

Chapter Three



The REA Enterprise Ontology: Value System and Value Chain Modeling

LEARNING OBJECTIVES

The objectives of this chapter are to describe the components of a typical enterprise's value system and value chain and to discuss the procedures for developing models of enterprise value systems and value chains. After studying this chapter, you should be able to:

1. Identify an enterprise's external business partners
2. Identify the resources that are exchanged between an enterprise and its business partners
3. Develop a value system level REA model for an enterprise
4. Identify the business processes (transaction cycles) in an enterprise
5. Identify the resource flows between an enterprise's internal business processes
6. Identify the economic events that cause the resource flows between an enterprise's internal business processes
7. Develop a value chain level REA model for an enterprise
8. Explain how enterprises create value and describe Porter's Value Chain Model
9. Explain how evaluating enterprise activities at the value system and value chain levels facilitates understanding the business process level

VALUE SYSTEMS AND VALUE CHAINS

We introduced the concepts of value systems and value chains in Chapter 2; we examine them more closely in this chapter. You may be surprised to learn that many of the critical steps of building an information system have little to do with programming a computer. The process begins with identifying the need for a business solution and acquiring a better understanding of the environment you plan to support and/or improve. You must examine that environment (the enterprise) from different perspectives and at different levels

of detail. We believe the first level of detail you should consider is the least detailed—the big picture view that we call the value system level. You may have heard the saying “they couldn’t see the forest for the trees” used to describe those so mired in detail that they forget the big picture of what they are trying to accomplish. We believe that looking at the forest level of an enterprise first and trying to develop a plan for analyzing the enterprise a section at a time will help you keep your perspective and avoid getting mired in the detail. Obviously there is plenty of detail in which to get mired, so try to keep picturing the end goal and the plan for getting there to keep you on the path.

Examining the **value system** level of a firm includes thinking about the enterprise’s mission and strategy. Understanding this level is crucial because later you must ensure that activities within the enterprise’s business processes are consistent with its overall mission and **strategy**. The REA ontology is about much more than developing information systems; it is about understanding enterprises.

Everything an enterprise does should create value for its **customers** according to Michael Porter in *Competitive Advantage*.¹ Creating value has a cost. For example, an enterprise that assembles automobiles creates something of value but also must pay for various inputs (e.g., materials, supplies, and time of employees). Porter computes an organization’s **margin** as the difference between value and cost. This calculation includes all value and all cost, much of which is difficult to measure financially, but which the REA value chain model can capture if measurements are available.

The concept of creating value applies to both for-profit and not-for-profit organizations. For-profit organizations try to maximize their margins. Not-for-profit organizations, such as charitable or governmental entities, seek to maximize the goods and services they provide with the **resources** (funds) they receive. Over the long run, charitable and governmental organizations seek to optimize their services while matching outflows to inflows. Whether for-profit or not-for-profit, viable organizations provide goods and services that customers value in a cost-effective way. The main difference between for-profit and not-for-profit enterprises is that at the value system level, the input resources and output resources are paired with different external business partners. That is, some of the partners who give resources to the not-for-profit enterprises do not receive resources directly from the not-for-profit enterprises and some of the partners who receive resources from the not-for-profit enterprises do not give resources to the not-for-profit enterprises. The overall notion of input resources being transformed into output resources is still valid because one would expect that if the not-for-profit organization failed to provide the expected goods and services, its contributing external business partners would discontinue their contributions.

Every organization seeks to create value by providing goods and services customers want. For example:

- A grocery store creates value by providing food in a clean and convenient location for customers to purchase.
- An airline company creates value by safely transporting passengers and cargo in a timely manner.
- An automobile manufacturer creates value by producing safe, reliable vehicles to transport people and cargo.

¹M. Porter, *Competitive Advantage: Creating and Sustaining Superior Performance* (New York: Free Press, 1985), p. 12.

Case in Point

In the late 1970s and early 1980s when gas prices were rapidly rising and our oil supplies were in doubt, most new car buyers favored smaller, more gas-efficient automobiles. America's automobile manufacturers had several lean years as they modified their automobile design to smaller, fuel-efficient vehicles. Over the next decade as the percentage of small cars increased, most parking lots adjusted the size of the parking stalls from 8 or 9 feet wide to 7 feet wide. But since 1987 the size of America's cars has been getting bigger. In sprawling Western and Southwestern cities, the popularity of sport-utility vehicles and pickup trucks can make parking a hassle. Parking lots with larger parking stalls are now able to charge a premium price. Parking problems will likely increase as the popularity of the Hummer increases. The Hummer is the civilian adaptation of a military vehicle that is 8 feet wide, including the mirrors.*

*Neal Templin, "Big Cars and Little Spaces Cause Mayhem," *The Wall Street Journal*, March 11, 1998, pp. B1, 8.

- A municipality creates value by providing essential community services (e.g., police protection, fire protection, emergency services, and utilities) to its citizens.

Enterprises that provide goods and services of value to their customers will survive and grow while those that do not will shrink and die. Due to competition for scarce resources, each enterprise must provide value in a cost-effective manner. Although some organizations manage to defer their demise through deceit, disguise, or political influence, ultimately every organization has to answer to the final arbiter of value—the customer.

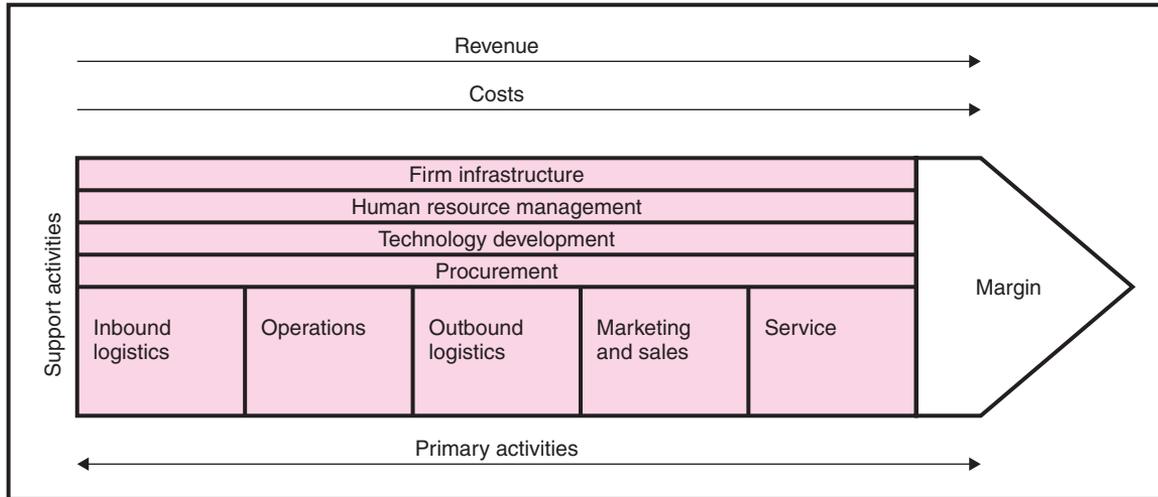
Because enterprises need increased adaptability, effectiveness, and efficiency to remain competitive, most organizations find it essential to differentiate between the various business activities in which they engage. Obviously, organizations must look internally at each of their functions and develop capabilities in each area. They also must effectively integrate and coordinate all business functions. However, in today's business world, an organization's performance is increasingly affected by the world around it. You might work for the most internally cost-effective organization you can imagine, but it might be an unsuccessful organization. Why? Perhaps the organization has competitors who better meet the needs of customers, do a good job of outsourcing some business functions, or do a better job of creating effective strategic alliances with trading partners.²

To really understand and analyze an organization, you must understand more than internal operations and functions. You must look outside the organization at the industry, the **suppliers**, the customers, and all the other parties that affect organization performance. In other words, you must examine the enterprise at its value system level, and also consider how the enterprise's value system interacts with the value systems of the other enterprises in its **supply chain**. An enterprise supply chain encompasses all of the enterprises involved in providing a product or service to an end customer. For example, Robert Scott Woodwind Shop purchases instruments from its suppliers as part of its value system level activities. Those suppliers had value systems of their own to make those instruments available for

²Outsourcing occurs when one organization finds another organization to perform some work. This is usually done when the outsourcing organization can't complete the work (e.g., they do not have the capacity or the expertise) or when they identify another organization that can complete the work in a more cost-effective manner.

EXHIBIT 3-1 Porter’s Generic Value Chain

Source: Michael Porter, *Competitive Advantage: Creating and Sustaining Superior Performance* (New York: Free Press, 1985).



sale to RSWS. Likely RSWS buys the instruments from the manufacturers; their value system levels would involve purchasing raw materials, labor, and manufacturing equipment from their suppliers. Those suppliers had value systems to make those items available for sale.

Eventually managers must look at the entire supply chain to streamline interenterprise activities and gain efficiencies in operations. However, the best first step is to focus on the enterprise in the context of its immediate business partners, then to focus on the enterprise value chain and the **internal business processes** that comprise that chain. Once you understand the enterprise in the context of its immediate business partners and its internal processes, examine the more distant links on its supply chain.

To complete a thorough cradle-to-grave analysis, many people use the value chain analysis approach originally proposed by Michael Porter.³ Porter illustrated that each firm is a “collection of activities that are performed to design, produce, market, deliver, and support its product.” You can see Porter’s Generic Value Chain in Exhibit 3-1.

Although this diagram looks different from the value chain diagrams we use in this textbook, both types of value chain diagrams encompass the same set of activities. Porter’s value chain is defined as a set of business activities that add value or usefulness to an organization’s products or services; the REA ontology defines the **value chain** as a set of business processes through which resources flow, with the assumption that value is added to the resources within each business process. The value chain is intended to show total value and consists of value activities and margin. Value activities are the physical and technological activities performed by an organization. Porter presented two types of value ac-

³M. Porter, *Competitive Advantage: Creating and Sustaining Superior Performance* (New York: Free Press, 1985); and *Competitive Strategy Techniques for Analyzing Industries and Competitors* (New York: Free Press, 1980).

tivities in his generic value chain: primary and support. **Primary value activities** consist of the events that create customer value and provide organization distinctiveness in the marketplace. They are the critical activities in running a business. **Support value activities** facilitate accomplishing the primary activities. Margin is the difference between total value and the cost of performing the value activities.

Porter's *primary* value activities include the following categories:

- **Inbound logistics**—activities associated with receiving, storing, and disseminating inputs to the products or services
- **Operations**—activities associated with transforming inputs into the final products or services
- **Outbound logistics**—activities associated with collecting, storing, and physically distributing the products or services
- **Marketing and sales**—activities associated with providing a means by which customers can buy products and the means for inducing them to buy
- **Service**—activities associated with providing service to enhance or maintain the value of the products or services

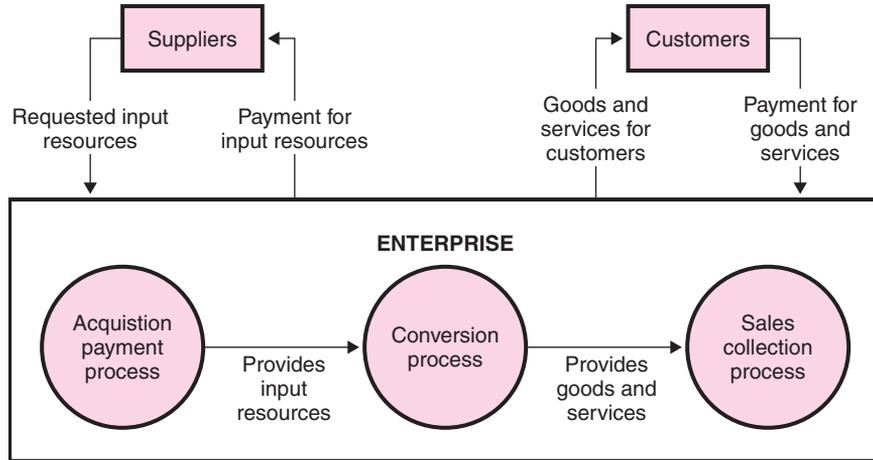
Porter's *support* value activities include:

- **Procurement**—the function of purchasing inputs to a firm's value chain
- **Technology development**—the know-how, procedures, or technology embedded in processes that are intended to improve the product, services, and/or process
- **Human resource management**—activities involved in recruiting, hiring, training, developing, and compensating all types of personnel
- **Firm infrastructure**—activities that support the entire value chain (e.g., general management, planning, finance, accounting, legal, government affairs, and quality management)

In REA value chain analysis we also differentiate value activities in three event categories—operating events, information events, and decision/management events. We define and discuss these categories in Chapter 4.

Value system and value chain analyses are valuable because they compel you to understand the internal operations of a firm as well as the forces and parties outside the firm that affect its ability to create value. The direct actions of an organization are only part of its overall value chain process. It is also important to look at external linkages, such as the activities of customers and suppliers, to understand the ability of an organization to create value. For example, some organizations may be more successful at creating value because they elicit quality responses from their customers and use the feedback to quickly change or upgrade their products. Other organizations may achieve success because they have worked effectively with their suppliers to reduce costs and improve the ability to respond to customer desires. A thorough analysis of the value system and value chain helps you to understand all the activities that are strategically relevant to an organization, not just the portion of activities in which an organization directly participates or controls. In Exhibit 3–2 we illustrate how the value system and value chain activities are linked. In this diagram note that Suppliers encompasses suppliers of every type of resource, including employees, investors, and creditors, as well as those who supply products and services.

EXHIBIT 3-2
Relating Value
System
and Value
Chain Levels



VALUE SYSTEM LEVEL REA MODELING

To develop a value system level REA model you must answer the question, “Who are the enterprise’s **external business partners**?” To answer this question, focus on **resource flows** and ask the question this way, “To whom does the enterprise give resources and from whom does the enterprise receive resources?” Recall from Chapter 2 that resources are defined as things that have economic value to the enterprise. Recall also from Chapter 2 that we are taking a pattern-based approach to developing enterprise information systems. Thus we want to consider what is true for most enterprises and then make adjustments as necessary for our particular enterprise. Most enterprise resources fit into one of the following categories:

- Cash
- Inventory (raw materials, finished goods, merchandise, parts, and supplies)
- Labor
- Property, plant, and equipment
- Insurance
- Services (such as advertising or government services)
- Utilities (water and energy)

To determine an enterprise’s external business partners, a helpful step is to examine which of these resources the enterprise provides or uses and then determine to whom they provide the resources and from whom they acquire the resources. To make matters even simpler, in the current economic environment cash is the universal resource for which most other resources are exchanged. Very seldom do companies engage in barter transactions (**exchanges** of a noncash resource for a different noncash resource). Therefore by concentrating on identifying the various partners to whom the enterprise pays cash and from whom the enterprise receives cash, you very likely have identified all the appropriate external business partners. Typically the external business partners fit into the following categories:

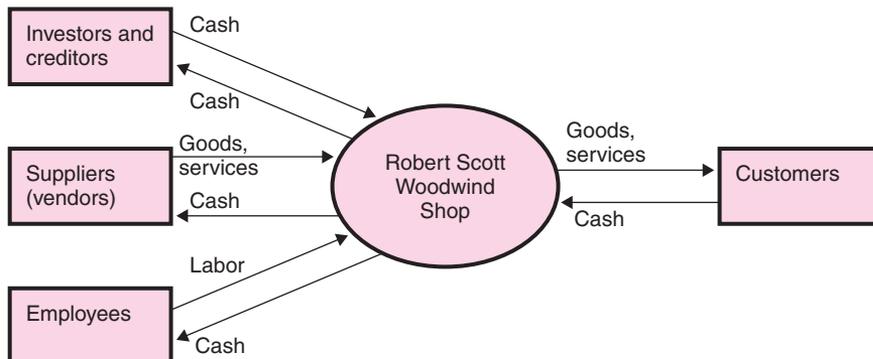
- Vendors or suppliers (of various types of inventory, equipment, utilities, insurance, and services)
- Employees
- Investors and creditors
- Customers

Sometimes examining the cash outflows of an enterprise does not reveal a resource received in exchange. For example, when an enterprise pays cash to government agencies (such as the Internal Revenue Service) what resource does the enterprise receive in exchange? Some resources the government provides are easy to identify, such as a license to do business, or police and fire protection services. However, the amounts paid in taxes and fees to the government often exceed an identifiable resource received in exchange and we must simply label the resource as government services. Payments to charitable organizations pose a similar dilemma. If an enterprise donates money to a university, what resource does it receive in exchange? The enterprise must believe it receives a resource, because enterprises are assumed to make economically rational decisions. The enterprise may expect goodwill, an increased reputation in the community (in effect, advertising), or an advantage in recruiting the university's students. Based on the assumption that the enterprise does in fact receive resources in exchange for these payments, hopefully you have figured out that government agencies and charitable organizations would be included in the external business partner category of vendors or suppliers.

Once the resources an enterprise uses are identified and the external business partners with whom these resources are exchanged are determined, the information is portrayed in a diagram. The enterprise being modeled is represented as a circle or oval in the center of the diagram. Each external business partner is represented as a square or rectangle; these are placed around the outside of the circle that represents the enterprise. Arrows are drawn between the circle and the squares as appropriate to indicate the actual resource exchanges between the enterprise and its business partners. Let's examine the RSWS example introduced in Chapter 2 to determine how the value system level REA model was constructed. The value system diagram from that example is reproduced in Exhibit 3–3.

The first step in constructing this model is to examine the various resources RSWS uses in its operations. Cash is certainly used by RSWS. Let's consider how the cash is used, to

EXHIBIT 3–3
Robert Scott
Woodwind
Shop REA
Value System
Level Model



whom it is paid, and from whom it is received. We identify that cash is received from investors (for equity financing), from creditors (for debt financing), and from customers. Thus we draw a rectangle to represent the set of investors and creditors and another rectangle to represent the set of customers. Cash is received from investors and creditors because they expect to receive cash in exchange, therefore we simply draw an arrow from investors and creditors to RSWS and label it cash to represent those cash inflows. We draw another arrow from RSWS to investors and creditors to represent cash outflows to investors and creditors (e.g., for interest payments, dividends, principal repayments, and treasury stock purchases). Next we draw an arrow from customers to RSWS and label it cash to represent the cash inflows from customers. We realize that the reason customers give RSWS cash is because they expect RSWS to provide goods (e.g., instruments, accessories), repair services, or the use of goods (i.e., rental of instruments). Therefore we draw an arrow from RSWS to customers to indicate that RSWS provides those resources to its customers.

We then inspect the narrative to determine what types of cash payments are made and to whom. We identify cash payments made to employees and realize that those payments are made in exchange for labor provided by our employees. Therefore we draw a rectangle to represent the set of employees. We draw an arrow from RSWS to employees to represent the cash outflows to employees and we draw an arrow from employees to RSWS to represent the labor inflow from employees. You might notice that there is no arrow to represent benefits such as health insurance paid to employees. Is it because RSWS doesn't offer any such benefits or is it because they have forgotten to represent them? The answer is neither. Payments made for health insurance for employees is a cash outflow to suppliers made by RSWS on behalf of the employees. The actual insurance is an outflow from the health insurance supplier to the employees and is outside the scope of RSWS's value system model, which only examines the direct resource flows between RSWS and its external business partners. This leads us to the other external business partner for RSWS—the suppliers (some enterprises may call these vendors). Suppliers is the set of all nonemployee individuals or organizations from which an enterprise acquires goods and services. We draw a rectangle to represent the set of suppliers, an arrow from RSWS to suppliers to indicate the cash outflow, and an arrow from suppliers to RSWS to indicate the inflow of goods and services.

VALUE CHAIN LEVEL REA MODELING

Once the value system level analysis is complete, much of the initial value chain analysis has also been completed. This level of analysis focuses on the resource flows between its internal business processes. A *business process* is a series of activities that accomplishes a business objective: adding value to input resources. Once you have identified the resources flowing into and out of the enterprise, examine what the company does with its input resources and how it generates its output resources. As business processes use up resources, they should be producing resources worth more to the enterprise than those used up. As noted earlier, enterprises create value by developing and providing the goods and services customers desire. Goods and services are provided through a series of business processes. Regardless of the type of goods or services provided, each organization has at least three business processes (see Exhibit 3–2):

1. *Acquisition/payment process*: The objective of the acquisition/payment process is to acquire, maintain, and pay for the resources needed by the organization. Many resources are required including human resources, property, plant, equipment, financial resources, raw materials, and supplies. Resources are acquired from external entities like suppliers or vendors. These are the inputs required by the organization to provide goods and services to its customers. Because the acquisition of financial resources and the acquisition of human resources have complexities not found in the acquisition of other goods and services, many enterprises separate these activities into additional business processes, called the *financing process* and the *human resources process*, that we cover separately in later chapters.

2. *Conversion process*: The objective of the conversion process is to convert the acquired resources into goods and services for customers. The raw inputs are transformed into finished goods and services by this process.

3. *Sales/collection process*: The objective of the sales/collection process is to sell and deliver goods and services to customers and collect payment. The finished goods and services from the conversion process are sold to customers (external entities) in exchange for their payment, usually in the form of cash.

Creating a value chain model that illustrates the linkages between these processes requires understanding of two very important concepts in the REA ontology: *duality* and *stockflow*. These concepts characterize the core economic phenomena of an exchange. As noted earlier, enterprises are assumed to make rational economic decisions. Rational economic theory precludes decision makers from giving up something with no expectation of anything in exchange. For every event in which an enterprise gives something up we expect a related event in which the enterprise receives something. The causal relationship between a give event and a take event is a **duality relationship**. Stockflow is defined as the **inflow** or **outflow** of a resource. Stockflow relationships exist between give events and resources (these stockflows are outflows) and between take events and resources (these stockflows are inflows). The value chain level of the REA ontology is constructed based on these two concepts. Geerts and McCarthy say, “Duality relationships are the glue that binds a firm’s separate economic events together into rational economic processes, while stockflow relationships weave these processes together into an enterprise value chain.”⁴

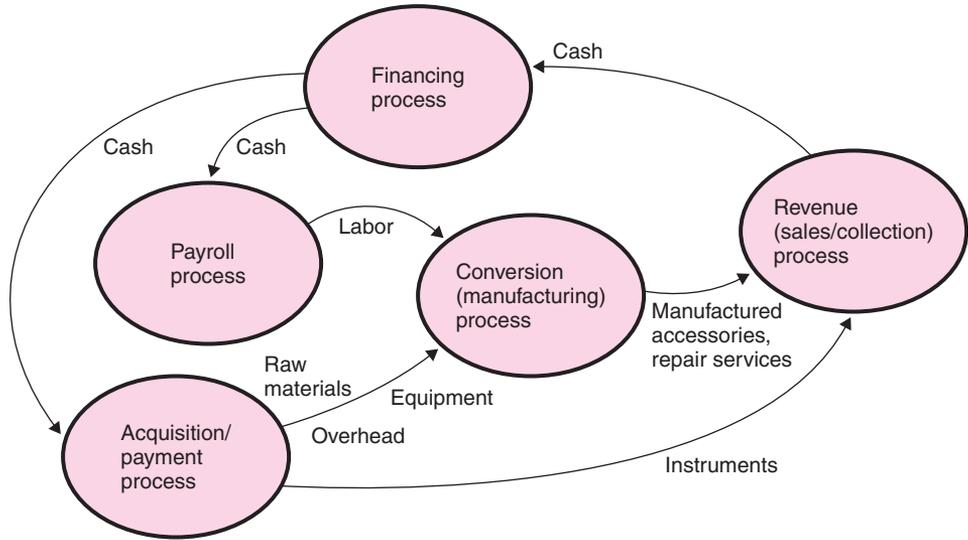
The first step in creating a value chain model is to write the enterprise script to identify the business processes that need to be included in the value chain. We use the value system level model along with whatever other information we have such as a narrative description about the enterprise’s activities. The second step in creating a value chain model is to draw the resource flows to link the business processes together. The third step is to determine the economic exchange events and the duality relationships that make up the core of each business process in the value chain. An example will clarify these steps.

Let’s revisit our RSWS example. In Exhibit 2–3 (reprinted here as Exhibit 3–4) we portrayed a summarized value chain level that would be the result of the first two steps. After going through steps 1 and 2 to reconstruct this model, we discuss step 3 and illustrate the resulting detailed value chain model.

⁴G. Geerts and W. E. McCarthy, “Modeling Business Enterprises as Value-Added Process Hierarchies with Resource-Event-Agent Object Templates,” in J. Sutherland and D. Patel, eds., *Business Object Design and Implementation* (London: Springer-Verlag, 1997), pp. 94–113.

EXHIBIT 3-4

**Robert Scott
Woodwind
Shop Business
Processes
and Resource
Flows
Summarized
Value Chain
View**



Step 1: Write the Entrepreneurial Script

To complete this step, we examine the typical scenes of the entrepreneurial business script to see which of the typical scenes RSWS has. Based on our value system level analysis, the typical script pattern, and the narrative description of RSWS we write RSWS’s script as follows:

- RSWS gets cash from investors and creditors
- RSWS engages in value-adding activities
 - uses cash to buy instruments, raw materials, and overhead from vendors
 - uses cash to acquire labor from employees
 - uses materials, equipment, and overhead to manufacture accessories and to provide repair services
 - sells instruments, accessories, and repair services to customers for cash
- RSWS pays cash to investors and creditors

The first and last scenes together comprise the financing process; in scene 2, the subscenes are (in order) the acquisition/payment process; the human resources (payroll) process; the conversion process; and the sales/collection process. Keep in mind that all of these scenes and subscenes come directly from our value system level analysis except for the “uses materials, equipment, and overhead to manufacture accessories and to provide repair services.” Because the subscene doesn’t involve resource exchanges with external business partners, it is not modeled at the value system level. Thus you must be careful when developing your value chain model to include not only the scenes that you derive from the value system level but also any business processes that add value via internal resource transformations.

Step 2: Connect the Scenes with Resource Flows

Once all the scenes are identified they need to be combined to form a value chain (at which point no distinction is made between scenes and subscenes). The resource flows provide the link from one scene to the next. Once the cash is acquired in the financing process, it is used as input for the acquisition/payment and human resource processes, where it is transferred out to external business partners in exchange for instruments, raw materials, overhead, and labor. Because the value chain model only illustrates the internal processes, we don't show the cash outflows from the acquisition and payroll processes to the external partners, nor do we show the related resource inflows from those external partners. From this perspective we view the acquisition process as one that uses up cash and produces materials, equipment, overhead, and instruments; and we view the payroll process as one that uses up cash and produces labor. We view the conversion process as one that transforms the labor, materials, equipment, and overhead into the accessories and repair service resources. The sales/collection process is then viewed as one that uses up instruments, accessories, and repair services and obtains cash. The assumption is that in each of these scenes the resources produced are worth more than the resources used up; thus value is added to the enterprise in each link of the chain.

Step 3: Specify the Economic Exchange Events within Each Scene

The third step in creating the value chain diagram adds more detail to the diagram that clarifies how each scene's representation in the value chain diagram provides the starting point for a business process level model representation. This step entails depicting the economic exchange events inside each scene's bubble on the value chain diagram. Each scene must contain at least one economic increment (take) event and at least one economic decrement (give) event. You can use the resource flows to determine what events are needed. This analysis also helps you to determine whether a scene in your value chain should be decomposed into multiple scenes. The general rule to follow for this step is that each process must have an economic decrement event to match up with each resource inflow and an economic increment event to match up with each resource outflow. The idea is that if a resource is flowing into a process, the process must include an event that uses it up (either by transferring it to an external partner or by transforming it into a different resource). Similarly, if a resource is flowing out of a process, the process must include an event that produced the resource (either by transferring it in from an external business partner or by creating it as a transformation of some other resources).

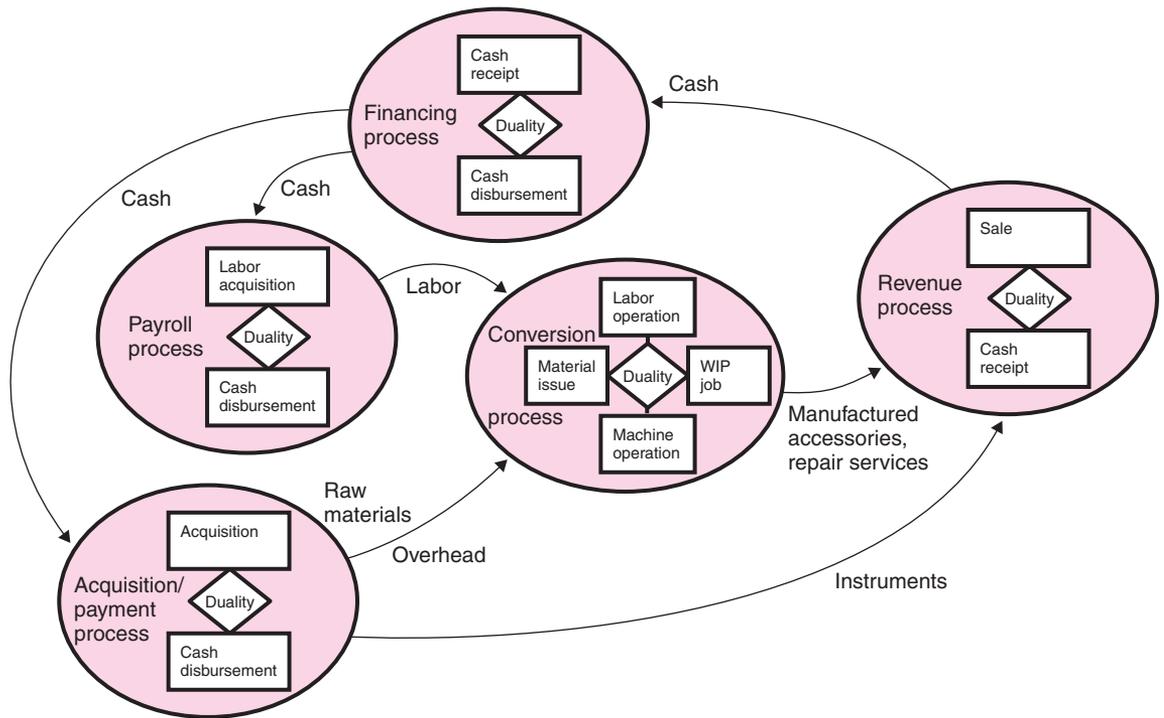
In our RSWS example, let's add detail first to the financing process. Because cash is a resource inflow to that process, the process must include an event that uses it up (i.e., a cash disbursement event). Cash is also a resource outflow from financing, so the process must include an event that acquired it (i.e., a cash receipt event). The cash receipt and cash disbursement events are linked via a duality relationship. So we draw two event boxes inside the financing process bubble and connect them via a diamond (relationship symbol) labeled with the word *duality*. We label the events *cash receipt* and *cash disbursement*. Note that even though the cash flows from the financing process to multiple other processes, the data attributes of all cash receipts are likely the same so we consider cash receipts for all purposes as part of the same event set. The fact that cash got used for different purposes doesn't matter.

Next we examine the payroll process. Because cash is a resource inflow, the process must include an event that uses it up (i.e., a cash disbursement event). Notice that the enterprise will likely have only one cash disbursement event set that encompasses all cash disbursements made for all purposes, but we must depict the event set in each business process that uses cash. The payroll process generates labor as its resource outflow, so there must be an event within the payroll process that obtains that labor (labor acquisition, an event that transfers the labor in). So we draw two event boxes inside the payroll process bubble and connect them via a diamond (relationship symbol) labeled with the word *duality*. We label the events *cash disbursement* and *labor acquisition*.

The acquisition/payment process is similar to the payroll process. Cash is a resource inflow to acquisition/payment, so the process must have an event that uses it up (i.e., a cash disbursement event). The acquisition/payment process has instruments, materials, services, and equipment as outflows, so the process must include an event that obtains those things from external sources (i.e., an acquisition event set). Here we must determine whether the same data attributes are recorded for acquisitions of each of these types of items. For any that are different, the events should be modeled separately and the recommendation would be to make separate acquisition cycle bubbles. Let's say we determine that RSWS records all acquisitions using a common set of forms and captures the same data attributes for them. Thus we need only one acquisition event set and only one acquisition process (scene). We draw two event boxes inside the acquisition/payment process bubble and connect them via a diamond labeled with the word *duality*. We label the events *cash disbursement* and *acquisition*.

Next we examine the conversion process. The conversion process is typically the most complicated scene. Our value chain diagram shows input resource flows as materials, equipment, labor, and overhead. That indicates our conversion process must have events that use up each of those items. We determine that raw materials are used up as they are issued into a manufacturing or repair job so we draw a box labeled *material issue*. We note that employee labor is used up through the employees' involvement in labor operations, so we draw a box labeled *labor operation*. Equipment and overhead are used up in machine operations, so we draw a box labeled *machine operation*. Next we need to determine what event produces the finished accessories and/or repaired instruments. We determine that for RSWS every repair service and each production run for a batch of parts or accessories is considered to be a *work in process job*. Thus we add a box labeled *WIP Job*. We realize that the material issues, labor operations, and machine operations are **economic decrement events** (they use up resources) that are matched with the WIP job, which is an economic increment event (it produces resources). Therefore we draw a diamond symbol to connect all four boxes and label it as *duality*.

Now all our scenes are detailed except for the Sales/Collection process. We see that the input resources are the instruments (from the acquisition process), and the manufactured accessories and repair services (from the conversion process). The instruments get changed into cash either by selling them or renting them to customers. The repair services and manufactured accessories are also changed into cash by selling them to customers. As with the acquisition process, we need to make a choice as to whether there is a common sale event set for which the same set of data attributes can be maintained, or whether the activities are dissimilar enough to warrant being maintained as separate event sets. For this example, we assume RSWS uses the same set of forms and captures the same data attri-

EXHIBIT 3-5 Robert Scott Woodwinds Shop Detailed Value Chain

butes for each of these revenue-generating activities, so we combine them into one economic decrement event called *sale*. The output resource flow is cash, indicating that the process must include an event that produces or obtains the cash, in other words an economic increment event called *cash receipt*. We draw two boxes with a duality relationship connecting them; we label one box *sale* and the other box *cash receipt*. Now our value chain is complete (see Exhibit 3-5) and may be used to facilitate creation of the business process level models for RSWS. We discuss that process in detail in Chapter 4.

CONCLUDING COMMENTS

In this chapter we have provided a patterned approach for developing models of enterprises at two levels of detail—the value system level and the value chain level. This approach facilitates your understanding of how business enterprises work. As you go about your daily activities, pay attention to the business enterprises with which you interact and look for these script patterns. When you go out to eat at a restaurant, or order pizza, see if you can picture the value system and value chain for that restaurant or pizza place. When you go shopping at different kinds of stores: grocery, convenience, department, or electronics, see if you can identify the value system and value chain patterns for those stores. Consider what they have in common and any differences they may have. Think about the possibilities of using the things they have in common as base objects in an information system and

keeping the things that are unique as nonfoundational elements in the information system. Think about how such an approach could lead to enterprise systems that may be integrated with solid connections rather than tied together with string.

Key Terms and Concepts

Customer, 36	Internal business process, 38	Resource flow, 40
Duality relationship, 43	Margin, 36	Service, 39
Economic event, 46	Marketing and sales, 39	Strategy, 36
Exchange, 40	Operations, 39	Supplier, 37
External business partner, 40	Outbound logistics, 39	Supply chain, 37
Firm infrastructure, 39	Outflow, 43	Support value activities, 39
Human resource management, 39	Primary value activities, 39	Technology development, 39
Inbound logistics, 39	Procurement, 39	Value chain, 38
Inflow, 43	Resource, 36	Value system, 36

Review Questions

- LO4 R1. What is a business process? Describe each of the major business processes found in most enterprises.
- LO8 R2. What does it mean to create value? How do enterprises create value?
- LO8 R3. What is an enterprise's margin as defined by Michael Porter?
- LO2 R4. Differentiate between the objectives of a profit and a not-for-profit enterprise.
- LO8 R5. Give an example of a primary value activity for a retail store.
- LO8 R6. Give an example of a support value activity for a retail store.
- LO1-LO3 R7. To begin creating a value system model, what does the chapter recommend as the first thing you should try to identify?
- LO6 R8. What do duality relationships consist of?
- LO5, LO6 R9. What is the difference between a stock inflow and a stock outflow? What types of events are associated with stock inflows and with stock outflows?
- LO6, LO7 R10. When you are creating a value chain level REA model, if you have two resource inflows and one resource outflow for a transaction cycle, what do you know about the events in that cycle?

Multiple Choice Questions

- LO8 MC1. Which events in Porter's value chain create customer value and provide organization distinctiveness in the marketplace?
 - A. Primary activities
 - B. Support activities
 - C. Operational activities
 - D. Value activities

- LO6, LO7 MC2. Which of the following is usually represented as a value activity in the REA value chain?
- The generation of an aged accounts receivable report
 - The sending of a bill to a customer
 - The sale of goods to a customer
 - The decision as to whether to discontinue a product line
- LO3 MC3. Which level of the REA enterprise ontology represents the big-picture view?
- Value system
 - Value chain
 - Business process
 - Task
- LO8 MC4. Which of the following is considered a primary value activity, as opposed to a support activity, in Porter's value chain?
- Procurement
 - Accounting
 - General management
 - Inbound and outbound logistics
- LO7 MC5. To which other internal business process are manufactured goods typically made available by the conversion process?
- Financing
 - Revenue
 - Payroll
 - Acquisition/payment

Discussion Questions

- LO8 D1. If only enterprises that truly create value survive, how do tobacco companies stay in business? How do illegal drug markets survive?
- LO1, LO2 D2. Do some events occur outside enterprise boundaries? Should information system designers focus on events that lie beyond an enterprise's boundaries?
- LO4 D3. All business organizations have at least three broad business processes: acquisition/payment, conversion, and sales/collection. Into which of these processes do each of the following activities belong? Explain your response.
- Delivering a new product to a customer
 - Hiring new employees
 - Paying for a new capital tool
 - Assembling subcomponents for a finished product.
- LO9 D4. Why is it useful to try to understand an enterprise's activities at the value system and value chain levels rather than simply beginning with the business process level?
- LO5-LO7 D5. Is it easier for you to first think about the resource flows associated with a transaction cycle and then use that knowledge to identify the economic events in the cycle, or is it easier to first think about the economic events in a cycle and then use that knowledge to identify the related resource flows?

Applied Learning

- LO1-LO7 A1. Owen's Farm owns approximately 50 acres of peach trees. Migrant farmworkers perform almost all of the work. In the late winter and early spring they prune the trees. During the midspring they thin the fruit on the trees, and in late summer and early autumn they pick the fruit.

The farm manager does most of the other work, such as spraying the trees, irrigating, and selling the fruit. Spray concentrate, fruit boxes, and other supplies are purchased on account from the local food co-op stores. Fruit is sold on account to major grocery chains such as Kroger and Albertson's.

Required:

- a. Draw a value system level diagram for Owen's Farm.
 - b. Assuming the various activities that need to be performed in the conversion process are considered labor operations, draw a value chain level diagram for Owen's Farm.
- LO1-LO7 A2. Visit a local movie theater. Observe what you can about the economic activities of the theater (e.g., ticket sales, concession sales, movie showing). Consider what must also happen that you are unable to observe (e.g., theater's purchase of concessions and ingredients for concessions from suppliers; acquisition of movies to show).

Required:

- a. Create a value system level model for the movie theater (as best you can tell).
- b. Create a value chain level diagram for the movie theater (as best you can tell).

Answers to Multiple Choice Questions

MC1. A; MC2. C; MC3. A; MC4. D; MC5. B.