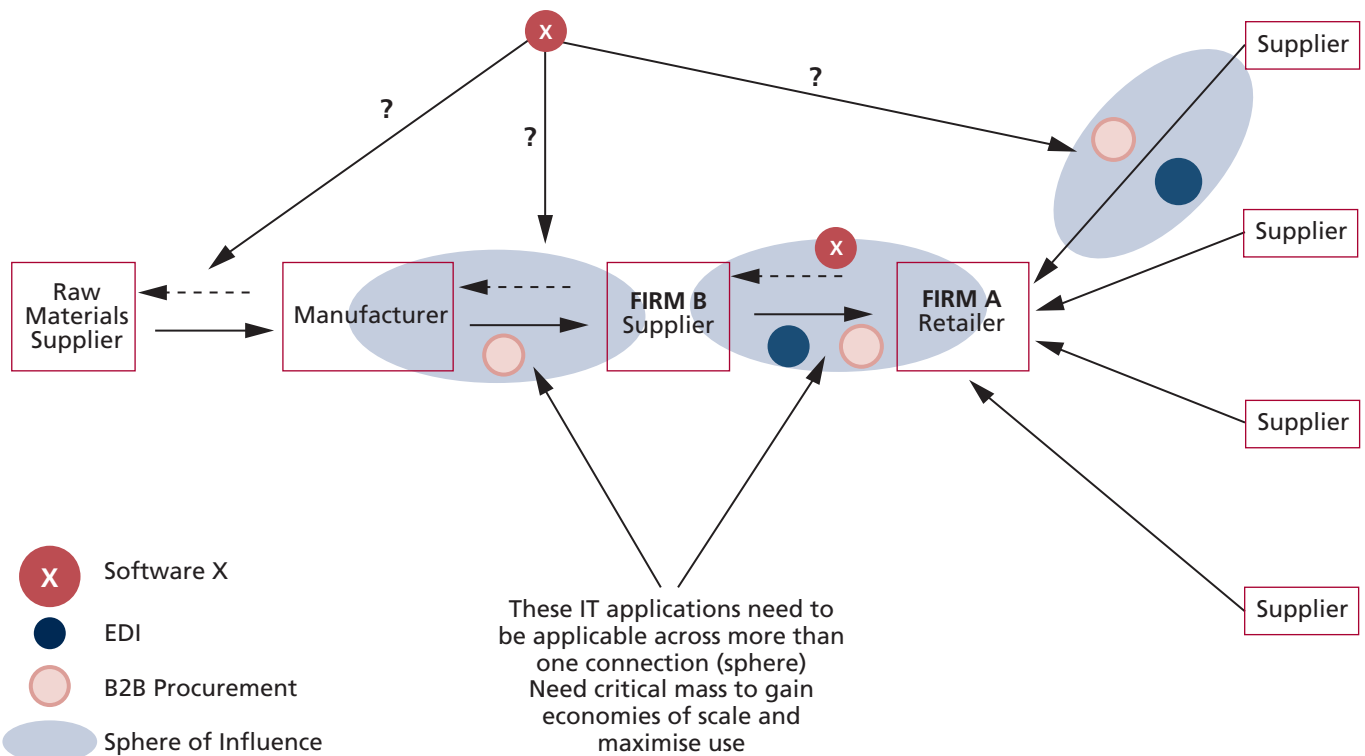
influence and control their external operating environments. Figure 7 describes the spheres of influence concept and a potential scenario.

There are numerous examples of major industry players trying to impose standards and technologies on its customers and suppliers. Wal-Mart is famous for its ability to combine information from companies across their supply chain with demand and inventory data from its stores to minimise operating costs and reduce prices. The Meta Group's Dwight Klappich declares that the only collaborative successes to date "are when you have a channel master that can dictate participation" (Worthen, 2002). This is further emphasised by Wal-Mart's recent announcement that all 16,000 suppliers that service the entire Wal-Mart group of companies can only use UCC-certified interoperable software to connect to Wal-Mart (AMR Research, 2002).

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Figure 7: Spheres of influence scenario

For example, assume that Firm A is a channel master and wants to establish a CPFR link with one of its largest suppliers, FIRM B, using software X. Firm B is more likely to invest in software X, if other firms in the same industry are using software X and subsequently, greater value could be delivered to FIRM B, if its customers and suppliers could conduct business using software X.



Key Considerations Going Forward

Siloed thinking – Traditional silo function thinking is still a predominant theme in the way things are run and how information is communicated, even though for the last 5 years, organisations have been implementing cross-functional systems. Whilst the benefits of a flat organisation structure was preached and somewhat widely adopted earlier in the decade, horizontal thinking or cross-functional thinking has yet to become a salient feature in organisations. The Australian Defence Force (ADF) is an example of an organisation adopting new thinking. Traditionally, the ADF had operated around functional bases, such as, electrical engineering, avionics, mechanical engineering and so on. The ADF realised that the armed forces could be better serviced by creating integrated teams, which has led to teams organised around specific weapons system/platforms. The P-3 Orion fleet is an example of an integrated team with expertise across such areas as electrical engineering, avionics and the like all focussed on supporting this specific platform. Cisco is another example of an organisation that structures itself around market requirements instead of siloed functions, resulting in an approach that creates end-to-end transparency across different actions and aligns the company with its most important performance drivers (Cook and Tyndall 2001).

The functional silos that have arisen over the last decade encumber the ability and ease with which an organisation can implement and effectively use new supply chain applications. This is because they must not only learn the technology, but also really understand how their existing supply chain processes interact across the different functions. In addition, the process is complicated when each function has both official systems and processes and informal ones, and each functional silo may have its own management and corporate goals. (Bermudez 2002). Essentially, management must ensure that the momentum in breaking down these barriers is transferred to establishing external collaborative operations with trading partners. It is important to set the foundation right for collaboration within the organisation by dissolving the invisible barriers that exist between functions and breeding a cross-enterprise culture of trust.

Culture – According to research conducted by Bain & Co., most businesses take an introverted approach to their supply chain activities with almost 80% of

companies' efforts focused inside their four walls and only 15% of supply chain initiatives 'having end to end "network" reach' (Cook and Tyndal, 2001). It is therefore not surprising that more than half of companies surveyed by Bain & Co. failed to collaborate outside the company on critical areas such as demand and production planning.

Risk minimisation – Collaboration itself increases an organisation's exposure to interdependence risk. The automotive industry is a prime example of this interdependence with the most recent case earlier this year involving a major automotive components supplier. Their 12-day strike brought most of the industry to a standstill before a resolution was brokered. Organisations need to factor in the depth and breadth of the relationships it has in place to properly plan to minimise risk.

Security – In organisations where internet-based communication and commerce has been widely deployed, the threat of an information attack, theft, misuse, unprivileged access to data or destruction of valuable info represents a far more serious threat than physical attack, as the information or data is the blood that keeps the supply chain alive. It is among the most critical of an organisation's assets however the Internet, as a medium for communication is replete with security loopholes. The transmission of information needs to be secure at both the receiving and sending sides to ensure that there is protection against eavesdropping, masquerading and unauthorized access to resources. No organisation is completely protected in the open-network business environment and each is exposed to the vulnerabilities of the participants in its network, whether they may be a company's own employees, the employees of it suppliers or even the employees of a supplier's supplier (Schrader and McConnell 2002).

Standards – Standards are essential to supporting the collaborative IT environment. Various industry groups and technology governing bodies are busily trying to create the most appropriate standards for conducting business. These standards must include both technology standards (e.g. SGML/XML, EJB, COM+, and CORBA) and business standards (e.g. OFX for payments, OBI for open MRO procurement and ICE for information content exchange).

In support of this observation, many collaborative initiatives to date would have failed if a 'channel master' was not involved in sponsoring the program and driving results. A true collaborative IT environment, however, does not involve the imposition of IT on trading partners nor the exclusion of certain channels by implementing IT within a selected base. A true collaborative IT environment incorporates the requirements of as many companies as possible across the process/perspective mix and builds trust and supply chain equity across the participants. This allows the supply chain participants to capture as many benefits as possible.

We should note that understanding an organisation's 'spheres of influence' and its role in driving improvements will become more complex as collaboration evolves and channel masters interact across

traditional vertical industries. Establishing a solid understanding of this concept is absolutely critical.

Developing a Future Vision

In determining the best way to move forward, it is necessary to leverage the work completed in defining and understanding the organisation's current environment. Collaborative IT strategy development must define what the future environment will encompass and how it will operate. Understanding the overall business strategy for the organisation assists in the definition of this future collaborative IT environment. This vision is then used to determine the gaps between the current and future models, utilising the process/perspective mix. Essentially this process utilises proven collaboration methods that allow the

Key Learnings Going Forward

The vision of virtually integrated supply chains, characterised by a network of internal and external relationships that are constantly changing to meet the needs of each organisation, is still along way off for the majority of organisations.

Collaborative programs are moving from a cost reduction and internal efficiencies focus towards reducing uncertainty and promoting key external relationships. This includes taking on a more strategic approach built on common goals with clear outcomes.

Some of the key learnings drawn directly from Dawson Consulting's collaborative practices include:

- **Be realistic** – There needs to be a heavy dose of realism brought to bear when defining the business/IT objectives coming out of the strategic planning process
- **'Don't rob Peter to pay Paul'** – successful programs have taken into account change already taking place within each participating trading partner. This is paramount to ensuring that current change programs, be they process, people or technology focused, are not adversely affected.
- **Don't be a supply chain bully** – in most cases, supply chain solutions (process or technology) pushed onto trading partners to force compliance, providing benefits primarily to the bully, create significant problems for the channel's other members. This situation more often than not reduces the efficiencies and increases the costs of the macro supply chain.

- **Trust builds supply chain equity** – trust generated through shared benefits and achievements will allow collaborative efforts to expand and become more complex. These developments will define the supply chain networks of the future.
- **The hare and the tortoise can live together** – even though an underlying principle for any collaborative initiative is to build towards objectives in structured stages. Seemingly simple initiatives can produce disproportionate benefits to its members, particularly in terms of swift return on resource investment.
- **Challenge is to achieve satisfactory ROI** – Most sentiment among today's organisations is that their IT investments over the past decade have failed to deliver a significant ROI. As such, any future IT strategy development must remain highly conscious of the commercial requirements around any IT investment.
- **Process before portals** – companies that have tried to use technology as the principal enabler when implementing collaborative practices have generated considerable organisational waste. The 'new way of doing things' unravels when the basic process activities that need to be supported by technology have not been addressed. ERP implementations are a good example of this flaw, with attempts to create intra-organisational collaboration turning into corporate horror stories.

organisation to 'best fit' its collaborative IT strategy into the organisation's future operating model and overall strategy.

It also needs to take into account multiple future scenarios. This allows the organisation to create contingency plans and conduct 'what-if' planning within the strategic planning framework. These steps play a more critical role, when related to situations such as a major customer imposing rigid information systems requirements, that are in conflict with your organisation's current portfolio and future strategy.

Successful collaborative IT strategy development recognises the need to get the organisation's 'IT house in order' first. This is closely related to the principles of optimising the organisation before attempting to work closer with its trading partners. This method also allows us to identify those cross-enterprise processes that are 'change ready', principally internal processes that are optimised. This in turn will allow an organisation to determine the development path that will best suit the organisation to meet its stated strategic objectives. Future collaborative IT objectives can then be properly sized and prioritised to identify the leverage points for productivity gains and operational savings across the process/perspective mix. The importance of generating swift early stage benefits cannot be understated, as they generate implementation momentum.

Dawson Consulting's collaborative experiences with leaders in the Retail and Agribusiness industries underline the importance of following a structured collaborative IT approach. Collaborative initiatives, to date, have been focussed on enhancing and expanding current information systems between the trading partners. Initiatives addressing collaborative forecasting, planning and replenishment (CPFR), distribution network visibility and online procurement are being reviewed to check the direction and objectives of these individual programs against each organisation's overall IT strategy. These new activities form the basis for future collaborative IT strategy development.

Whilst it is important to address some of the difficulties and areas of concern from a technical viewpoint, it is important not forget some of the organisational issues in fostering supply chain collaboration. So in addition to the frameworks discussed, there are a number of key considerations that form part of any IT strategic planning that must remain a part of the process (Refer to 'Key considerations going forward'). Some of these are 'softer' issues, which are based on our key learnings and experiences in facilitating supply chain collaboration

(Refer to 'Key learnings going forward'). They form part of our detailed methodology and should also be considered in IT investment decisions. They are definite prerequisites to progressing with a collaborative program.

Conclusion

The ever-expanding collaborative demands on organisations are transforming the business strategy process. Maintaining a myopic view of an organisation's long-term future will be to its detriment, as an organisation's success will be more closely linked to the success of its trading partners. This thinking needs to be applied to the development of an organisation's IT strategy to ensure that the correct enablers are implemented to support the business objectives (Refer to 'IT alignment to supply chain performance – a quick diagnostic').

IT alignment to SC performance – a quick diagnostic

- Are Sales, Marketing, Production, Logistics and your Suppliers working from the same demand forecast?
- Has all rekeying of data been eliminated?
- Do promised delivery lead times reflect available capacity within the organisation's supply chain?
- Are all production plans mathematically 'optimised'?
- Is product part numbering consistent across every system?
- Do the organisation's key performance metrics measure total SC performance?
- Can you see how much product your key customers consumed today?
- Have you consolidated the management of the transportation, procurement, planning and execution processes and associated technologies?
- If a process fails, does the responsible manager discover the problem same day?
- Do the organisation's pricing and discount structures dynamically change to variations in capacity utilisation, competitors' actions and individual customers?

Reference: ARC Advisory Group & Dawson Consulting

The significant IT investments of the last 5-10 years make the development of a collaborative IT strategy for the future a more difficult task. This is due mainly to the reality that organisations are still trying to get these investments settled and operating to their fullest capabilities and the myriad of collaborative technologies being marketed are quite immature. It is a brave CIO that looks towards investment in any 'new' collaborative technology without a firm grasp of the technology's track record, the returns capable in this market and the degree to which collaborative processes are being adopted in the organisation.

Subsequently, traditional IT strategy development requires an upgrade to better equip the organisation for the collaborative future. Dawson Consulting's experience at the forefront of collaboration's evolution in Australasia has enabled us to develop and refine an approach that incorporates the necessary strategic components to best determine the way forward. Indeed the organisations we have assisted have identified the importance of creating a collaborative IT strategy and will continue this development. By applying our process/perspective mix and ensuring that all relevant factors are addressed through the collaborative IT strategy development cycle, an organisation can better prepare for the future. □

Glossary

BPR (Business process reengineering) is the analysis and redesign of workflow within and between enterprises. BPR reached its heyday in the early 1990's when it promoted the idea that radical redesign and reorganisation of an enterprise was sometimes necessary to lower costs and increase quality of service and that information technology was the key enabler for that radical change.

Channel master is an organisation with disproportionate power in an industry group.

COM+ is both an object-oriented programming architecture and a set of operating system services. It is an extension of Component Object Model (COM), Microsoft's strategic building block approach for developing application programs. It adds to COM a new set of system services for application components while they are running, such as notifying them of significant events or ensuring they are authorised to run. COM+ is intended to provide a model that makes it relatively easy to create business applications that work well with the Microsoft Transaction Server (MTS) in a Windows NT or subsequent system. It is viewed as Microsoft's answer to the Sun Microsystems-IBM-Oracle approach known as Enterprise JavaBeans (EJB).

CORBA (Common Object Request Broker Architecture) is an architecture that enables pieces of programs, called objects, to communicate with one another regardless of what programming language they were written in or what operating system they're running on. CORBA was developed by an industry consortium known as the Object Management Group (OMG).

CRM (Customer Relationship Management) entails all aspects of interaction a company has with its customers.

EDI (Electronic Data Interchange) is a standard format for exchanging business data. The standard is ANSI X.12 and it was developed by the Data Interchange Standards Association. ANSI X.12 is either closely coordinated with or is being merged with an international standard, EDIFACT. An EDI message contains a string of data elements, each of which represents a singular fact, such as a price, product model number, and so forth, separated by a delimiter. The entire string is called a data segment. One or more data segments framed by a header and trailer form a transaction set, which is the EDI unit of transmission (equivalent to a message). A transaction set often consists of what would usually be contained in a typical business document or form.

EJB (Enterprise Java Beans) is an architecture for setting up program components, written in the Java programming language, that run in the server parts of a computer network that uses the client/server model. Enterprise JavaBeans is built on the JavaBeans technology for distributing program components to clients in a network. Enterprise JavaBeans offers companies the advantage of being able to control change at the server rather than having to update each individual computer with a client whenever a new program component is changed or added. EJB components have the advantage of being reusable in multiple applications.

ERP (Enterprise resource planning) is an industry term for the broad set of activities supported by multi-module application software that helps a manufacturer or other business manage the important parts of its business, including product planning, parts purchasing, maintaining inventories, interacting with suppliers, providing customer service, and tracking orders. ERP can also include application modules for the finance and human resources aspects of a business. Typically, an ERP system uses or is integrated with a relational database system.

ICE (Information and Content Exchange) is an XML-based standard protocol for electronic business-to-business (B2B) asset management. ICE defines an architecture and a common language that can be used as a means of automating Web content syndication (information sharing and reuse between Web sites) for publishing and e-commerce uses.

MRPII (Manufacturing Resource Planning) is a process for determining material, labour and machine requirements in a manufacturing environment. MRPII is the consolidation of Material Requirements Planning (MRP), Capacity Requirements Planning (CRP), and Master Production Scheduling (MPS). MRP was originally designed only for materials planning, but when labour and machine (resources) planning were incorporated it became known as MRPII. Today the definition of MRPII is generally associated with MRP systems.

OBI (Open Buying on the Internet) is a proposed standard for business-to-business purchasing on the Internet, aimed particularly at high-volume, low-cost-per-item transactions. OBI uses a number of security technologies such as the digital certificate to allow orders to be placed and filled securely. There are four entities involved in an OBI transaction: the requisitioner, the buying organisation, the selling organisation, and the payment authority. The requisitioner is the person who places the order and must have a digital certificate for authentication. The buying organisation maintains an

OBI server that receives OBI order requests and approves them. The buying organisation also negotiates and maintains contracts with selling organisations. It is the responsibility of the selling organisation to provide a catalogue tailored to each department in each company, maintain products and prices based on contracts with the buying organisation, and authorise payments with the appropriate payment authority.

OFX (Open Financial Exchange) is a unified specification for the exchange of electronic financial data over the Internet. Using a request-response system of communication, OFX allows a client to connect directly to a financial institution's server. An OFX application sends a request to another OFX application, which sends a response.

SCM (Supply Chain Management) is a business strategy aimed at improving shareholder and customer value by coordinating assets to optimise the flow of products, services and related information from source to customer.

TQM (Total Quality Management) is a comprehensive and structured approach to organisational management that seeks to improve the quality of products and services through ongoing refinements in response to continuous feedback. TQM requirements may be defined separately for a particular organisation or may be in adherence to established standards, such as the International Organisation for Standardization's ISO 9000 series. TQM can be applied to any type of organisation; it originated in the manufacturing sector and has since been adapted for use in almost every type of organisation imaginable.

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