Răduţ Carmen
Universitatea „Constantin Brâncoveanu" - Piteşti, Facultatea Management Marketing în Afaceri Economice Rm. Vâlcea, Str. Aleea Cocorilor, nr.5, Bl.25, Sc.D, Ap.2 Rm.Vâlcea, c_radut@yahoo.com, 0723245092
Codreanu Diana
Universitatea „Constantin Brâncoveanu" - Piteşti,Facultatea Management Marketing în Afaceri Economice Rm. Vâlcea Str. Mihai Eminescu, nr.47, Bl.C13, Sc.A, Ap.16, Rm.Vâlcea, codreanudia@yahoo.com, 0743167718

Interest is growing among IT executives in the benefits offered by relatively new developments in the business integration arena such as service oriented architectures (SOA). By improving communication and integration between IT systems regardless of the underlying technology, SOA is just one factor that is making it increasingly easy and quick to share information and reproduce best practice, not only internally but also within an extended business partner community.

Business integration , Service Oriented Architectures, Electronic Data Interchange, Enterprise Service Bus.

Introduction

Most large businesses introduced EDI (Electronic Data Interchange) many years ago to enable them to exchange business critical information electronically with their trading partners. EDI was expected to eliminate the manual processes that result in increased order processing and lead times, introduce human error, and cause lost information due to incomplete fax transmissions, mislaid paperwork and unanswered phone calls. In reality, the technology has struggled to fulfil its true potential.

Traditional EDI relied on transforming information into an agreed message format and exchanging it between trading partners via dial-up connections over a VAN (Value Added Network) – a third party mailbox system. Implementing EDI solutions, maintaining the skills needed to produce data in the correct format for exchange and sending data over a VAN has proven to be expensive. Large organisations that can afford to take advantage of the technology's undoubted benefits have failed to see their ROI fully realised because there was no cost-effective solution available for their smaller trading partners, limiting the success of EDI as take-up rates were much lower than initially forecast.

Today this situation is rapidly changing. The international availability of the Internet, the 'commoditisation' of technology, plus related universally accepted data structures such as XML are transforming the way that data is exchanged, opening up the benefits of business integration to all.

Assessing where your organisation is today and identifying where you can make effective changes is an obvious first step to maximising the benefits to be gained from business integration.

Figure 1 indicates a range of integration stages that organisations across various industries can find themselves at - from traditional EDI to current best practice. In order to reach best practice, businesses can take two main routes, they can rely on B2B gateway applications (developed inhouse or by a specialist vendor) or they can find a trusted partner to provide integration as a service .

Developments in technology are undoubtedly making it much easier to benefit from business integration by reducing the traditional barriers to entry previously faced by smaller businesses.

The adoption of the Internet, in particular, represents a turning point as it provides a robust, more flexible and cost-effect alternative to traditional EDI based on VANs. However, there are still challenges to be faced. As typical trading communities continue to increase in size, for example, managing them efficiently can become a drain on in-house skills, resources and time.

	Traditional EDI	Transforming	Best Practice
Communication Services	Secure, reliable electronic delivery is possible between larger trading partners using a limited number of traditional capabilities such as asynchronous/bisynchronous, X.25 and X.400 protocols in common use. Data is exchanged in batch mode overnight with slow data exchange speeds.	Point-to-point communications based on dial up protocols deliver security using frame relay or leased lines. ISDN emerges as a high-speed option for the batch exchange of data.	Secure, reliable, near real-time electronic delivery of information is possible between all trading partners and application systems. Can work with traditional and emerging capabilities such as AS2, web services and RosettaNet.
Trading Partner Management	EDI uptake within the trading community is low. Barriers to entry are high. Trading partner management is handled in-house by EDI teams.	In-house EDI management teams are expanded to cope with increasing numbers of trading partners and more complex relationships.	Software tools or outsourcing are used to assist with trading partner management, including community development services, billing operational reports and dashboards. Easy-to-use, customisable portals mean that trading-partners can self-provision and access B2B gateway applications.
Integration	Basic integration is delivered through simple file exchange in local directories over a LAN.	Tightly coupled integration using APIs (Application Program Interfaces) or ODBC (Open Database Connectivity) links.	Complex integration to many internal applications using many different protocols over LANs and WANs.
Application Services	No application services offered.	Web-forms available to electronically exchange data with low technology trading partners	Applications deployed to deliver advanced web-forms processes, online reports, archiving of documents, tracking of all documents and maintenance of product catalogues.
Business activity monitoring and event management	Not Available	Simple error/exception reporting.	Events and information about events captured and stored for analysis. Dashboards graphically display real-time and historic data based on the user's profile. Key performance indicators show trading partner interactions from a business point of view (such as response times to POs).
Service Oriented Architecture (SOA)	Not Available	Not Available	B2B gateways developed using service-oriented design methodologies to enable full interoperability with IT strategy.
Business Process Management	Not Available	Business process management delivered through complex coding or scripting usually created by internal IT departments providing interfaces with EDI software.	B2B gateway enables workflow to be defined within the gateway based on trading partner profiles, business rules and requirements. Easy to configure with low cost and low skill base.

Figure 1: Business integration development model

Figure 2 shows how, as the traditional barriers to business integration have fallen, the number of trading partners able to become e-enabled has risen. It also shows the range of capabilities enterprises need if they wish to make the most of the opportunities available to them.

By employing the correct business integration strategies, organisations can implement solutions that help optimise and support critical business processes. A tight coupling between ERP systems, e-business and other applications combined with the ability to exchange data in multiple formats with customers, suppliers and partners leads to a collaborative, business process based, virtual enterprise.

Processes and supply chains become visible from end-to-end, business activities can be closely monitored to provide an early alert to potential problems and rules and workflow can be built-in to provide greater control.

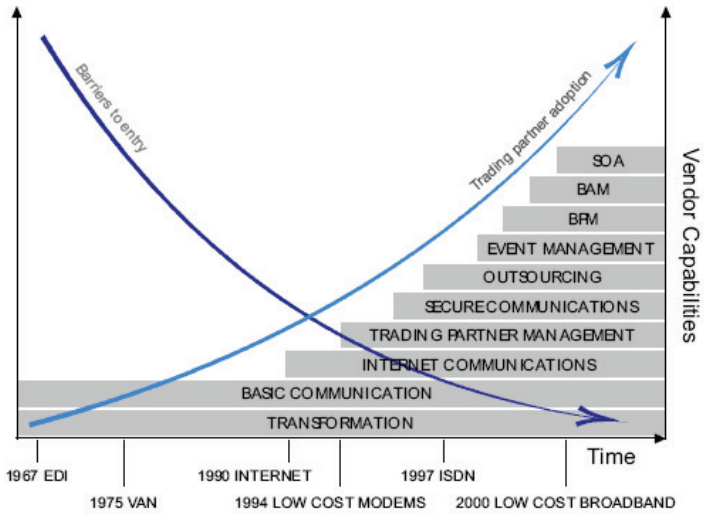

Figure 2. The traditional barriers to business integration

Using just a web browser, data from even the smallest business can be seamlessly created, transformed into the correct format and transmitted to a partner as easily as sending an email. Likewise, small businesses can receive

and manage documents just as simply. No matter how small or where in the world a company is located, it can become part of a global supply chain hosted by a major organisation.
The business benefits of effective business integration include:
- Improved customer service – shorter lead times for order fulfilment, a reduction in errors, improved tracking and visibility of orders and better communications throughout the supply chain.
- Reduced costs - more efficient processes, improved productivity and lower inventory carrying costs.
- Increased profits - reduced costs, quicker product development and a shorter time to market.
As business integration evolves, many early adopters of EDI technology – large enterprises - find they have an inflexible solution that has been in place for years and has suffered from under investment over time. There is probably a monolithic ERP system at the centre of the organisation onto which an EDI or B2B gateway solution has been bolted. Often a great deal of complex custom code is required to deliver business process management and provide the capabilities needed to get data into legacy applications. It may be necessary to convert data from EDI formats into XML and back again simply to pass it around the organisation.
In this typical scenario, the speed and accuracy with which data can be moved is compromised. The increasing volume and variety of data produced today becomes a challenge. Add to this the fact that old technologies may no longer be supported, the skills associated with them are becoming scarce, and existing knowledge within the organisation is likely to be held by a small number of ageing experts and you have a situation that makes it difficult to integrate new protocols, message types and services. Managing trading communities in today's fast changing, international environment is complex, especially when it is no longer unusual to have to cope with data from thousands of partners.
Smaller organisations face a different set of challenges. Most will be considering EDI or business integration solutions in response to a request from a major customer and will naturally feel reluctant to change their existing technology or business processes. Many perceive significant barriers as they are unlikely to have a large – or indeed any – in-house IT resource.

The business integration solution
Over time, the information technology landscape inside of and amongst companies changes in fits and starts with new applications, products and technologies coming and going. Ideally, information would flow between applications like electricity through some equivalent of standard wall outlets and plugs. While things continue to get easier and despite what product vendors have promised over the years, significant challenges remain in sharing information services without significant costs, risks and brittle custom development.
Part of the challenge lies in keeping up with changes to the IT landscape. Changes occur as businesses seek efficiencies and improved services to customers and partners and because of drivers, such as company mergers and upgrades to packaged and custom enterprise applications. The business need, business value and technical ease of integrating disparate internal and external systems are growing as the capabilities, costs, standardization and ease of implementation of commercial products are improving.
Historically, when enterprise applications needed to share information with other applications, custom one-off or other proprietary approaches were implemented for each specific case. Over time, these point solutions create a myriad of stovepipe custom connections between components with many moving parts, each requiring different specialized skills. Without a central architecture, reuse strategy and business integration solution, the following problems will emerge:
a) Interdependencies between applications and integration code make upgrades and enhancements expensive, time consuming, risky and unsupportable.
b) Hidden dependencies and bypassing of security and business rules through direct data access results in erratic and incorrect results and difficult-to-diagnose problems.
c) Lack of discipline and standards in developing point-to-point integration solutions leads to maintenance and management nightmares with different languages, tools, incompatible versions and approaches.
d) Security is largely unmanaged – connections between applications are controlled within each custom developed connection with no ability to effectively manage access.
Part of the solution to integration problems lies in architectural governance over the selection, design and development of integration products across all applications. Achieving central control is more difficult than it sounds. In addition to understanding internal enterprise applications, awareness of industry products, trends, standards and best practices are all key requirements for designing and implementing a corporate integration strategy.
A second part of the solution lies in the architecture and implementation of a business integration technology platform. Enterprise Service Bus (ESB), message broker and business process management products from vendors, such as IBM, Microsoft, Tibco and WebMethods provide an integration framework for:
a) Data translation (e.g., to and from various XML and non-XML, standard and custom formats).

Use of software adaptors that can connect to a large variety of commercial packaged applications and technologies, such as SAP, Peoplesoft, Ariba, CommerceOne, CICS and others over a variety of protocols via standard plug-in interfaces.
Routing of messages between applications based on content or availability.
Central management of message flows (including security and failure detection).
Live central monitoring of key corporate metrics (e.g., number of orders flowing through a hub).
Security of message flows between applications.
Tenets of long-lived enterprise scale system design are easily realized with a well- architected integration solution based on products such as WebSphere Business Integration Message Broker, Microsoft BizTalk Server or WebMethods. Design principles used in the implementation of integration solutions are: loose coupling between applications; short and asynchronous transactions; service-oriented interfaces (focus on use/reuse of business services of a system vs. via direct access to data); and reuse through use of industry standards and best practices.
The combination of ESB and message broker products, XML and Web-based standards, and a SOA-based approach to application and commercial product implementations sets the stage for efficient and standardized integration architecture.

Conclusion

Unfortunately smaller businesses unable or reluctant to move with the times find themselves increasingly disadvantaged in the global market.
Without the ability to easily exchange data and integrate it into back office systems they are forced to rely on costly, error prone manual processes that affect business agility. A reluctance to adopt new standards and practices will drastically affect their ability to trade in the future.

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