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## MyLab MIS

Using Your Knowledge Questions
7-1, 7-2, 7-3

Excel Application
Question 7-1

enjoys cycling. If you add Flores's software to the mix, you've got a hybrid entertainment-fitness company."

Zev nods slightly and says, "Good, so how are we going to make money?"

Henri chimes in, "We'll definitely make money selling the app for the AR headsets. An augmented reality app for stationary bikes would be cool. Both the headset and bike manufacturers would love this app because it will help them sell more units. The integration with Flores's system is going to be tricky, though."

Raj sees his opening. "We could also sell virtual spinning classes led by expert instructors. Imagine a group of 20 riders biking through Arches National Park in the early morning. That would be really cool..." He pauses, clearly deep in thought, and then continues, "But I'm not sure if we have the bandwidth or backend resources to handle that."

**"We could also sell virtual spinning classes..."**

*Source:* Aliaksei Brouka/123RF

"Cassie, what do you think?" Zev asks.

"Well," Cassie says, "I think we should consider placing ads into the AR interface. Google, Facebook, and Twitter all make most of their money from ads. There's a real opportunity there.

Certain companies would *love* to put ads in front of cyclists. We also might be able make money from celebrity rides, charity events, and promotional contests. I'm not sure how to make money using social media. Would users want to post their stats to Facebook? I'm not sure."

Ashley listens intently and then says, "You know, I think we could get referral fees from personal trainers if we could send them some of our users. They might even teach our virtual classes for free if they think it would attract clients. Large businesses might also be interested in using ARES for their wellness-at-work programs."

"Sounds good," Zev says approvingly. "Cassie, check into the ad revenue potential for ARES. Raj, see if it would be possible for our system to handle a virtual spinning class of 20 people. Henri, look at the costs of developing the apps and integrating the data on the backend system. Ashley, you look into the trainers and employers. Any questions?"

Everyone looks around the table; no one says a word.

"OK, see you next week."

# STUDY QUESTIONS

**Q7-1** HOW DO INFORMATION SYSTEMS VARY BY SCOPE?

**Q7-2** HOW DO ENTERPRISE SYSTEMS SOLVE THE PROBLEMS OF DEPARTMENTAL SILOS?

**Q7-3** HOW DO CRM, ERP, AND EAI SUPPORT ENTERPRISE SYSTEMS?

**Q7-4** HOW DO INTER-ENTERPRISE IS SOLVE THE PROBLEMS OF ENTERPRISE SILOS?

**How does the knowledge in this chapter help you?**

CE

**Optional Extensions for this chapter are • CE9: Enterprise Resource Planning (ERP) Systems 522 • CE10: Supply Chain Management 537**

# Q7-1 HOW DO INFORMATION SYSTEMS VARY BY SCOPE?

As shown in Figure 7-1, modern organizations use four types of information systems that vary according to the scope of the organizational unit. We begin by considering each IS type.

## PERSONAL INFORMATION SYSTEMS

**Personal information systems** are information systems used by a single individual. The contact manager in your iPhone or in your email account is an example of a personal information system. Because such systems have only one user, procedures are simple and probably not documented or formalized in any way.

It is easy to manage change to personal information systems. If you switch email from, say, MSN to Google, you'll have to move your contact list from one vendor to the other, and you'll have to inform your correspondents of your new address, but you control the timing of that change. Because you will be the sole user of the new system, if new procedures are required, only you need to adapt. And, if there are problems, you can solve them yourself.

Figure 7-1 uses the example of a drug salesperson. Each person has his or her own personal information systems for managing data about doctors and other customers, appointments, product descriptions and prices, drug companies, and so forth. All of this data exists independently of other salespeople.

## WORKGROUP INFORMATION SYSTEMS

A **workgroup information system** is an information system that facilitates the activities of a group of people. At a physicians' partnership, doctors, nurses, and staff use information systems to manage patient appointments, keep patient records, schedule in-office procedures and equipment, and facilitate other workgroup activities.

Workgroup information systems that support a particular department are sometimes called **departmental information systems**. An example is the accounts payable system that is used by the accounts payable department. Other workgroup information systems support a particular business function and are called **functional information systems**. A prospect tracking application is an example of a functional IS. Finally, the collaboration information systems discussed in Chapter Extension 2 are also workgroup information systems.

Workgroup information systems, whether departmental, functional, or collaborative, share the characteristics shown in Figure 7-1. Typically, workgroup systems support 10 to 100 users.

| Scope | Example | Characteristics |
|---|---|---|
| Personal | Drug Salesperson | Single user; procedures informal; problems isolated; easy to manage change |
| Workgroup | Physician Partnership | 10–100 users; procedures understood within group; problem solutions within group; somewhat difficult to change |
| Enterprise | Hospital | 100–1,000s users; procedures formalized; problem solutions affect enterprise; difficult to change |
| Inter-enterprise | Healthcare Exchange | 1,000s users; procedures formalized; problem solutions affect multiple organizations; difficult to change |

**Figure 7-1**
Information Systems Scope

The procedures for using them must be understood by all members of the group. Often, procedures are formalized in documentation, and users are sometimes trained in the use of those procedures.

When problems occur, they almost always can be solved within the group. If accounts payable duplicates the record for a particular supplier, the accounts payable group can make the fix. If the Web storefront has the wrong number of widgets in the inventory database, that count can be fixed within the storefront group.

(Notice, by the way, that the *consequences* of a problem are not isolated to the group. Because the workgroup exists to provide a service to the rest of the organization, its problems have consequences throughout the organization. The *fix* to the problem can usually be obtained within the group, however.)

## ENTERPRISE INFORMATION SYSTEMS

**The Career Guide on pages 242–243 to learn more about careers in managing the development of enterprise applications.**

**Enterprise information systems** are information systems that span an organization and support activities of people in multiple departments. At a hospital, doctors, nurses, the pharmacy, the kitchen, and others use information systems to track patients, treatments, medications, diets, room assignments, and so forth.

Enterprise information systems typically have hundreds to thousands of users. Procedures are formalized and extensively documented; users undergo formal procedure training. Sometimes enterprise systems include categories of procedures, and users are defined according to levels of expertise with the system as well as by levels of security authorization.

The solutions to problems in an enterprise system usually involve more than one department. Because enterprise systems span many departments and involve potentially thousands of users, they are very difficult to change. Changes must be carefully planned and cautiously implemented and users given considerable training. Sometimes users are given financial incentives and other inducements to motivate them to change.

## INTER-ENTERPRISE INFORMATION SYSTEMS

**Inter-enterprise information systems** are information systems that are shared by two or more independent organizations. Such systems involve hundreds to thousands of users, and solutions to problems require cooperation among different, usually independently owned, organizations. Problems are resolved by meeting, by contract, and sometimes by litigation. Because of the wide span, complexity, and multiple companies involved, such systems can be exceedingly difficult to change. The interaction of independently owned and operated information systems is required.

Supply chain management is the classic example of an inter-enterprise information system. We will study inter-enterprise ARES examples throughout the remaining chapters of this text. The development of information systems at any level can lead to problems caused by information silos. We turn to those problems and the ways that IS can be used to solve them next.

# Q7-2 HOW DO ENTERPRISE SYSTEMS SOLVE THE PROBLEMS OF DEPARTMENTAL SILOS?

An **information silo** is the condition that exists when data are isolated in separated information systems. Silos come into existence as entities at one organizational level create information systems that meet only their particular needs. For example, Figure 7-2 lists six common departments (workgroups) and several information system applications that support each. Reflect on these applications for a moment and you'll realize that each application processes customer, sales, product, and other data, but each uses that data for different purposes and will likely store somewhat

| Department | Application |
|---|---|
| Sales and Marketing | • Lead generation<br>• Lead tracking<br>• Customer management<br>• Sales forecasting<br>• Product and brand management |
| Operations | • Order entry<br>• Order management<br>• Finished-goods inventory management |
| Manufacturing | • Inventory (raw materials, goods-in-process)<br>• Planning<br>• Scheduling<br>• Operations |
| Customer Service | • Order tracking<br>• Account tracking<br>• Customer support |
| Human Resources | • Recruiting<br>• Compensation<br>• Assessment<br>• HR planning |
| Accounting | • General ledger<br>• Financial reporting<br>• Cost accounting<br>• Accounts receivable<br>• Accounts payable<br>• Cash management<br>• Budgeting<br>• Treasury management |

**Figure 7-2**
Common Departmental Information Systems

different data. Sales, for example, will store contact data for customers' purchasing agents, while Accounting will store contact data for customers' accounts payable personnel.

It's completely natural for a workgroup to develop information systems solely for its own needs, but, over time, the existence of these separate systems will result in information silos that cause numerous problems.

## WHAT ARE THE PROBLEMS OF INFORMATION SILOS?

Figure 7-3 lists the major problems caused by information silos at the department level and illustrates them for a silo between the Sales and Marketing department and the Accounting department. First, data are duplicated. Sales and Marketing and Accounting applications maintain separate databases that store some of the same customer data. As you know, data storage is cheap, so the problem with duplication is not wasted file space. Rather, the problem is data inconsistency. Changes to customer data made in the Sales and Marketing application may take days or weeks to be made to the Accounting application's database. During that period, shipments will reach the customer without delay, but invoices will be sent to the wrong address. When an organization has inconsistent duplicated data, it is said to have a **data integrity** problem.

Additionally, when applications are isolated, business processes are disjointed. Suppose a business has a rule that credit orders over $15,000 must be preapproved by the accounts receivable department. If the supporting applications are separated, it will be difficult for the two activities to reconcile their data, and the approval will be slow to grant and possibly erroneous.

In the second row of Figure 7-3, Sales and Marketing wants to approve a $20,000 order with Ajax. According to the Sales and Marketing database, Ajax has a current balance of $17,800, so Sales and Marketing requests a total credit amount of $37,800. The Accounting

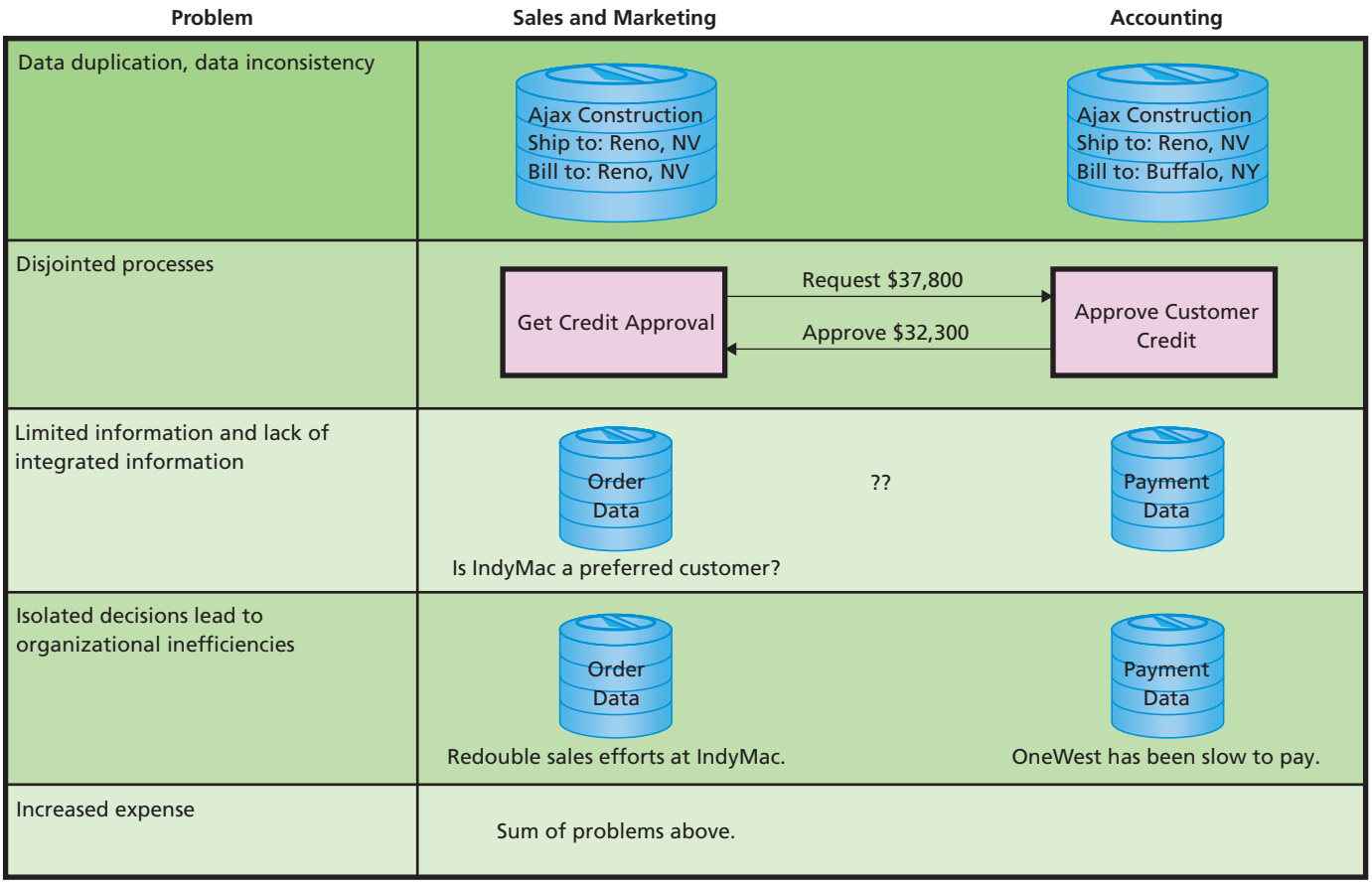


**Figure 7-3**
Problems Created by Information Silos

database, however, shows Ajax with a balance of only $12,300 because the accounts receivable application has credited Ajax for a return of $5,500. According to Accounting's records, a total credit authorization of only $32,300 is needed in order to approve the $20,000 order, so that is all it grants.

Sales and Marketing doesn't understand what to do with a credit approval of $32,300. According to its database, Ajax already owes $17,800, so if the total credit authorization is only $32,300, did Accounting approve only $14,500 of the new order? And why that amount? Both departments want to approve the order. It will take numerous emails and phone calls, however, to sort this out. The interacting business processes are disjointed.

A consequence of such disjointed activities is the lack of integrated enterprise information. For example, suppose Sales and Marketing wants to know if IndyMac is still a preferred customer. Assume that determining whether this is so requires a comparison of order history and payment history data. With information silos, that data will reside in two different databases and, in one of them, IndyMac is known by the name of the company that acquired it, OneWest Bank. Data integration will be difficult. Making the determination will require manual processes and days, when it should be readily answered in seconds.

This leads to the fourth consequence: inefficiency. When using isolated functional applications, decisions are made in isolation. As shown in the fourth row of Figure 7-3, Sales and Marketing decided to redouble its sales effort with IndyMac. However, Accounting knows that IndyMac was foreclosed by the FDIC and sold to OneWest, which has been slow to pay. There are far better prospects for increased sales attention. Without integration, the left hand of the organization doesn't know what the right hand is doing.

Finally, information silos can result in increased cost for the organization. Duplicated data, disjointed systems, limited information, and inefficiencies all mean higher costs.

| Scope | Example | Example Information Silo | Enabling Technology |
|---|---|---|---|
| Workgroup | Doctor's office/ medical practice | Physicians and hospitals store separated data about patients. Unnecessarily duplicate tests and procedures. | Functional applications. |
| | | ⇩ | Enterprise applications (CRM, ERP, EAI) on enterprise networks. |
| Enterprise | Hospital | Hospital and local drug store pharmacy have different prescription data for the same patient. | |
| | | ⇩ | Distributed systems using Web service technologies in the cloud. |
| Inter-enterprise | Inter-agency prescription application | No silo: Doctors, hospitals, pharmacies share patients' prescription and other data. | |

**Figure 7-4**
Information Silos as Drivers

## HOW DO ORGANIZATIONS SOLVE THE PROBLEMS OF INFORMATION SILOS?

As defined, an information silo occurs when data is stored in isolated systems. The obvious way to fix such a silo is to integrate the data into a single database and revise applications (and business processes) to use that database. If that is not possible or practical, another remedy is to allow the isolation, but to manage it to avoid problems.

The arrows in Figure 7-4 show this resolution at two levels of organization. First, isolated data created by workgroup information systems are integrated using enterprise-wide applications.

Second, today isolated data created by information systems at the enterprise level are being integrated into inter-enterprise systems using distributed applications (such as ARES) that process data in a single cloud database or that connect disparate, independent databases so that those databases appear to be one database. We will discuss inter-enterprise systems further in Q7-4.

For now, to better understand how isolated data problems can be resolved, consider an enterprise system at a hospital.

## AN ENTERPRISE SYSTEM FOR PATIENT DISCHARGE

Figure 7-5 shows some of the hospital departments and a portion of the patient discharge process. A doctor initiates the process by issuing a patient discharge order. That order is delivered to the appropriate nursing staff, who initiates activities at the pharmacy, the patient's family, and the kitchen. Some of those activities initiate activities back at the nursing staff. In Figure 7-5, the enterprise information system (solid red line) supports the discharge process (dashed red line).

Prior to the enterprise system, the hospital had developed procedures for using a paper-based system and informal messaging via the telephone. Each department kept its own records. When the new enterprise information system was implemented, not only was the data integrated into a database, but new computer-based forms and reports were created. The staff needed to transition from the paper-based system to the computer-based system. They also needed to stop making phone calls and let the new information system make notifications across departments. These