# Enabling Supply Chain Automation through Information Synchronization

The Internet has solved the problem of global communication and information access. Now, as enterprises become increasingly "virtual" and "extended," the basic business processes that support a synchronized supply chain become more information-intensive. Synchronizing the information essential to supply chain operations will be the new e-business challenge. The next iteration of supply chain technology, then, must provide a process-based infrastructure for management of information that drives the virtual enterprise.

## Introduction

In the e-business model, where enterprises become more virtual and distributed, the basic business processes linking them to their suppliers and trading partners become more information-intensive. As a result, companies increasingly turn to industry organizations to provide information and process models to normalize communications in the inter-enterprise space. Through specialization and segmentation, virtual enterprises are able to focus their efforts on core competencies, but are still left with the task of adapting to new industry standards for exchanging information throughout the supply chain.

A key component of supply chain automation (SCA), "information synchronization" refers to the ongoing technical and business processes that convert data into useful information. These include analyzing, publishing, collecting, controlling, and monitoring. Supply chain participants, whether doers or decision-makers, must be able to dynamically invoke these basic information management processes if they are to remain synchronized around a common set of business objectives. Strategic advantage will flow to those companies that implement this kind of flexible, process-oriented infrastructure – an underlying "information supply chain" – for managing the flow of information throughout the supply chain.

## Shifting from Enterprise to Supply Chain Perspective

The new e-business paradigm brings with it a rate of change and span of control that no longer accommodate the 12- to 24-month technology implementation cycles of the previous economic model. Centralized, transaction-based applications do not provide the scalability and flexibility needed for supply chain automation in a demand-driven, e-business environment.

Virtual enterprises striving to achieve competitive advantage through supply chain automation face a number of challenges in a global marketplace where change is constant and is often out of their control. Even components most fundamental to supply chain automation – the partners themselves, the technology systems those partners use, and the information partners need to perform effectively – are in a continuous state of flux. These components are respondents to, not drivers of, forces at work in their respective competitive markets.

While implementing an enterprise resource planning (ERP) or other enterprise application is entirely within the control of the corporation, implementing a supply chain automation infrastructure requires the cooperation of many different entities – all of which have information systems, requirements, and processes particular to their own business. They are limited in their ability to handle IT demands, and have multiple customers of their own who also have their own processes, and so on. This presents a challenge unique to all business-to-business (B2B) integration efforts – especially supply chain automation.

E-businesses attempting to automate their supply chain by implementing a single information technology solution will find it a very

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expensive and time-consuming endeavor – one that results in an inflexible, proprietary solution. During the yearlong implementation cycle, changes in the marketplace, corporation, or supply chain will have occurred that make the solution part of the problem. These rigid architectures of classic enterprise systems are incapable of synchronizing the ever-broadening range of information available in new applications, environments, and formats.

## Focusing on Information

Whether a product manager in Dallas sends customer feedback to software engineers in Boston, or a car manufacturer in Asia utilizes U.S. survey results to define the shape of a new family car, it is the timely processing of business-critical information that ensures survival in demand-driven, e-business environments. Without it, opportunities are lost, inefficiencies abound, and customer satisfaction dwindles. Concepts like "just-in-time inventory" and "made-to-order" have arisen out of competitive necessity, and so too has the notion of "information synchronization."

In a product supply chain, consumer demand is but one kind of information. Other essential information exists in unstructured formats, like CAD drawings, schematics, engineering change orders (ECOs), and technical specifications. In addition, corporations have current investments in ERP, customer relationship management (CRM), or other internal systems that contain vast amounts of information
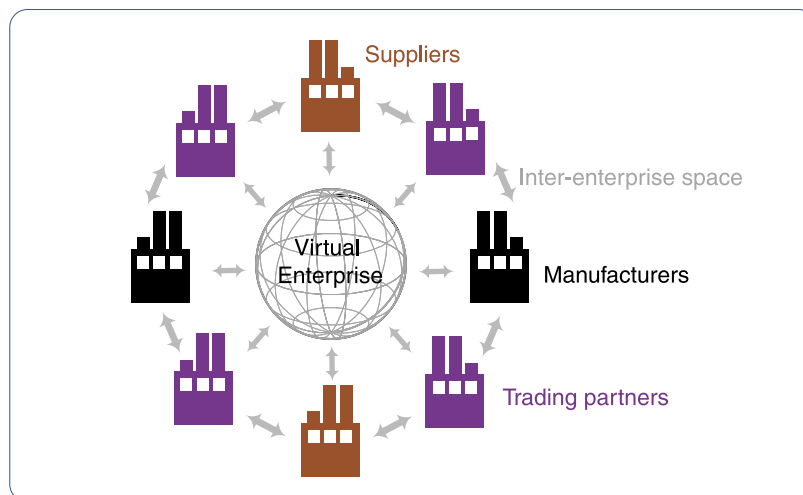


Figure 1.0 | The virtual enterprise environment

useful in supply chain planning and decision-making. In fact, it is not uncommon for businesses to use several distinct systems to manage their supply chain, further compounding the synchronization challenge. Finally, the Internet holds a wealth of knowledge, readily available to decision-makers but dispersed throughout an intricate network of millions of HTML pages and PDF documents.

Clearly, to achieve optimal financial and strategic results, decision-makers in a virtual enterprise must draw upon the information contained in Internet, enterprise, and supply chain systems – so business decisions are based on a complete view of the value chain, from corporation to consumer. The challenge is to create an efficient, comprehensive flow of information across the supply chain to enable this kind of decision-making. With the multitude of technologies, platforms, and applications in use at organizations worldwide, it becomes even more important to focus on a process-based approach to synchronizing the information supply chain.

## Managing E-Business Relationships

The diversity of information types, sources, and technology systems begets the Internet as a fundamental building block in communications infrastructures. Companies must

work at "Internet speed" to keep pace with the needs of consumers that are far more educated and demanding precisely because the Internet offers such quick and easy access to information. Web browsers and e-mail programs are the essential tools for today's savvy consumer. Convenience and speed are the norm – and not only in the business-to-consumer (B2C) marketplace.

As companies are realizing the substantial return on investment (ROI) that can be gained through business-to-business (B2B) integration efforts like supply chain automation, suppliers, and trading partners are demanding the same fast, easy access to information that is afforded to end consumers. In order to achieve the high levels of collaboration required to synchronize the supply chain, companies must balance the needs of customers with those of suppliers and partners.

This includes offering suppliers and partners the same communication vehicles as consumers, namely the Internet and e-mail. But whether B2C or B2B, the access and transfer of information over the Internet raises issues of security. A high value is placed on intellectual property – it is often the very basis for the existence of a business. And while a synchronized supply chain requires trust and collaboration, it also demands proper access control and security measures to safeguard proprietary

information. This is particularly critical in supply chain communications, where the content may pertain to planning, transactions, or other strategic business activities. In addition to balancing the needs of customers and suppliers, businesses must maintain equilibrium between open communication and responsible information exchange.

## Achieving Synchronization

A synchronized supply chain can bring about many advantages, including operational efficiencies, reduced costs, and increased customer satisfaction. The challenges to achieving synchronization through technology, however, are also many. Constant change, diverse information requirements, disparate information systems, and the safeguarding of valuable intellectual property present a few of the major barriers to implementation and adoption.

In a business environment where outsourcing is common, competition is global, and products are becoming increasingly complex, companies should approach supply chain automation through the fundamental perspective of information synchronization. Information synchronization is both an objective and a feature of successful supply chain automation projects. Rather than introducing new technology or applications, information synchronization focuses on providing the key information management processes required for continuous collection, communication, and management of information throughout the supply chain. Achieving the fastest, most cost-efficient means of communicating the most comprehensive set of information can translate into supply chain excellence. But no matter how many applications are involved, a process-oriented infrastructure is needed for synchronizing information.

## Key Attributes of Information Synchronization

The following highlights key attributes of the technology infrastructure underlying successful supply chain automation pro-
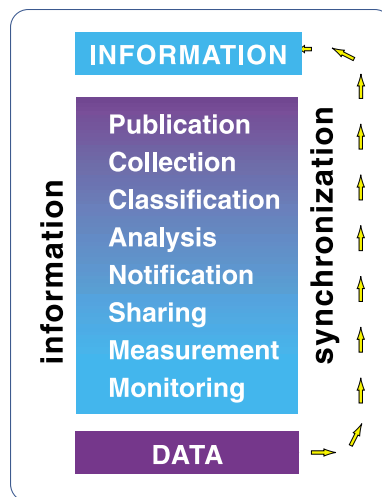


**Figure 2.0** | Information synchronization process

jects:

- Integration with existing systems and processes
- Information synchronization technology should support a fundamentally incremental and iterative implementation process. This will enable companies to dynamically address the many opportunities and forces shaping their supply chain management and automation objectives.

### Broad, expanded view of content

The information exchanged throughout a supply chain may exist as CAD drawings, ECOs, graphical images, or in some other business-specific format. Enterprise systems contain other types of useful information, such as ERP reports, customer profiles, text documents, financial spreadsheets, as well as Internet and intranet content. To facilitate the exchange of this wide array of information formats, the technology infrastructure that supply chains use to communicate and share information must be open and flexible enough to support any type of information, derived from any source.

Typically this takes form as an Internet-based and standards-based vehicle that is able to collect, access, and present information in a way that is useful to

decision-makers. Leveraging the Internet, the technology should integrate with existing corporate information systems by consolidating enterprise and supply chain information in a single, searchable repository. This synchronization of all information relevant to supply chain decision-making – regardless of data type, format, or location – is the foundation of a supply chain automation infrastructure.

### Safeguard of intellectual property

Once the foundation is set to support the various types of information involved in supply chain communications, appropriate measures must be established in order to ensure the safety of intellectual property and other digital assets. This requires the technology solution to provide solid content management functionality in the form of access control, encryption, and audit trails.

### Access Control

For maximum flexibility with the highest degree of security, the technology should enable access control be set for distinct pieces of information at the individual or group level. This provides a flexible, user-driven approach to granting controlled access to information – regardless of where the information is physically stored.

### Encryption

As a second line of defense in safeguarding intellectual property, valuable supply chain information should be encrypted to further prevent unauthorized use. When coupled with access control, encryption ensures that only 'authorized users' would be able to view the contents of an information packet traversing the Web.

### Audit Trail

To aid in the ongoing monitoring of supply chain information and processes, the technology should generate a secure, authenticated audit trail with usage and activity reports. Audit logs must be maintained to record the publication, notification, acknowledgement, and downloading of content, along with other updates, accesses, or connections to the informa-

tion. This provides managers the real-time feedback essential to closed-loop supply chain operations.

### Robust information management and processing

After the information is synchronized and secured, automation and resultant benefits begin to take shape. The communications infrastructure is in place to enable the timely and continuous exchange of information in a rapid and effortless way. The most valuable information is the most current information. Thus, the technology should feature efficient information management and processing facilities that automate the publishing, organization, collection, and notification of supply chain information.

*Publication*

Supply chain participants must be provided with an intuitive, drag-and-drop interface for real-time content publication if continuous information sharing is to occur. Information should be uploaded easily through the use of automated profiles and interactive wizards. The new information must be automatically published for immediate discovery and reuse throughout the supply chain. Once published, supply chain managers must be able to add, delete, or modify information to maintain operational objectives amidst constantly changing variables.

*Collection*

It is neither economically nor technically viable to approach supply chain automation by simply providing online access to information. A single point of access in conjunction with a Web-based repository offers a much more attractive platform from which to implement the many new information synchronization processes that were not a primary objective of the previous enterprise systems. The technology solution should provide intelligent agents to automatically harvest enterprise and Internet content. Suppliers should be able to specify the content to be collected and delivered – from any source – on scheduled, event-driven, or dynamic inter-
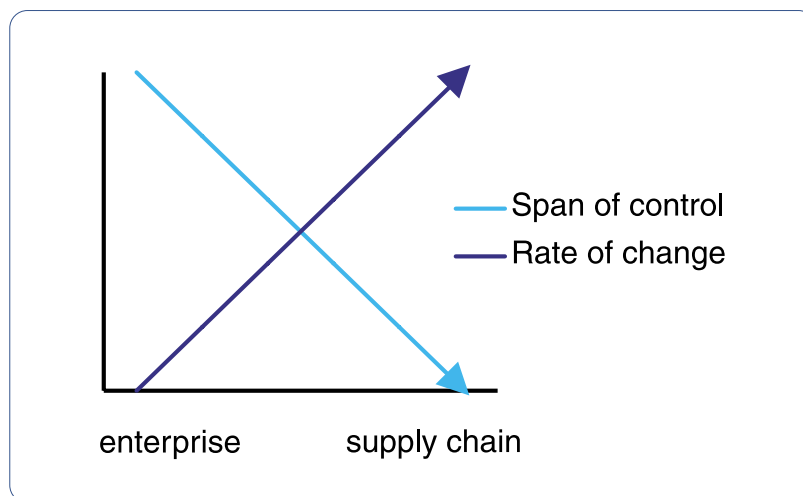


**Figure 3.0** | Enterprise vs. supply chain systems

vals. Database connectivity and XML conversion are key requirements in this area.

*Classification*

To enable efficient reuse of information, the technology solution must be able to classify information by extracting key concepts based upon a flexible set of business rules. This information is key to all of the subsequent processes outlined here.

*Analysis*

Once data is published, collected, and classified, there should be flexible, business-rule driven facilities to analyze the information to determine subsequent workflow and notification processes.

*Notification*

In an Internet-based infrastructure, e-mail is a principal method of communication. But in successful supply chain automation, the technology solution must automate that process for maximum efficiency. When new information has been made available or changed, automatic e-mail notifications must be sent in a timely and reliable manner to a configurable list of supply chain participants.

*Sharing*

The technology solution should offer sup-

ply chain participants a mechanism for searching based on relevant supply chain information – such as project name, supplier name, or part number. This kind of advanced context-sensitive searching assures highly accurate query results.

*Measurement*

Continuous improvement demands key business processes be measured for compliance to some standard of operation. Information synchronization will not be consistently sustained in an environment that does not provide built-in mechanisms for business process measurement.

*Monitoring*

Management by exception is impossible without closed-loop monitoring. Technology solutions should provide a clear and extensible framework for monitoring business process compliance to a flexibly defined set of business rules. Information synchronization involves too many individual processes to conform to other management paradigms.

### Conclusion

The new, virtual enterprises will operate in an environment where the rate of change is inversely related to a constantly diminishing span of control. This will bring

about a new generation of technology that is necessarily more information- and process-based than the traditional systems and technologies of the last economic model. The companies that thrive as e-businesses are those that rethink their approach to process management and communication in terms of information synchronization.

Information synchronization and, consequently, supply chain automation, demand an underlying technology infra-structure that:

- enables implementation of key information synchronization processes
- utilizes the Internet as a common communications medium
- secures sensitive information from unauthorized use
- augments and integrates existing technology solutions

While there are countless software applications available for managing supply chains, it is a major challenge to bring enterprise information into the supply chain decision-making process – or vice-versa – by implementing a single technology solution. However, if companies utilize technology to implement a process-based means of synchronizing information, they are more likely to succeed as virtual enterprises than those attempting to synchronize the technology itself.