Plan for Today's Lecture

Enterprise integration "by eye" using composite UIs and portals

Using integrated enterprise data to provide "business intelligence"

Supply chains

Information supply chains

Alternatives to "heavyweight" enterprise integration
  - Service-oriented integration
  - Enterprise information mashups
The Enterprise Integration Challenge

Business processes span multiple departments (or companies), and the business applications run by separate departments (or companies) may not have been designed to share information with each other.

"Stovepipes" most often describe the non-integrated systems within a given company, but can also be applied to non-integrated systems within a well-defined supply chain.

Stovepipe applications naturally occur when business activities are organized hierarchically -- where engineering, manufacturing, sales, marketing, etc. are separated into different departments -- because hierarchy often limits the interactions between them to the "hand-offs" of "finished work" to each other.
An Enterprise Information Integration Scenario

An existing customer calls a service representative to increase an order

The service representative must:

- locate information about the customer
- locate the existing order
- determine if the order can be changed or whether a new order must be created
- determine whether to accept the order based on the customer's payment history and credit

What information sources or applications must the service rep consult? How can it be done?
Integration "By Eye"
Swivel-Chair Integration

The need to consult multiple unintegrated applications to locate information to complete a business process

Recent study by Corizon:

- 66% of call center agents use three applications or more to serve customers on a typical call
- 27% use five or more
- 71% claim time is wasted on or after a call because of switching between different applications
- 53% admit that errors creep in when entering data into multiple systems
Enterprise Portals
Enterprise Portal Applications

Portal applications replace the different interfaces to multiple systems with a single, user-friendly screen that accesses only the parts of a back-end system that the employee needs.

Purpose is to create a unified experience with a "single sign-on".

You can think of this trying to recreate something like Yahoo for the enterprise (Intranet).

Nearly every major software vendor has created an enterprise portal solution that is an attempt to "up-sell" from the application server platform.
Enterprise Information Integration

Integration "by eye" is inadequate in situations with high transaction rates or complex data, and it is necessary for the applications to share data without human intervention.

This requires true semantic unification of the underlying logic and content models, which may or may not be presented to the user as a single "composite application".

For large firms, and increasingly for medium-sized ones, a solution is to implement an ERP system that integrates all of the operational data.
Business Intelligence

ERP and other enterprise systems contain the very granular and "live" operational data of the enterprise.

ERP systems generate historical reports that are useful for long-term decision making, but don't enable ad hoc analysis of operations needed to make tactical decisions.

So you need another set of your enterprise data organized in a data model optimized for asking questions rather than running your business.
Generic Enterprise Information Integration Architecture (Gantz, 2004)
Data Warehouses

A data warehouse is a "subject-oriented, integrated, time-varying, non-volatile collection of data used in organizational decision making"

Data warehouses extract data from ERP systems and other related business software applications into a separate repository

It is common practice to "stage" data prior to merging it into a data warehouse with an "Extract, Transform, and Load" (ETL) application

Since the information won't change, denormalization to improve query performance is a common ETL process

The data model for the warehouse, designed to enable efficient ad hoc data analysis and reporting, is sometimes called a "hypercube"

A common term for the analysis done in a warehouse is online analytical processing or OLAP
The Virtual Warehouse

A virtual warehouse is created "on demand" by centralizing and normalizing metadata about the data sources rather than the data itself.

The data is left in its original location and extracted only when needed, which makes more "real time" analysis and "business intelligence"
### Bad UI for Business Intelligence

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Driving Your Business

The best data warehouse design and the most clever OLAP won't help the business if the analysis can't be understood by the decision makers.

"Dashboards" combine information integration with information visualization to enhance the usability of business intelligence.

A dashboard provides hierarchical views appropriate to different management levels and the means to "drill down" to find details.

See idashboards.com or demo.visualmining.com
Dashboard UI for Business Intelligence
Compliance Dashboard
SAP Buys Business Objects

SAP TO ACQUIRE BUSINESS OBJECTS IN FRIENDLY TAKEOVER; COMBINED COMPANIES TO ACCELERATE LEADERSHIP FOR BUSINESS USER APPLICATIONS

SAP and Business Objects to offer the industry’s most comprehensive portfolio of business performance and optimization solutions for Business Users for companies of all sizes

Walldorf/Germany - October 07, 2007 - SAP AG (NYSE: SAP) and Business Objects S.A. (Nasdaq:BOBJ) (Euronext Paris ISIN code: FR0004026250 – BOB) today announced that the companies have reached an agreement that will bring together two of the information technology industry’s leaders, resulting in an unmatched offering for Business Users, enabling timely and accurate decision-making. Under the terms and conditions of the tender offer agreement, SAP will make a cash offer of €42.00 per ordinary share and for American Depositary Shares (ADS) at the US$ equivalent based on the EUR/US$ exchange rate as of the settlement of the tender offers. The transaction volume taking into account the transaction costs will be slightly above €4.8 billion. The Business Objects board of directors has approved the tender offer agreement between the two companies and anticipates recommending the offer to its shareholders subject to fulfillment of certain regulatory requirements.

Together, SAP and Business Objects intend to offer high-value solutions for process- and business-oriented professionals. The solutions will be designed to enable companies to strengthen decision processes, increase customer value and create sustainable competitive advantage through real-time, multi-dimensional business intelligence. SAP and Business Objects believe that customers will gain significant business benefits through the combination of new, innovative offerings of enterprise-wide business intelligence solutions along with embedded analytics in transactional applications. Additionally, the
What is a Supply Chain?

A supply chain is the network of facilities and distribution capabilities an enterprise uses to:

- "Source" (or "procure") raw materials (chemicals, ores, grains, ...) or components
- Transform the materials or assemble the components into products
- Deliver the products to customers (indirectly through distributors or stores or directly to the purchaser)

A supply chain usually reflects long-term, point-to-point, and tightly coupled relationships centered around a dominant enterprise

THE GOAL: Get the right stuff in the right amount at the right time in the right place
Supply Chain Depicted as Physical Model
Supply Chain Depicted as Conceptual Model
Supply Chain Design [1]

Your business model and strategy sets the framework for design of the supply chain.

Supply chain structures (like the number of suppliers and distributors) are shaped by industry characteristics and product architectures.

Supply chains reflect many interconnected decisions about allocation of materials, production, and distribution responsibilities.
Supply Chain Design [2]

Location of manufacturing facilities and how to transport materials and goods to and from them

Location of suppliers and distributors with respect to manufacturing facilities

How many distributors and other intermediaries between the manufacturer and customers (0 or more)?

How much inventory to maintain at each stage

How visible are secondary tiers (suppliers of suppliers (of suppliers...))?
In Venice, young Bassanio wants to borrow 3,000 ducats from his merchant friend Antonio so that he properly court Portia, a wealthy heiress. But Antonio says:

<SPEECH>
<SPEAKER>ANTONIO</SPEAKER>
<LINE>Thou know'st that all my fortunes are at sea;</LINE>
<LINE>Neither have I money nor commodity</LINE>
<LINE>To raise a present sum: therefore go forth;</LINE>
<LINE>Try what my credit can in Venice do:</LINE>

Until Antonio's ships return, he doesn't know if he is rich or poor. And when two of them are wrecked at sea, he gets into trouble with Shylock, the lender...
The flow of materials and goods in a supply chain is accompanied by information about it.

Breaking that constraint to enable information movement independently of the goods enabled the rise of the industrial corporation.

New technologies let information about goods move much faster than the goods themselves.

These new technologies also enable intangible goods and services that are information-based and that can be delivered worldwide almost instantaneously.

Information also flows in the opposite direction from the customer, retailers, and distributors back into the supply chain – this is sometimes called the demand chain.
The Information Supply Chain [2]

Information about the supply chain is taking on independent value

Information about where products are, who uses them, and when and how they are used can be worth more than the products themselves

Slogan: Replace inventory with information
Designing an Information Supply Chain

- What information is exchanged?
- Which entities in the supply chain are able to exchange information?
- What is the frequency of this information exchange?
Opportunities for Information Supply Chains

Information supply chains can be created in any industry

How can technology be used to speed information flows within an enterprise and between the enterprise and its suppliers and customers?

Profound shift underway from forecast to demand driven business models
Case Study: Fresh Direct

"Bagging Market Share With IT" describes the strategy and technology of a company dealing with the "Wal-Mart Effect"

Fresh Direct uses its ERP system to treat filling online grocery orders as a component-assembly problem

Suppliers are integrated "by eye" through a web portal

Business intelligence applications analyze customer transaction histories to personalize customer service and user experience
"Pervasive computing systems" like the network of sensors deployed in an Oregon vineyard for this project can provide rich information about an environment.

Key design question is again the usual tradeoff -- how much computational interpretation of the data is needed "on the way in" to make it "actionable" rather than just informative?

Equipment as well as people can be the recipients of the "actionable" information.

RFID tags on tools and equipment can track workers and eliminate manual timekeeping.
"Tight coupling" between two businesses, applications or services means that their interactions and information exchanges are completely integrated and optimized in performance...

... by taking advantage of knowledge of their internal processes, information structures, technologies or other private characteristics that are not revealed in their public interfaces

... and usually implemented with a custom program that fit only between the two of them

Tight coupling is most often used, and usually limited to, situations in which the same party controls both ends of the information exchange, as it does in an ERP system

But tight coupling can be a "Faustian bargain" that trades efficiency for flexibility (John Hagel)
Loose Coupling Via Services

Loose coupling is a fundamental design principle for the Web, and using a browser for "integration by eye" between a service provider and consumer is a ubiquitous and default form of "integration".

Numerous specifications have been developed that support automated loose coupling using Internet protocols with XML document payloads as the standard approach for integrating applications that cross enterprise boundaries, and often for internal integration as well.

Web Services -- with a capital "S" -- generally means a particular set of specifications for doing service-oriented integration with XML documents as the "payload" that conveys the information required by the service interface.

It can require significantly less effort to "retrofit" a web service interface onto an application or information source than to integrate using traditional enterprise integration techniques.
Enterprise Information Mashups

At the end of the integration effort / rigor / robustness spectrum are "mashup" approaches.

These might be suited for ad hoc combinations of institutional and personal information, which will never be integrated using ERP or Business Intelligence applications.

Mashup approaches would also enable combinations of internal and external information, which likewise won't be supported by institutional mechanisms.
About the Midterm on 29 October

Choose 4 Short Answer (2 paragraphs) out of 6
Choose 2 Long Answer (3 paragraphs) out of 4
Open book, open notes, but not "open Internet"
Use your laptop or work on a lab computer
Turn in one printed page per question, with your name on each page