

# Integrating and Automating Business Processes

Throughout this book, your winery has been used to demonstrate techniques for real-world applications of XML. You've explored methods for merging and searching data in the winery catalog, (which advanced the business case for standardizing the company's data representation using XML) and seen how XML from one system could be transformed into some other XML schema for use by a different business application.

It's clear that access to dynamic data enables a company to create a viable and powerful B2C (business-to-customer) presence on the World Wide Web. The new marketing channel allows the company to increase sales by targeting a new segment of consumers, thus increase revenues and the company's bottom line. You expanded on the business case by using applications to leverage dynamic information provided by external applications using web services, and saw the winery lay the foundations for a B2B strategy by providing timely information and dynamic data to external consumers using web services.

During the life of the winery — and this holds true for any business in any industry or sector — the company executives may decide to increase its market share by merging with or acquiring other companies in the industry. This process is often very tumultuous and costly as business managers and information technology managers struggle to cope with the challenges of merging their processes, applications, and data with those of the newly acquired business entities. You've already explored some strategies to tackle the challenges of merging data between businesses.

To complete a well-rounded study of XML at work, though, you need to look at how XML can be used to integrate and automate business processes between a company and its partners. XML can define business documents and collaborative workflows; enable the synchronization of business functions across business enterprises, heterogeneous systems, and business applications; and serve as the glue to merging the operations and disparate technologies of business partners and vendors.

This chapter examines issues of significance to both business analysts and technical architects, focusing on the critical issues of integrating and automating business processes. There are many

good vendor solutions in the market; some of these are proprietary solutions, while others are based on standards. The standards themselves are evolving and many of the vendors have active representation in the standards organizations to help incorporate the best practices in the industry.

This chapter provides an overview of the strategies and best practices for process integration. It doesn't attempt to implement any code to demonstrate concepts for the simple reason that code needs an application server to run in and we want to stay vendor- and standard-neutral. This strategy is not out of a fear of offending any one vendor by omitting it from the list but out of the practical need to keep the discussion focused at a higher level and on the strategic role of XML in process integration.

## Problem

Globalization and the global economy have been a mixed blessing to businesses. On one hand, companies have access to wider markets and consumer segments; on the other hand, they now have to face more competitors in the market, some of whom have a local advantage. The companies with that advantage have to stay ahead of the curve by improving their internal business operations and keeping costs low so that they can produce their goods more efficiently and compete more effectively.

Over the past few decades, there has been a lot of research conducted on how a company can achieve success in business. The universal agreement among the experts is that technology is a very powerful factor in enabling businesses to become more efficient. Companies have access to state-of-the-art applications that allow managers to effectively monitor and control their internal operations, which increase operational efficiency and reduce operating costs.

Lack of interconnectivity is a major barrier to companies integrating their systems. For years now, most companies have had a fairly efficient internal network to connect all their systems, applications, and databases, although business partners were forced to deploy very expensive virtual private networks (VPNs) or point-to-point network connections to connect partner systems. Ever since the Internet became available for use by private enterprise and individuals, the connectivity problem has been effectively solved. Network providers are addressing various associated issues such as reliability, performance, and security, and those factors won't prevent a company from using the Internet to work with its partners.

### **Low-Tech Success**

It is important to note that there are many small to medium-sized businesses that have always been very profitable and efficient without relying on high-technology solutions. There are scores of family-owned businesses that rely on the skills and business acumen of a few individuals who are the sole driving force behind the business operations. They have every business trick stored in their head with minimal reliance on business systems. The only applications they rely on are accounting systems for regulatory reporting needs and only because they are forced to do so by their accountants. These managers know how to streamline the production line, purchasing, and their vendor and supplier relationships to maximize profits and achieve business success. They are happy, their businesses are flourishing, and we wish them continued success. There's no need to focus on their operations or conduct a case study on their techniques or speculate about how they can achieve the scale needed to compete and grow in the global economy.

### ***The Value Proposition of Partnerships***

A long time ago, merchants and traders realized that they could not execute all aspects of their business on their own and had to learn to work with partners. Each entrepreneur focused on a small niche product or service and learned to work effectively with other entrepreneurs who provided complimentary skills and products. They created rules for working with each other efficiently, thereby ensuring their mutual success.

The wisdom gained from studying successful entrepreneurs through the ages has special significance to the companies that are trying to stay one step ahead of their competition in the current age.

Both global and local companies can achieve greater success by focusing on their core business functions and creating partnerships with their suppliers and consumers. The core functions of all the partners should work together smoothly and efficiently as they together create value for the consumer.

There are, of course, many small and medium-sized businesses that do not spend time or money creating business partnerships with the organizations in their value chain. Some maintain tight control of their sales and distribution strategies by hosting the operations in-house. For some of these companies, the relationships with their suppliers are usually ad hoc, which gives them the flexibility to change their vendors easily and quickly.

For most businesses, however, all evidence points to their becoming more profitable by creating partnerships and working efficiently with their partners. They can also gain a competitive advantage by leveraging technology to achieve their business goals. Partnerships imply a trust relationship between trading partners; a lot of care and planning should go into creating these relationships to guarantee the success of all partners.

Many management philosophies have evolved to address the issues of partnering, and a discussion of these are beyond the scope of this book. A search on the web will bring up some very good references that explore all aspects of business partnerships.

### ***The Challenges of Integrating Data and Systems***

Business applications have been the driving force behind the proficient operations of many companies. Most of the best applications were streamlined to effectively deal with a single business operation. Software vendors or in-house IT departments provided efficient applications for specific business operations such as finance, procurement, sales, and manufacturing. Each application invariably created and maintained its own data repository. These applications were referred to as *silo applications*, because they worked in isolation and it was difficult, although not impossible, to access the application from outside the functional department that owned and operated them. It is a huge, costly challenge to get these systems to integrate and work seamlessly with other applications within the organization or with the systems and applications of business partners.

One solution is to integrate at the data layer. This is an even bigger challenge because it isn't always easy to integrate the data formats from each database vendor. In Chapter 9, you saw XML used to effectively solve the problem of merging data formats. An XML schema can be created for integrating with relational data for each data repository. An application has access to the framework and can execute queries on several merged XML documents representing data from different sources.

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Business applications evolved to meet the growing demands of a fast-paced global marketplace. Standards like XML for representation of business data and documents have helped spur the evolution of business applications and frameworks. Applications have become more sophisticated, and the analysts and architects have more choices than just data integration for merging businesses. The next few sections briefly discuss four significant business integration strategies that spurred the evolution of business applications and frameworks:

- ❑ Electronic Data Interchange (EDI)
- ❑ Enterprise Resource Planning (ERP)
- ❑ Enterprise Application Integration (EAI)
- ❑ Business Process Integration and Workflow

### **Electronic Data Interchange**

Electronic Data Interchange (EDI) has been around since the late 1960s and is one of the earliest standards for businesses to conduct electronic commerce. It defines a set of business documents using mutually standardized notations. Trading partners are connected using the EDI network and exchange EDI documents via their mailboxes on the network. Very few business applications can use EDI documents directly; specialized applications are needed to bridge between systems. Translator software modules convert the EDI document to the company's format for that particular business document. The translator also converts the company data into the appropriate EDI document, which is delivered to the business partner's mailbox.

Companies have to pay for connecting to the proprietary EDI network, maintaining a mailbox as well as incur a per-document charge for using the network. EDI-enabling a business is very expensive, and only large companies can afford to implement this strategy. Many companies have been successful using this strategy to work with business partners. XML, the Internet, and the World Wide Web are reshaping the direction of EDI and making it more affordable for smaller businesses to use its technologies to work with partners.

### **Enterprise Resource Planning**

Another popular strategy is the use of large Enterprise Resource Planning (ERP) systems that integrate modules for the most common business functions. The modules have to be customized to work with each business's processes.

ERP systems share common data repositories and avoid the problem of data integration. These are a good solution for most large manufacturing and sales organizations, but very few companies can successfully implement the strategy. ERP systems are very expensive, and the outlay for customizing and deploying them in an enterprise is formidable. Small vendors and suppliers cannot justify the expenditure and effort needed to implement an ERP system.

ERP systems help companies take control of their data and systems. XML plays an important role in the standardization of data representations and allows tighter integration between modules. Using XML to represent data also provides an added benefit when business partners want to integrate their ERP systems across the Internet.

## **Enterprise Application Integration**

Enterprise Application Integration (EAI) involves the creation or deployment of a middleware application that integrates other business applications, databases, and legacy systems within an enterprise.

With EAI, the middleware application uses application connectors and asynchronous messaging frameworks to form a bridge between the various applications. EAI depends on message queues in the middleware applications that use messages for passing data and control information between the systems. Using XML to represent the data and control information within a message is critical for integrating disparate business applications and data repositories. This, too, is a costly strategy with a sizeable amount of custom code generation needed to effectively integrate the systems.

The relatively low Internet connectivity costs have made it possible for companies of all sizes to create a B2C presence on the World Wide Web and connect to the B2B arena. However, it has not solved the problem of integration between business partners. Not all partners can afford to deploy the same solutions. Heterogeneous systems, applications, and data are the reality of doing business in this day and age, and no company can dictate what systems their partners must deploy or use. Small vendors and distribution channels may have streamlined systems that are tailored to their operations. Integration can be achieved by creating custom connectors for each partner but this may not be financially feasible for every company. Integration at the data level may not be an option because very few partners will provide open access to their data. Using XML as the standard for data representation and intersystem communications also supports integration with the systems of business partners across the Internet.

A search on the Internet will provide a comprehensive list of the popular ERP and EAI systems on the market. Over the past few years, research has focused on workflows and business processes. The new breeds of technology solutions revolve around integrating businesses at the process or workflow, concepts explored in the following section.

## **Business Process Integration and Workflow**

Dr. Michael Hammer defines a process as:

An organized group of related activities that together create a result of value to the customers.

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That definition highlights some of the characteristics of processes. A process is a group of activities and all activities working together help create value. Activities are related and organized. They are interconnected and performed in sequence. A stream of activities produces the desired outcome, which is a common goal. Activities are aligned around a purpose, and the process results in value to the customers.

A *business process* is a function or set of functions within an organization that helps successfully deliver a product or service to the customer. The customer may be an end consumer in a B2C relationship or another company in a B2B relationship; the latter takes the input and adds additional value for its customers.

Organization structures vary widely across industries, yet they all perform similar business processes, typically:

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- Finance
- Human resources
- Logistics
- Procurement
- Quality assurance
- Sales
- Marketing
- Manufacturing
- Engineering

Many other business processes support these core business functions, and the support processes can be set or improved by benchmarking against industry leaders. Effective communication between business partners is critical for the success of the partnership. This includes communication of data, information, and people. An effective integration strategy should include processes and technologies that support all three types of communications.

*Workflow* is the flow of work between people and the departments within an organization or across organizations. It deals with the routing and approval processes for business documents. A business activity may be triggered by a business document, or a business document may be created to signify the end of an activity. This is why business workflow is routinely associated with business document processing.

### **Workflow Engines**

Workflow engines are information systems that manage and monitor the flow of documents and stages of approval in an organization. They generally:

- Provide the functions to define and track documents in the approval pipeline
- Automate a range of tasks in the approval process and route to the right people at the right time
- Have a mailbox capability that notifies users of pending work

Managers and supervisors can create and route approvals as well as observe the status of an approval at any time. Workflow engines support automation of the approval process but also allow for manual intervention for customized tasks. The finance department of a company has many functions and accounts payable (AP) is the favorite of all vendors because that is how they get paid for their products and services. Within each business function, a company may have a specific process to execute tasks. The check approval process within the AP function of the finance department is one example of a business workflow.

### **Custom Solutions and Vendor-Based Proprietary Systems**

Software vendors created powerful workflow engines for a long time. Earlier on in the chapter we covered the evolution of business systems from the simple accounting software packages to the ERP systems and finally the EAI middleware solutions for integrating business processes. These systems were very successful in integrating internal applications. Some of these solutions were very successful at achieving automation of the internal business processes and workflow. However they could not be integrated with disparate systems and data formats. The proprietary data formats and messaging solutions used to integrate systems within an enterprise do not do very well in integrating across business enterprises.

## **Business Process Integration**

A typical interaction between business partners involves several different business processes within many business functions. For example, order processing, customer management, inventory tracking, shipping, invoice generation, order fulfillment, and accounts payable. Each process may be supported or enabled by one or more business systems. For the smooth functioning of the business, all the processes must work in synchrony with no disruptions.

Critical data from one stage in a particular process may be needed by another stage in an entirely different system. Automatic sharing of the data is preferred because manual data entry is prone to errors. The processes should be integrated so that the work flows between systems and organizations seamlessly. Tighter integration between the systems allows the processes to be automated.

To integrate custom applications, each system has the interactions coded in a sequence corresponding to the steps of the business process. The data generated by that sequence of steps is saved along with the state of the process. The next sequence in another system is invoked and the process continues. The data and state of the previous system is available because the systems use a common repository and there is strict control of the data formats. Complex business functions are long running, so failure in one sub-function requires a rollback to the state in previous stages. Once corrections are made, the process needs to be rerun.

Using software components to model business process is cumbersome. Because subfunctions are hard-coded, it becomes a change and maintenance problem if the business process changes. For example, marketing strategies and pricing may be amended frequently, and tax laws are subject to change often.

Workflow engines have steps that map to the steps of a business process. They also have connectors to the business system driving the processes.

There is another category of software called *rule engines*, which can be used as standalone systems or to drive workflow engines. These text-based rules engines manage business rules and are effective for some processes, but managers often use experience rather than documented business rules to make business decisions. These cannot be modeled in any text-based rule or coded in software components.

## **Design**

You now have a clear picture of the problems facing most organizations as they try to find ways to work together with their business partners. The organization and partners must commit to changing their processes and creating the environment for integration. This means building a trust relationship, overcoming cultural obstacles, and changing their organizational structures. Once the commitment is made, the organizations can follow standard roadmaps to create and implement new processes.

## **Business Process Reengineering**

To stay competitive, organizations constantly strive to improve their processes. The continuous improvement model is used to get a detailed understanding of the current process while generating metrics that describe the effectiveness of the process. As a result, you can identify areas for improvement, make iterative changes, rerun the process, gather new metrics, and continue the improvement cycle.

Another way to change process is to use the Business Process Reengineering (BPR) approach. If an organization does not have the time to make incremental changes, it may choose to make rapid, often dramatic changes to its processes. BPR assumes that the current process is broken and can be discarded, and the organization can start out fresh defining a new process. The organization defines a scope and objectives for the reengineering, benchmarks other organizations that excel in the same process, and creates an ideal “to-be” process (how the process will work after reengineering) for the organization. Analyzing the gap between the current and ideal structures leads to a plan to transition the organization to the new state. The plan includes changes to the organization structure, removing cultural obstacles, educating employees on the new culture, retiring legacy systems and applications, deploying state-of-the-art systems, and training employees on the new systems. The final step is implementing the plan.

An organization can choose which approach to follow based on its current state. For example, some businesses jumped on the Internet bandwagon immediately, modifying processes and deploying the technology to support some level of e-commerce. They subsequently floundered because of a lack of clear direction in the industry and lack of standards based tools. These organizations can employ the techniques of continuous improvement to gradually move them toward true business process integration.

Some companies held back and did not jump of the Internet wagon. These organizations must make drastic changes in their processes to integrate their workflows with their supply chains. BPR can help those companies made rapid changes.

Business Process Management (BPM) are the activities that a business manager performs, including monitoring and optimizing business processes or adapting them to new business needs. BPM is also a synonym for the set of tools that support business managers’ activities. A clear understanding of the business manager is essential to changing or streamlining business processes.

### ***Patterns for Business Process Integration***

Patterns are models that are created by observing recurring solutions to known problems in the real world. Patterns are widely used in software design and integration. Business integration patterns are similar in that they have evolved from standard solutions for integration problems. These can be used as templates for creating solutions for certain business integration scenarios.

Here are three common business integration patterns:

- ❑ **Application to application** — Defines the interaction between the systems of two trading partners in a supply chain.
- ❑ **Data exchange** — Requires a common data format to be defined. XML is the logical choice for a universal data format.
- ❑ **B2B process integration** — Uses XML-based messages to manage processes. This pattern is shaping the standards and protocols that define business transactions.

A detailed discussion of all the business integration patterns is beyond the scope of this book. A search on the web turns up several very good references that can help increase your understanding of using patterns in the redesign of your business processes.



### **Leveraging Technology for Process Integration**

XML has been thrust into the forefront for data representation in application integration scenarios because it can hide the actual data representation used by each system. XML is also used to represent business documents and even the EDI standard has changed to use XML representations of its document formats. XML enables SOA (Service-Oriented Architecture), which is a collection of services. Systems interact using service calls and communication is achieved by passing messages.

As discussed in Chapter 12, web services are software systems that support communications between systems using messages. SOAP (the protocol for communications), WSDL (the interface definition), and UDDI (a directory protocol) are all based on XML.

The next generation of software solutions needs to support the definition and execution of collaborative workflows and business transactions that can cross the organization's data, network, system, and application boundaries and integrate disparate applications across enterprises.

### **Business Process Management Systems (BPMS)**

Business managers need to constantly monitor business operations and optimize processes or change them to meet new business needs. These tasks are called *business process management*, and the category of software tools and systems that help a manager perform these tasks is called business process management systems (BPMS).

BPMS build on the functions of workflow systems and allow for direct execution of processes. They do not fall under the category of rules-based engines and do not need text-based rules to be defined. They do not need custom software modules to be developed for each task. Commercial BPMS software focuses on graphical process model development rather than text-based business rules.

Business process modeling is done in a graphical user interface (GUI). BPMS incorporates process modeling software with graphical views for modeling business processes. Business rules are auto-generated from the GUI icons in the model.

All BPMS support three basic process functions:

- Definition
- Execution
- Monitoring

BPMS eliminate the need for costly and long software development cycles. They allow for the direct execution of business processes and use services in applications or send messages to humans to perform nonautomated tasks.

The GUI enables managers to monitor the execution in real time and access metrics to analyze the performance of a process that is running so that they can tweak the process or make complete changes as the need arises.

### **XML Standards for BPMS**

There are various standards and protocols to be used in process and workflow integration. Following is a brief description of the major ones:

- ❑ **Business Process Modeling Notation (BPMN)** — Enables managers, analysts, and technical architects to describe business processes using a universal scheme. It is the bridge between defining the business models and the execution of the models. It also can also be used to generate execution modules from the diagram notations.
- ❑ **Web Services Business Process Execution Language (WS-BPEL)** — Describes business processes and uses web services (SOAP/XML) for message passing.
- ❑ **XML Process Definition Language (XPDL)** — A standard proposed by the Workflow Management Coalition (WfMC), a nonprofit organization dedicated to creating standards for workflow products to interoperate.
- ❑ **Web Services-Choreography Definition Language (WS-CDL)** — Creates a framework to define collaborations between peers as well as message passing for execution of processes. Based on XML.
- ❑ **XML/EDI** — Creates XML formats for defining standard EDI (Electronic Data Interchange) documents.
- ❑ **BizTalk** — BizTalk is the name given to the collective set of tools, framework, and server that are at the heart of Microsoft’s business integration strategy. BizTalk uses XML to enable communications and integration of applications and has widespread backing from companies and vendors all over the world.
- ❑ **RosettaNet** — A nonprofit consortium of companies that have banded together to define standards for the management of the supply chain and distribution processes and efficient techniques for collaborative commerce among organizations of various sizes.

Most commercial vendors support one or more of these standards and protocols, and this allows applications on different systems to be easily integrated as long as XML is used as the format for data representation and message passing. There is a lot of rapid change taking place in the area of standards and protocols. There is also a lot of merging and consolidation of standards. Newer proposals will supersede some of the names on this list, and a detailed discussion of each is beyond the scope of this chapter. You can find the most current information on each of the standards and protocols on the web.

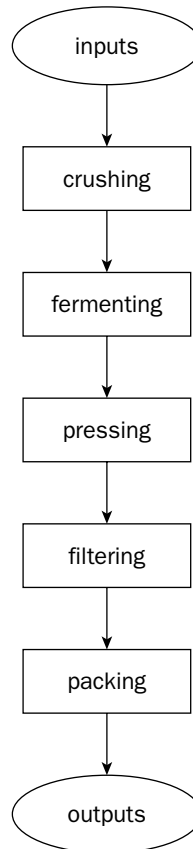
## **Solution**

How can business process and workflow integration help the streamline the operations of the winery? Let’s examine the winery’s operations and discuss how integration and automation can help the business to more efficient and profitable.

Remember, the winery solution cannot be a one-size-fits-all answer, so it may not be relevant to other organizations or industries.

### **The Winery Operations**

Figure 14-1 shows a high-level flow chart of the wine production process. The size of a winemaking business can vary from a small home-based operation to a large winery, but they all follow some basic steps in the manufacturing process.



**Figure 14-1**

Good-quality grapes are the most essential input to the wine production process. Some winemakers may start with grape juice but most of the wineries control the quality of the finished product by starting with the fruit. Not all winemakers grow their own grapes; their production begins with the purchase of the fruit from vendors. Several wineries maintain tighter control on the finished product by owning the growing process. (The study of vine cultivation is called viticulture, a very complicated process that will not be part of this discussion.) Those wineries control their own vineyards, carefully select premium quality vines, and maintain strict controls on the cultivation of the grapes. The growing process becomes an integral part of the manufacturing process.

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For this chapter's project, begin your study at the point the grapes arrive at the winery. Vinification is the process of converting the fruit to wine. There are minor variations in the process for the production of white, red, sparkling, and fortified wines, but all you need to do here is focus on the basic steps, which are common to all winemakers.

**Oenology (enology in the United States) is the study of wine and winemaking. The name is derived from the Greek *oenos* (wine) and *-logos* (one who deals with).**

The process starts with the setup stage in which all equipment is cleaned, pretreated, and sanitized with special chemicals. Ripe grapes from the vineyard are transported to the winery where they are cleaned, destemmed, and crushed. The output of this step is called must, which is pumped into fermentation tanks where yeast culture is added to start the fermentation process in which the sugars in the juice are converted to alcohol. After fermentation the mixture is sent to a wine press where the juice is separated from the residue and unused yeast. The wine is then transferred to storage tanks or oak barrels for aging. The length of the aging process varies for different varieties of wine. Filtration is an optional step in the process where sediment is removed from the juice before the bottling of the finished product.

Basically, the inputs required for the production process include:

- Grapes
- Chemicals to sanitize the equipment
- Special varieties of yeast cultures for the fermentation
- Oak barrels for aging
- Special filters for filtration
- Packaging materials

Oak barrels are critical elements in the production process with a limited life span and have to be changed frequently. They are not considered fixed equipment and have been included as inputs to the process like any of the materials essential to keep the production process running smoothly.

### **The Supply Chain**

Wine production is a seasonal activity and is not driven by customer orders. To be successful, the winery has to listen to customer needs, and adjust the selection and production of certain varieties of wines accordingly. The production process itself begins and ends on a predetermined schedule and is not affected by customer demands. The duration of the production process is fixed and cannot be altered without affecting the quality of the product.

### **Procurement**

The production process begins a long time before the end of the harvest season and is often a year-round process. The winemaker keeps tabs on weather and soil conditions, and makes a best guess at how the harvest will affect the next production cycle in terms of quantity. The master winemaker begins selecting the quality of the fruit and deciding the type of product it will go into as part of the production planning process. Before production starts, the winery has to ensure that all equipment is working and that there are adequate stocks of raw materials, supplies, and equipment for each stage of production process.

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In a nonautomated business, the production staff is responsible for keeping track of the materials and supplies needed for a production run. If any of the essential materials are in short supply, the staff contacts the procurement department, which initiates the manual process of buying the supplies. After choosing a vendor and negotiating the quantity and price, a purchase order is generated and sent to the vendor. The vendor receives the purchase order and hopefully till has adequate stock to fill the request. The product is shipped, and the winery updates its supply inventory to indicate the new materials. The supplier also creates an invoice and sends it to the winery finance department, which starts the check approval process, after which the winery pays the supplier for the materials sent.

The manual procurement process is labor intensive, prone to human error, and very time-consuming. After studying the processes of all partners and implementing suitable process reengineering, you determine that the winery can create better business relationships with its suppliers and vendors. As part of the partnership, all partners (winery, suppliers, and vendors) can choose to deploy technologies that allow their business systems and processes to be integrated. By tightly integrating and automating the supply chain, all partners can become more efficient and see marked improvements in their processes, resulting in cost savings and increased profitability to all the participants.

Here is a possible scenario for the automated procurement process:

1. The winery's materials tracking system detects a shortage of a particular essential input for the production process.
2. The materials system sends an XML message to the integrated procurement system indicating a need for a specific quantity of that item.
3. The procurement system accepts the request and sends an XML message that queries the sales catalog system.
4. The supplier's system extracts the pricing information and sends an XML message back to the procurement system.  
The procurement system can make similar queries to all of its preferred vendors and, after all reply messages have been received, make a selection based on the best price.
5. The winery's procurement system creates an XML purchase order document and sends it to the chosen vendor's XML-based order entry system.
6. The vendor extracts and validates critical information such as the price quoted in the request and availability of the quantity in its inventory system, before entering the request into the order fulfillment system.
7. The vendor sends an XML message acknowledging receipt of the purchase order.
8. The vendor's order fulfillment system automatically decrements the level of the inventory system, and fulfillment operations prepare the product for delivery and submit a shipping request to the transportation system.
9. When the winery receives and signs for the shipment, a message is sent to the vendor's order fulfillment system acknowledging receipt of the product.
10. The vendor's system generates an invoice and sends it in an XML message to the winery's procurement system.

This completes the full cycle of a procurement process.

## Production

For most wineries, the production process requires manual intervention, and data about the stages have to be manually recorded and logged into production-tracking software applications. Some wineries have taken advantage of state-of-the-art technology to automate and control all stages of the production process using electronic equipment and computers. Production data, signals, and triggers from each of the automated stages can be viewed and controlled. The manufacturing modules of the business systems use XML to represent the state of the system and communicate using XML messages to other business systems. Depending on the size of the winery, the cost of deploying a web-enabled intelligent manufacturing system may or may not be justified.

Reducing production costs is one way to increase the profitability of a company. Just-in-time delivery of raw materials and finished inventories can help to improve the efficiency of the production process. The data from automated production systems lets the business managers monitor the state of the production process at any given time.

Automated production processes are supported by just-in-time delivery mechanisms. There is always a huge cost of storing raw materials and finished products. Automation leads to shorter setup time for producing batches of products, lower inventories, less waste of raw materials, and faster delivery to the distributors. If there is a problem in the production line, it is discovered earlier and corrective action can be taken to prevent a complete loss of the batch.

Furthermore, if the automated production management systems are integrated into the other business process management systems, the signals and triggers from the automated production process can be used to drive the supply chain. Figure 14-2 shows the winery supply chain, including postproduction buyers and consumers.

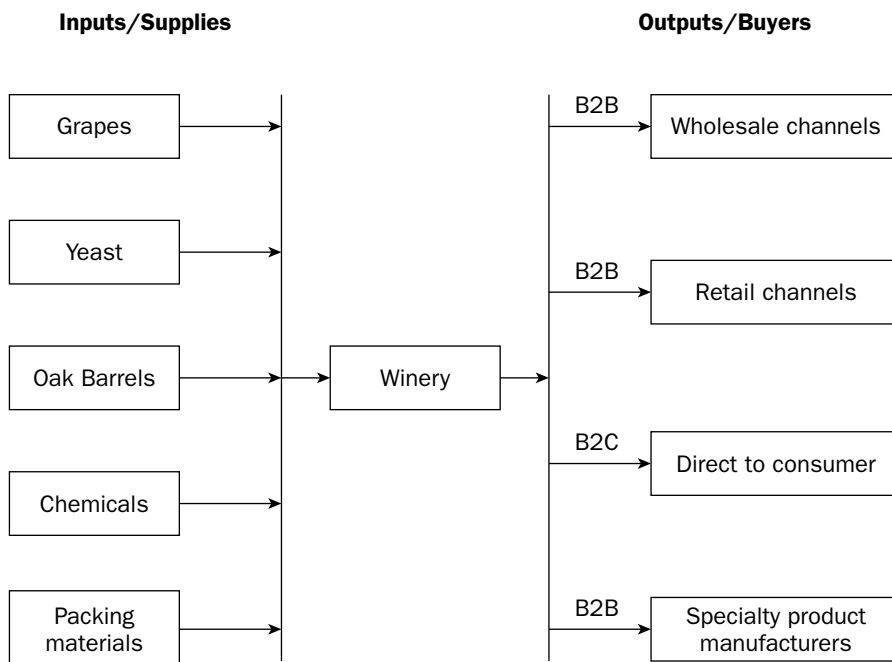


Figure 14-2

For example, when raw materials for a particular stage are low, an automated request can be sent to the procurement process to order more and have it delivered just when it is needed. At the end of the production process the packaged goods can be picked up on time for delivery to the distributors. The logistics and transportation systems are informed by the production systems, and suitable arrangements are made to deliver the product to the distribution channel.

### ***Sales and Distribution***

After some length of time in the production pipeline, the wine is available as output. The production data at the end of the process feeds into the inventory system. The sales systems have a real-time view of the levels of inventory. The sales and marketing managers can make quick decisions about prices and the catalogs are updated automatically with the new data.

In the B2C channel, the winery markets directly to the end consumer. The buyer can log on to the e-commerce-enabled web site and make purchases. The e-commerce web site is integrated into the other business systems. After conducting research on the types and history of a particular wine, the buyer can check on the availability and prices before placing the order. The order entry system is integrated with the order fulfillment system and the finance systems with a merchant banking system to accept credit card payments. This completes the sales loop for the B2C process.

Wholesalers and retailers can also be integrated into the winery B2B business model. The distributor's systems can query the winery catalog and automatically extract pricing and inventory levels. The distributor's procurement system initiates XML messages to the winery catalog and inventory system and can automatically enter orders received by the winery order fulfillment systems. An invoice message is sent to the distributors at the end of the procurement process.

A winery could also sell in bulk to manufacturers of specialty wine products. The winery then becomes a vendor in that manufacturer's supply chain. The same XML-enabled business systems can be used to integrate with the specialty manufacturer's XML-enabled business system as long as one or both have an XML enabled workflow engine to drive and automate the integrated business processes.

### ***Integrating Internal Processes***

The winery may choose to integrate the production process with other business processes. In the previous section, you saw how the winery could play the role of a supplier to its B2B customers. Integrating and automating the catalog systems with the inventory and sales systems will enable those customers to integrate their processes with the winery's.

Integrating the logistics processes allows the winery to monitor and maintain tight control of transportation and warehousing. Automating and optimizing these processes can help reduce operating costs of the winery.

By integrating the finance systems, the winery managers can monitor the financial health of the business in real time—they won't have to wait for month end closing to figure out what the net sales were and how much revenue was generated from operations.

The invoice messages sent by the suppliers can be validated against stored data and then automatically submitted to the finance systems accounts payable (AP) process for payment. The winery sends a message to their bank to credit the amount of the invoice to the supplier's bank account directly. Similarly payments from B2C and B2B customers can automatically be credited to the winery bank account, eliminating the need for writing paper checks which, in turn, reduces the costs of doing business.

### **The Benefits of Integration and Automation**

What's described in the preceding sections are not imaginary scenarios. The technology to create collaborative workflows powered by standards-based XML messaging systems are available in the currently available in the market and are being actively used by businesses to automate and activate their processes.

As discussed earlier, an XML-based workflow engine that integrates with the other XML-driven business systems enables the tight coupling and integration between the winery systems and those of business partners. Collaborative workflows are defined, and passing XML messages between the systems drives the workflow.

Business communications benefit tremendously from integration and automation. Labor-intensive tasks of data entry and transferring between systems are minimized or eliminated. The costs of business communications are greatly reduced. Figure 14-3 shows one way to integrate the winery business processes. The business process management system is at the core of the integration.

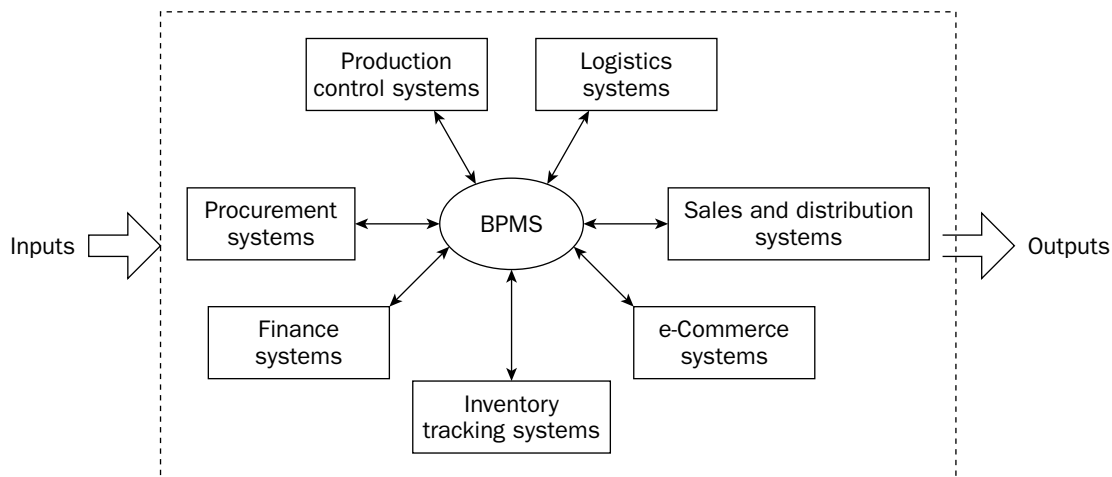


Figure 14-3

The Business Process Management Systems provides managers with instantaneous graphical overviews of the state of all aspects of the business, such as the production process, inventory, sales, and finances. The processes can be monitored and optimized to reduce waste and operating costs. All of the BPMS leverage the power of XML for data representation, triggers, and control within the BPMS as well as external systems under their control.

Vendors realize benefit, too, by saving on business communications. They can turn inventory around quicker, reducing warehousing costs. They get paid faster and, therefore, can give better payment terms and prices for partners whose systems are integrated and automated.

There is constant change occurring in the field of business process management systems, and vendors are consolidating their offerings as newer standards and protocols are adopted. A search on the Internet provides the names of the latest BPMS and their features. The following is a nonexhaustive list of commercial and open source business process management systems available in the market:



- ❑ **Oracle BPEL Process Manager**—Oracle Corporation ([www.oracle.com](http://www.oracle.com))
- ❑ **BEA Weblogic**—EA ([www.bea.com](http://www.bea.com))
- ❑ **IBM Websphere**—IBM ([www.ibm.com](http://www.ibm.com))
- ❑ **Intalio BPMS**—Intalio ([www.intalio.com](http://www.intalio.com))
- ❑ **Project Agila**—Apache Software Foundation (<http://incubator.apache.org/projects/agila>)
- ❑ **JBPM**—JBoss ([www.jboss.com/products/jbpm](http://www.jboss.com/products/jbpm))

## Summary

Integrating systems and processes with business partners' isn't always simple. Organization culture, trust relationships, and technology are some of the significant issues that can prevent companies from forming effective partnerships. Yet there are profitable results from successful partnering.

XML-enabled business systems and workflow engines make it easy to integrate systems and processes, especially when using XML for business documents or passing messages between the systems. BPMSs are the new breed of applications that are driven by XML and enable integration with other business systems and automation of process workflows.

This chapter illustrated how your winery could benefit from the new XML-enabled integrated and automated processes. You examined the procurement, production, sales, and distribution processes as well as how integration with other business processes such as finance would work.

So, here we are, at the end of our journey together. We chose the wine industry as the focus of our discussions to provide an interesting and fun way of exploring XML and looking at a relatively uncomplicated manufacturing operation.

XML offers a flexible and powerful means to represent data, integrate systems, applications, and processes. It drives all of the latest technologies that support and enable business integration. A company can streamline its business processes and create tighter integration with its partners by using systems enabled by XML. This results in higher productivity, less waste of time and resources, and ultimately helps make the company more profitable.

