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SYSTEMS CONSIDERATIONS IN THE DESIGN OF AN HRIS

Planning for Implementation

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EDITORS' NOTE

This chapter focuses on the HRIS as one large information system. It starts with a brief discussion of the various stakeholders who must be considered during the design and implementation of a new HRIS. Next, it turns to a discussion of the various hardware and software architectures that organizations may consider when implementing an HRIS. This discussion traces the history of HRIS from early mainframe systems to today's integrated, mobile, and cloud-based systems. An important consideration for all organizations is whether to select the best software package from different vendors for each functional area of HR (e.g., best of breed) or to select a system that integrates all the functions within one large software package. The chapter touches on how organizations would integrate these best-of-breed solutions so that they integrate as seamlessly as possible. This chapter focuses more on the key technology and processes underlying HRIS implementation.

CHAPTER OBJECTIVES

After completing this chapter, you should be able to

- Understand the different types of users or customers of the implemented HRIS and their different data needs
- Discuss the differences between the five general hardware architectures that are presented, from "dinosaur" to "cloud computing" to "bring your own device"

- Discuss, very generally, the main concepts of hardware and database security
- Discuss the "best of breed" approach to HRIS acquisition and the various options available for each functional area of HR
- Develop an understanding of the general steps and factors that affect system implementation
- Understand the pros and cons of implementing a changeover from one software system to another

INDUSTRY BRIEF

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Designing and implementing a Human Resource Information System is one of those initiatives that every organization encounters, yet most of the individuals within an organization usually have little or no experience in going through the process. This, combined with the continuous evolution of technology, puts organizations in the precarious spot of trying to figure out the best approach to successfully choosing and implementing a solution that provides the organization with all of the necessary value added benefits yet manages the risk of a potential failed implementation.

Organizations, whether they are commercial, education, or public sector, that have had the most success follow a design methodology that is centered on people, process, and technology. Those of us that have spent a great deal of our careers designing and implementing these systems have learned, sometimes through trial and error, that the planning and design of the system arguably play the most critical part in determining success. Common characteristics shared by organizations that have been and are most successful are as follows:

Commitment—A frequently used word that is only proven to be true by actions. Defining and understanding what the system needs to provide so that it can be an enabler for the organization and used as a competitive differentiator.

Proper Resource Allocation—Having your best and brightest be part of the design, participating throughout the lifecycle of an implementation. Insight is critical to avoid sloppy design, and it is worth the sacrifice to dedicate some of the most knowledgeable resources in the organization. The cost of not doing this will be paid later on due to rework and changes.

Understanding of Technology—Designing a system that will evolve along with technology, not one that will be restricted as technology changes. Too many organizations design systems that are somewhat outdated in a short period of time. This is primarily caused by the lack of understanding as to what the capabilities of the technology are and how they can help the system continue to be enhanced. I unfortunately have been part of many projects where once a system was "live" and operational, it almost immediately needed to be "upgraded" due to improper design up front.

Clear and Realistic Expectations—Once set, these expectations need to be constantly communicated to all stakeholders. This provides a common bond and keeps everyone focused on what needs to be accomplished.

Acceptance of Change—Through education and training, acceptance defeats resistance. Too many organizations choose the right technology yet fail to allocate the proper attention to change management.

Over 25 years of working and assisting with many diverse organizations as they design their HRIS, the most successful have truly understood and successfully managed these points. Through dedication and perseverance, these organizations have become leaders in their industries by using all of the benefits a properly designed HRIS can provide. As we continue into the digital age with access to more data faster than we could have ever imagined, it has never been more important for organizations to "get it right" when it comes to designing their HRIS.

HRIS IN ACTION

A billion-dollar retailer with more than 4,000 stores finds that it cannot move fast enough to beat out the competition. The organization's senior management arrives at the conclusion that it would be easier to achieve the strategic goals enumerated by the board of directors if the various organizational functions would share information. Shared information would enable them to develop and deploy new actions and tactics more quickly. The CEO and president have therefore ordered the major functions to update their information systems immediately so that data sharing is possible. The senior vice presidents (SVPs) of accounting and human resources immediately conclude that the only solution is to decide jointly on an **enterprise resource planning (ERP)** product. An ERP software application is a set of integrated database applications or modules that carry out the most common business functions, including human resources, general ledger, accounts payable, accounts receivable, order management, inventory control, and customer relationship management (see www.erpsupersite.com). To speed the installation along, the SVPs decide on a rapid-implementation methodology that a company down the street used. The goal is to have the new systems operational in nine months.

Shortly after this decision has been made, the SVP of HR calls you into his office and tells you that you will be management sponsor for this project. You have to decide on everything. You sit back in your nice office and think:

What's the problem with this scenario? It shouldn't be difficult to select a vendor and then borrow the methodology from down the street. It worked for them; it should work for us! We'll call a few vendors in the morning and find out about cost, time frame, and implementation methods. In the meantime, I should find out a little more about how to do this and who will be using the ERP. I remember from my information systems class in college that this is a reasonable first step when it comes to buying software.

What do you think your response would be to this inquiry? As you go through this chapter's material, keep this vignette in mind, and see if your answer changes.

INTRODUCTION

There are two ways of implementing a software design; one way is to make it so simple that there are obviously no deficiencies, and the other way is to make it so complicated that there are no obvious deficiencies. The first method is far more difficult.

—C.A.R. Hoare, James Martin

Professor of Computing, Wolfson College

Successful implementation is the central goal of every HRIS project, and it begins with a comprehensive design for the system. As the steps in the system development process are covered in this chapter, the foundation knowledge that is critical to the implementation process will be emphasized. Only by understanding the users/customers of the HRIS, the technical possibilities, the software solution parameters, and the systems implementation process can we increase the probability that the completed software installation will adequately meet the needs of the **human resource management (HRM)** function and the organization. The chapter will begin by identifying the potential users and the kind of information that the HRIS will be managing and storing to facilitate decision making. The chapter will next discuss the technical infrastructure, how the technical infrastructure has evolved, and the many choices that the organization must make. After the technology is discussed, the systems implementation process will be presented.

Those who have participated in a system implementation will tell you that success is the result of careful planning, a dedicated team, top-management support, and an awareness of potential pitfalls. These same people will also tell you that the implementation process provides a host of opportunities to reengineer and systematically improve HR processes to reflect best HRM practices. These opportunities should not be ignored, as they can benefit the organization as much as implementing the software will. Finally, the **implementation team** members will tell you that getting the system up and running was the most intense six months, year, or two years of their work life but that they learned a lot, and every moment of the experience was worth the time.

There are four things that should be remembered throughout the chapter:

1. It is important to keep in mind the customer of the data, the process, and the decisions that will be made.
2. Everything about HRM is a system of processes designed to support the achievement of strategic organizational goals. The HRIS, in turn, supports and helps manage these HR processes.
3. An HRIS implementation done poorly will result in an HRIS that fails to meet the needs of the HR function.
4. Successful implementation requires careful attention to every step in the system design process. However, done well, the implementation process is full of opportunities to improve the organization and processes. More consistent processes will contribute to enhanced organizational performance.

HRIS CUSTOMERS/USERS: DATA IMPORTANCE

Individuals who will be using the HRIS can be split into two general groups: employees and nonemployees. The employee category includes

- managers who rely on the HRIS and the data analyzed by the analyst or power user to make decisions;
- analysts or power users who use the HRIS to evaluate potential decision choices and opportunities;
- technical staff who are responsible for providing a system that is usable and up to date for each user or clerical employees who largely engage in data entry; and
- employees who use the HRIS on a self-service basis to obtain personal information, for example, to look up paycheck information, to make choices about benefits during open enrollment, or to see how much vacation time they have available.

The nonemployee group includes potential employees, suppliers, and partners. Potential employees are those who might log in via a Web portal to search for and apply for a position. Suppliers and partners are organizations that interface with the HR function for a variety of purposes, from recruiting to benefits administration and payroll.

Employees

Managers

The managers referred to within this section may have a variety of titles: manager, director, vice president, and even CEO. What they all have in common is that their primary HRIS need is to have real-time access to accurate data that facilitate decision making with regard to their people (Miller, 1998). The HRIS provides the manager with data for performance management, recruiting and retention, team management, project management, and employee development (Fein, 2001). The HRIS must also provide the information necessary to help the functional manager make decisions that will contribute to the achievement of the unit's strategic goals and objectives (Hendrickson, 2003). Easy access to accurate employee data enables the manager for each employee to view and engage in employee life cycle changes such as salary decisions, job requisitions, hiring, disciplinary action, promotions, and training program enrollment (Walker, 2001; Zampetti & Adamson, 2001).

Many HRIS products provide real-time reporting and screen-based historical information that can provide managers with information about their employees or their functional units. There are also several third-party software products available that provide managers with almost continuous data about the status of their unit and the organization—much as a dashboard on a car provides immediate information. The analysis of more complex situations is beyond the capabilities of many of these reporting and query tools. To facilitate decision making on complex issues, the manager, before making a decision, usually relies on the analyst or power user to complete some type of analysis.

Analysts (Power Users)

The **analysts or power users** are perhaps the most demanding users of the HRIS. The primary role of the analyst is to acquire as much relevant data as possible, examine it, and provide reasonable alternatives with appropriate supporting information to facilitate the decision process of the manager. The analyst is referred to as a power user because this person accesses more areas of the HRIS than almost any other user. Analysts must be proficient with reporting and query tools. Analysts must also understand the process used to collect the data, how new data are verified, and how the HRIS and the employee life cycle interact. They also need to understand the data definitions in terms of what data exist, the structure of the data, and what data fields are up to date and complete. Some HRISs also provide tools that the analyst can use to model scenarios or perform "what-if" analyses on questions of interest.

As an example, a recruiting analyst might be asked to provide a short list of potential internal candidates for a position that opened in the marketing function of a large retailer. The potential candidates' characteristics of interest are queried and may include (1) when they were last promoted, (2) whether they have engaged in continuous personal-skills development, (3) what their undergraduate degrees were, and (4) whether they have ever expressed any interest in marketing. The analyst would query appropriate tables and develop a list of internal candidates.

Another example might have the HR analyst completing an analysis of corporate headquarters turnover to determine if a particular function or salary issue is the cause of the problem. This information would be drawn from existing reports, ad hoc queries, and available salary information. Data could be compiled into categories by salary, function, gender, or organizational level and examined to determine if the cause of the turnover can be pinpointed and then countered.

Technicians (HRIS Experts)

Technicians (HRIS experts) straddle the boundary of two functions. Their role is to ensure that appropriate HR staff members have all the access, information, and tools necessary to do their jobs. HRIS experts do this by understanding what is needed from an HR-process standpoint and then translating that into technical language so the technical employees—programmers, database administrators, and application administrators—know exactly what to do. When the technical staff is planning to install the latest update and one of the results will be a change in functionality, the HRIS expert must take what the technical staff provides and translate that into language HR users understand so as to indicate how processes and activities might change. For example, if an HR professional required that a new report be generated every other Tuesday, the HRIS expert would learn what data the report requires—perhaps mock the report up with the user—and then explain to the technical people how to make sure that this report is automatically generated on the time schedule.

Clerical Employees

Much like power users, **clerical employees** also spend a significant portion of their day interacting with the HRIS. The difference is one of depth. The clerical employee must understand the process required to enter information into the HRIS and may also need to start the process or generate periodic reports. While clerical staff members in the HR employment department do not generally provide input about whether to hire an individual to a

particular position, they bear considerable responsibility for seeing that the new employee gets paid properly. Hiring a new employee requires that someone, for example, a clerical employee, enter the appropriate information into the HRIS—such as the reporting relationship of the new employee as well as his or her benefits, salary, and direct-deposit information.

Organizational Employees

Organizational employees are essentially all the other employees throughout the organization who interact with the HRIS. These employees serve in roles such as bank teller, nurse, machinist, salesperson, and accountant. These employees are not involved in human resources and are not likely to make decisions with HR data, but they may utilize the HRIS to help manage their personal information. Typically, all the employees in the organization may interface with the HRIS through a self-service Web portal or secure employee kiosk, removing the necessity of an HR clerk or staff member assisting with many routine HR record modifications (Walker, 2001). Self-service capabilities encourage employees to manage their personal HR profiles with respect to a variety of functions, such as benefit and retirement plan monitoring or computerized training, in addition to using HRIS-based systems to complete numerous personnel forms (Adamson & Zampetti, 2001; Zampetti & Adamson, 2001). Typical self-service applications are accessible most of the day throughout the week. Employees log on to the system, where their identity is authenticated and verified. Then appropriate change options are offered to the employee based on certain parameters that control the areas where the employee is allowed to make valid alterations to the HRIS—such as personnel data updates, job postings, or desired training enrollments (Adamson & Zampetti, 2001; Zampetti & Adamson, 2001). One fairly large financial-services organization noted that self-service options significantly enabled them to reduce the annual benefits open-enrollment process by reducing the paper documents generated, reducing necessary mailings, and reducing the data that had to be read and entered into the HRIS. Data entry time alone was reduced from six to two weeks (Bedell, 2003b).

Nonemployees

Job Seekers

It is estimated that 70% to 90% of large organizations use online recruitment, and that number continues to increase (Stone, Lukaszewski, & Isenhour, 2005). Online recruiting tends to attract individuals who are well educated, Internet savvy, and searching for higher-level positions (McManus & Ferguson, 2003). Online recruitment also attracts people born since 1980, who have grown up with computers and are therefore comfortable with obtaining information on the Internet (Zusman & Landis, 2002). A successful recruitment website needs to be user friendly and easy to navigate while attracting candidates to apply to an organization by clearly communicating the benefits of joining it.

Typical job seekers have little or no prior information about how to interface with the HRIS and have had nearly zero training opportunities with it. Therefore, the recruiting portal needs to provide ease of use and ease of access to up-to-date job information. The Web form that is used to collect applicant data must also be reliably entered into the appropriate fields within the company's HRIS database. This online recruiting activity will facilitate searches for new employees to fill existing and future positions.

Sourcing Partner Organizations

The partner organizations to HR functions require certain information to complete their tasks. **Sourcing partner organizations** such as Monster.com, Adecco, and most executive recruiting firms require information about vacant positions, including a position description, job specifications, desired candidate competencies, potential salary range, and contact information. The information provided is limited to specific searches for open jobs and is updated as needed.

Business partners that are the recipients of decisions to outsource portions of the HR function (e.g., benefit management firms) or that facilitate process completion on behalf of the employee (e.g., banks) require information that is related to current employees. This requirement increases the need for accurate data, training, and specialized security assurances, as employee information is leaving the organization.

Important Data

As is evident in the previous sections, each customer or user of the HRIS has slightly different needs with regard to what information he or she will be using. Some users simply input data and information, a few simply look at data and information provided in the form of reports, while a few others analyze the data and information to make decisions. What these users all have in common is that all the information is about potential and current employees, with a focus on managing the organization's human capital to improve decision making and help to achieve strategic organizational goals. Specific data from the HRIS database fit into three categories:

1. Information about people, such as biographical information and competencies (knowledge, skills, abilities, and other factors)
2. Information about the organization, such as jobs, positions, job specifications, organizational structure, compensation, employee/labor relations, and legally required data
3. Data that are created as a result of the interaction of the first two categories: for example, individual job history, performance appraisals, and compensation information

HRIS ARCHITECTURE

The "Early Days"

In the early days of human resource applications (just 40 years ago), large "dinosaurs" roamed the IT landscape. These were called mainframe computers and were primarily built by International Business Machines (IBM). These large systems hosted the payroll applications for most enterprises. Users of the mainframe system, which mainly consisted of IT personnel and HRMS administrators, executed large batch processes while directly logged onto the mainframe. Although access to the mainframe could be done via a desktop monitor, no processing was done locally. This architecture is

commonly called a single-tier computing system. Everything (user interface, application processing, and data storage) resided on the mainframe and had to be accessed by the client company locally.

Client-Server (Two-Tier) Architecture

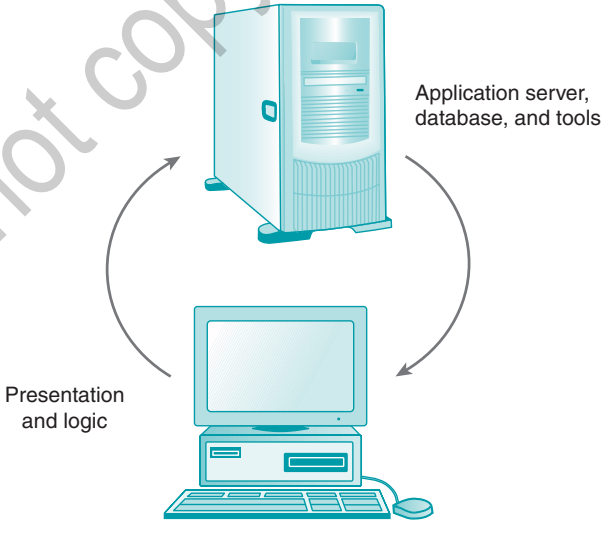
During the 1980s, it was discovered that many typical HR functions (such as employee benefits, recruiting, training) did not require such high-powered and expensive processing available on the mainframe computers. With the advent of the personal computer (PC), many of these functions could be re-allocated to the local processing power of the PC. The purpose of the two-tier (client-server) architecture was to spread out low-powered processing capability to the dozens of PCs now being used across the enterprise. High-performance applications such as payroll would still be run in a batch process on the mainframe (or large Unix server). Ease of computer usage was a driving factor to include individuals with lower levels of technology experience. By the end of the decade, HRIS vendors such as PeopleSoft began using the power of PCs and created the **client-server (two-tier) architecture** (see Figure 2.1).

Finally, the HR software application technology could be divorced from the database technology. This separation simplified the HR application and allowed an enterprise to select the most appropriate database management system (DBMS) for their needs. This time period coincided with the maturation of the relational database model. This model standardizes how data is physically stored on the computer and provides standard data access via the Structured Query Language (SQL).

Three-Tier and N-Tier Architecture

From about 1995 to 2010, this division of labor concept has expanded from two-tier into three-tier and finally N-tier architectures. With a **three-tier architecture**, the "back

FIGURE 2.1 ■ Two-Tier (Client-Server) Architecture



end" servers are divided into two components—the database server and the application server (see Figure 2.2).

The client still managed the user interface, but more demanding processing occurred in the middle—the application server tier. For example, if two recruiters updated the same job position at the same time, a transaction processor would ensure that both updates are committed to the database (if possible). This allowed many simultaneous users to access the central database. There are a couple of drawbacks with both two-tier and three-tier systems. First, there exists a large amount of network traffic or "**bandwidth**" required to execute database transactions between the client and the server. Second, the user interface client needs to be installed (along with database drivers) on every PC that needs to access the HRIS (with a corollary issue being that employees need to be trained on this application). Therefore, HRIS access tended to be limited to employees within the "four walls" of the enterprise (residing within the local area network). Low-bandwidth access, such as Internet dial-up, was impractical.

To truly provide for employee self-service (ESS) portals, the Web browser was adopted to solve these issues. First, the browser created a "thin client" environment as opposed to the "thick client" environment described in the two-tier model. An Internet Web browser comes installed on all major **operating systems** (OS; e.g., Windows, Mac OS, Linux, Android). The browser's user interface has become universal. Therefore, very little employee training is required to use a browser-based application. Finally, a browser works well in a low-bandwidth network environment. So now the typical HRIS application architecture looks like Figure 2.3. A standard Web server, such as Microsoft's Internet Information Server (IIS) or Apache's Web Server, manages **HTML (Hypertext Markup Language)** communication between the browser and the application server. And the application server also issues transactions to the centralized database server. Instead of just limiting ourselves to a four-tier label, this has been labeled **N-tier architecture** for the following reasons:

- It is expandable to multiple Web servers and application servers to handle **load balancing**.
- Web servers can be geographically dispersed to provide worldwide access.
- Additional file servers can be added to save documents, reports, error logs, and employee data, which are generated on a daily basis.

FIGURE 2.2 ■ Three-Tier Architecture

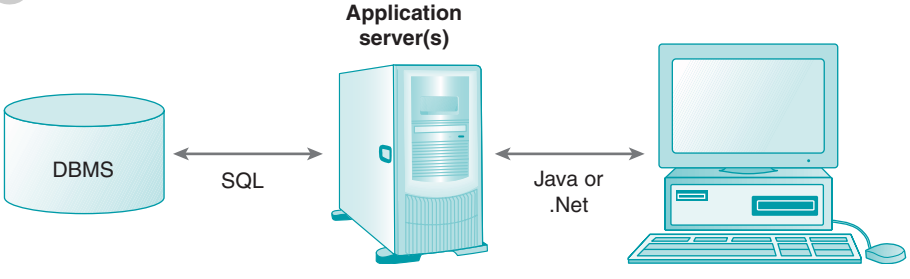
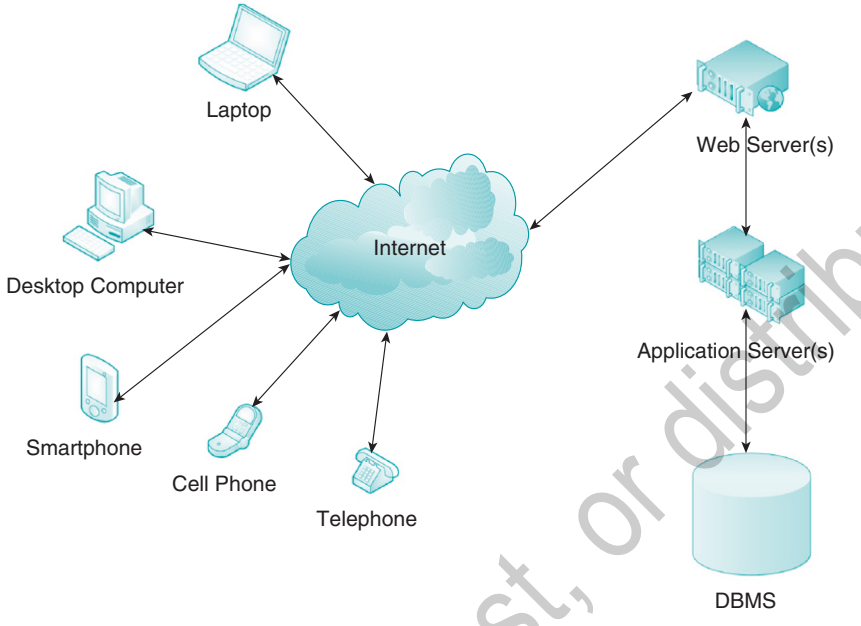


FIGURE 2.3 ■ N-Tier Architecture



- Multiple print servers or specialized printers can be added as needed. For example, payroll check printing requires a security-enabled toner called MICR to print encoded checks for bank cashing. These check printers can be physically located in a secure environment but connected to the HRIS N-tier architecture like any other printer.
- Additional "process schedulers" can be added to handle large batch jobs such as payroll cycles. These servers offload "heavy" processing from the main application server so that user interaction is not impacted.

The architecture diagram becomes even more complicated when other ERP components are added. For example, when payroll is run, financial-related transactions need to be registered in the company's general ledger (GL) application. Typically, GL exists within the financial/accounting component of large ERP systems from SAP, Oracle, and Microsoft. Therefore, GL transactions must be interfaced between payroll and these systems. So additional application servers and databases enter the picture, depicted in Figure 2.3. So even though the architecture may be more complicated, the logical view of the system remains relatively simple, and this complexity is hidden from the end user. For example, a consultant for a large IT services company can travel throughout the world, work with multiple clients, but still be able to record his or her time and expense reports with a single browser application from any hotel room.

Cloud Computing—Back to the Future?

In the last decade, a new architectural model has become prevalent: cloud computing. **Cloud computing** can be defined as a computing architecture that uses the Internet and central remote servers to maintain data and applications. Hosted services are then delivered over the Internet. Cloud computing technology allows businesses to use applications without having to go through the complex installation process. It is notable that the "cloud" in "cloud computing" was inspired by the cloud symbol that one uses to represent the Internet in flow charts and diagrams. There exist three general service categories commonly recognized in cloud computing. These include:

- **Infrastructure as a Service (IaaS)**—This type of service basically provides access to an operating system (such as Microsoft Windows or Linux) or cluster of connected systems. Amazon Web Services (AWS) provides access to on-demand operating systems.
- **Platform as a Service (PaaS)**—The next level of services include application and Web server technology prebuilt into the leased computer. Enterprises still build out custom applications on top of these servers. Microsoft Azure is an example of PaaS.
- **Software as a Service (SaaS)**—In this case, a complete application is delivered over the Internet. This can be as simple as an e-mail service (think Google Mail) or as complex as the entire HRIS application (e.g., Workday or SAP-Cloud).

The underlying goal with cloud computing is to reduce the resources an organization needs to maintain and run software. To achieve this, a server "cloud," or group of computers is operated off site and accessed through the Internet. In this way, a company can utilize the processing and storage powers of these "clouds" of computers without actually having to own and invest in them. This can reduce software and equipment capital outlays, as the company does not need to keep purchasing new software or hardware to keep pace with technology changes. That investment becomes the responsibility of the vendor offering the cloud computing services. Cloud computing can be sold on demand, by the minute or the hour, and is elastic—meaning that an enterprise can consume as much or as little of a service as it wants at any given time. From an accounting perspective, an enterprise leases a preset amount of computing power over an annual period. This can be budgeted in a similar manner as telephony or electrical expenses. Computing charges then become part of operational budget expense as opposed to large capital investments.

In a sense, cloud computing is a return to the single-tier model of the 1980s. Instead of a single, large mainframe running all of the applications, the Internet is acting as the "supercomputer," providing the application runtime environment. And instead of a "dumb" terminal accessing the mainframe payroll system, the browser now provides the interface to the entire set of human resources applications. In the ancient history of mainframe applications, HR departments had to rely upon corporate data centers to provide high-performing and up-to-date applications. With cloud computing, the burden lies with software vendors such as Oracle, SAP, or Workday to provide the updating. And of course, leveraging the cloud requires solid, high-performance Internet access all of the time.

On-Premise Versus Cloud Computing

Although cloud computing has many benefits, some key differences exist with respect to cloud-computing compared to traditional software delivery approaches. Traditionally, organizations used an on-premise approach to deliver software. With an **on-premise** approach, the purchasing organization (not the vendor) owns the hardware supporting the HRIS and purchases specific licenses for the software. Data for their organization are the only data stored on that instance of the software. . .that is, the software is **single tenant**, and the servers are likely located in-house. Typically, on-premise solutions have a large capital outlay up front when the hardware and software are purchased, as well as ongoing maintenance costs during the life of the system. Given that most software will almost never meet all the organization's needs, and given that the firm's own the license for the software, many organizations choose to customize their on premise solutions. **Customization** refers to enhancing the HRIS with updated software code that is tailored to meet the organization's specific business processes. This code could be separate from the HRIS application or built on top of the platform. Customization is possible because the company owns the software and because only its data are stored on their instance of the software.

Conversely, with cloud-based HRIS, there is minimal up-front capital outlay, because the vendor owns and maintains all the hardware and software. Instead, the organization will pay an ongoing fee annually to access and use the software. In addition, because the hardware and software are owned by the vendor, multiple organizations share the same instance of the software. That is, cloud-computing is **multitenant**, with data from multiple organizations shared on the same instance of the software. Therefore, with cloud computing, organizations cannot customize the software to fully meet their needs. However, they can configure the software to more fully represent their unique environment. **Configuration** can be defined as modifying the HRIS application by turning off or on certain features pre-built into the software, or changing the look and feel of the interface to represent the organization. A simple analogy would be selecting predefined themes or styles in a word-processing document.

Mobile Access

Increasingly, workforces are mobile and work around the clock and around the globe. Most people have mobile devices that have much greater processing speed, power, and memory than even the most powerful computers had, even 20 years ago. In other words, we have the power of a supercomputer in our pockets! Mobile operating systems such as Android and iOS provide an easy to use interface that non-technical people can navigate. Instead of companies forcing mobile devices on their employees, enterprises encourage "bring your own device" (BYOD) policies (see Chapter 17 for more information on BYOD). Employees can then access the HRIS through apps installed on their phones. The majority of HRIS vendors provide apps for user-friendly access to the system. Think of mobile devices as the "thin client" in the N-tier model. Tasks such as approving an expense report, viewing budget data, and managing time cards are easily accomplished on mobile devices (from phones to tablets).

Security Challenges

Security ranks as a top priority for any human resource information system. Cloud service providers now maintain sensitive corporate data (outside of the four walls and possibly in other countries). So when choosing a cloud solution, the evaluation process must

include a thorough security analysis. Security needs to be addressed to handle the following situations:

- Exposure of sensitive payroll and benefits data between employees
- Loss of sensitive personnel data outside the enterprise (such as Social Security numbers)
- Unauthorized updates of key data such as salary amounts, stock options (both quantity and dates), etc.
- Sharing of personnel or applicant review comments with unauthorized employees
- Sharing data with external organizations and service providers

There are two auditing standards that cloud service providers should comply with: Statement on Standards for Attestation Engagements #16 (SSAE 16) and ISO 27001. SSAE 16 asserts that a provider meets security process requirements and has been audited. ISO 27001 requires that a provider implement a management and control framework related to security risks. HRIS cloud providers need to pass these certifications on a regular basis. Security for the HRIS is so important that there is an entire chapter that covers this topic in detail. If interested at this point, read Chapter 15 for a comprehensive discussion on HRIS security.

BEST OF BREED

As discussed in the previous section, an HRIS often exists as one of the main parts of an organization's overall ERP solution. However, an HRIS does not need to be a monolithic, or single, all-encompassing, solution. In other words, an organization does not need to purchase one, integrated solution, that supports most, if not all, core HR functions. This section of the chapter addresses the use of multiple HRIS within an organization, each of which supports a very specific HR function (e.g., recruiting, training, talent management, etc.) and the pros and cons of using such an approach. In general, an architecture that combines products from multiple vendors is called **best of breed (BoB)**.

The most well-known example of these BoB architectures comes from the audio industry—surround-sound receivers combined with CD players, DVD players, high-end speakers, and even the occasional retro turntable. All these components "plug and play" with each other to provide the best possible sound experience. This architecture works because of the standards that have been established for decades and that enable different devices to work together. We will see in what follows that BoB software components for an HRIS still need to mature somewhat to reach the capability of the analog audio components. Yet the goal remains the same: deliver the best-possible point solution to meet the business need.

For this synergy to work properly, three conditions need to be present for each software solution:

- First, there should be a perceived need for a specialized solution. For example, if a company expects to receive electronic job applications over the Internet 90% or more of the time, an **optical character recognition (OCR)** program, which scans handwritten or typewritten forms into an electronic format, would not be needed for resume scanning.

- Second, a universally agreed-on set of guidelines for interoperability must exist between applications. This exists at both the syntactical and the semantic levels. The **syntactical level** refers to the base "alphabet" used to describe an interface. For any two applications to communicate, they will need to share data. This data exchange can be done through databases, simple text files (such as Excel), or, increasingly, **XML (eXtensible Markup Language)**. Basically, XML is similar to HTML, which is used in all Internet browsers. XML files can be shared or transmitted between most software applications today. XML presents a structured syntax—an alphabet—to describe any data elements within an HRIS.
- Third, applications need to "speak the same language." Just as the Roman alphabet allows the spelling of words in multiple languages and formats, XML enables data to be described with many different tags. At the **semantic level**, the language needs to map between software applications. An employee's data description may consist of various tagged fields, such as Name, Address, Birth Date, Phone, Title, Location, and so on. If one of the applications does not have most of the same set of XML tags, it will not be able to exchange employee data. As important as the shared data semantics between applications is having analogous business process semantics. For example, a time-keeping system may define a pay period differently from the payroll application that actually prints employee checks.

An HR example would consist of selecting the most robust HR software applications—regardless of vendor—for each need and then using the XML language to move data efficiently among those applications. The HR department might select SilkRoad for talent management (recruiting), Workday for most HR applications and data management, Kronos software for time and labor tracking, ADP software for payroll purposes, and a proprietary vendor product for outsourced HR benefits administration. If all the conditions are met, HRIS applications should be able to interoperate with many point solutions. The following sections provide examples of where best-of-breed solutions are often considered.

Talent Management

The business process to recruit new employees for a company has many BoB opportunities. Large HRIS applications tend to focus on the internal hiring processes of the company—creating and approving job requisitions, saving applicant data, scheduling interviews, capturing interview results, and, finally, hiring the new employee. Yet there exist other software applications to "fine-tune" the hiring process. OCR scanning applications can eliminate the rekeying of applicant data from paper-based resumes, and other applications can perform applicant database searches, post job requisitions directly to Internet job sites, and run applicant background checks. These examples of specific functionality are typically not provided in an HRIS.

Time Collection

Most companies require employees to submit time-keeping data each pay period (e.g., time and attendance). For hourly employees, this typically means using a punch card and time clock to track hours. Some solutions use employee badges with magnetic stripes, thereby enabling employees to clock in and out. Again, most HRIS vendors do not provide

the hardware needed to track time. Time-keeping systems will capture the hourly data from various readers throughout a site. Employee scheduling for various shift coverages can be implemented with time collection or planning software. For example, transit districts schedule bus operators to cover a very complex route system throughout the week. Unionized rules force certain break periods and preferences for senior operators. Driver schedules are posted for future pay periods; and actual hours worked, reported sick time, and vacation time are collected for each pay period. Such data will be reviewed each pay period prior to being transmitted to the HRIS payroll application.

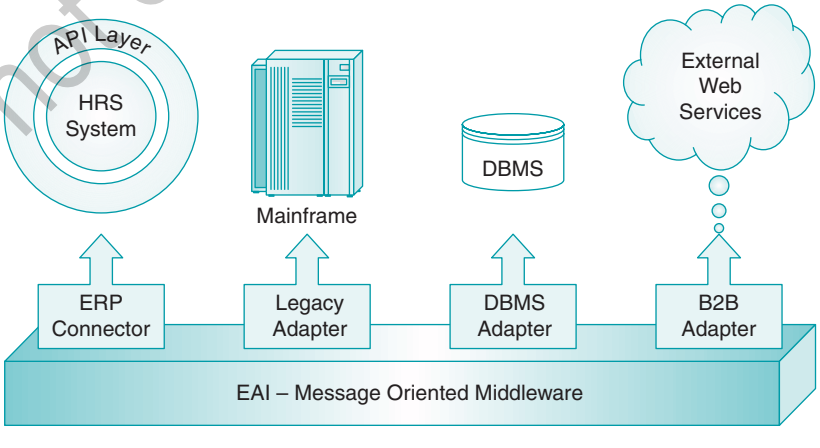
Payroll

In some cases, the entire payroll process may be outsourced to another vendor, such as ADP or Paychex. For some enterprises, the cost of maintaining a payroll application and staff in-house may outweigh the benefits of controlling the process. In this case, employee time data, pay rate, and benefit information would be transmitted to the external vendor for processing. This choice of using an outside provider is conceptually the reverse of the typical BoB motivation. The enterprise is not looking for the *best* technical or functional solution but for a provider offering a commodity service at the *lowest* cost. In the case of a large multinational corporation with lots of employee levels, it would probably be prudent to purchase the HRIS payroll application.

Employee Benefits

Each year, most employers present their employees with what is called the benefits open enrollment period, during which signing up for benefits is similar to course enrollment for students each semester. Instead of enrolling in courses, though, employees enroll for major medical, dental, and insurance benefits. For example, employees choose between health care providers such as Kaiser and Blue Cross for their medical insurance. These providers support interfaces with the major HRIS applications so that, as employees log into the enrollment software, they can review offerings tailored to their company's plan. Thus, when

FIGURE 2.4 ■ Best-of-Breed Solutions Architecture



employees select a particular insurance program, they can then transmit enrollment data to the provider through their organization's HRIS.

As one can see in Figure 2.4, BoB solutions introduce additional complexity into the software architecture. This complexity can add IT expense in the form of new software licensing and programming charges. The justification for the added functionality needs to compensate for these additional costs. So a benefit-cost analysis should be performed by the HR function to determine whether the BoB alternative is to be used. Detailed procedures to compute a benefit-cost analysis are covered in Chapter 7.

In summary, BoB options can create a much more powerful solution than a stand-alone HRIS. The BoB alternative also creates system flexibility, as each application can be managed and upgraded independently. Yet this power and flexibility may end up costing the IT department by giving rise to more complex systems administration issues.

PLANNING FOR SYSTEM IMPLEMENTATION

A variety of authors, consultants, and others have discussed implementation methods for information systems. Rampton, Turnbull, and Doran (1999) discuss 13 steps in the implementation process. Jessup and Valacich (1999) divide the implementation of a system into five steps, with a focus on the systems side of the process. Regan and O'Conner (2002) provide eight steps for implementing information systems. Some organizations have proprietary processes that they use for all implementations. Points to remember in regard to system implementation as this section is examined are as follows: (1) this is a process that will take a team of individuals anywhere from 6 weeks to 3 years to complete; (2) a variety of ways to manage this process may be attempted, so long as the key issues are examined and organizational goals for the implementation are achieved; and (3) there is no single definitive approach to be used in all situations.

The first key step is planning. This is an absolutely critical step in any business process and especially in the design of any large-scale software implementation involving multiple-process interfaces. Note that the planning process doesn't guarantee success—rather, it increases the probability that the implementation will be successful. The systematic examination of the following topics provides the organization with the opportunity to see how the implementation will work—to peer into the crystal ball—and identify some contingencies for implementation steps that might not go perfectly. In other words, a robust planning process provides a framework within which the implementation team can proceed, and it provides some decision-making parameters for any unforeseen difficulties that might appear (Bedell, 2003a).

The topics that need to be discussed during the various steps of the planning process include but are not limited to the following:

- Project manager
- Steering committee/project charter
- Implementation team
- Project scope
- Management sponsorship

- Process mapping
- Software implementation
- Customization (vanilla vs. custom)
- Change management
- "Go live"
- Project evaluation
- Potential pitfalls

It is rare that an HRIS will perfectly fit all of a company's business processes. So, as noted earlier, a key architectural decision during implementation is the choice between configuration and customization. However, for the organization to best understand which, if either, approach is optimal, a "fit-gap" analysis should be conducted that systematically works through every process in the HRIS that has been mapped as well as any new processes that have been identified as mission critical. The result is an understanding as to where organizational processes and the software processes mesh (fit) and where they do not (gap). Any gaps that are identified need to be closed either through modifying organizational processes, configuring the HRIS application to perform in a certain manner, or customizing the software. For additional information on analyzing an organization's needs, please read Chapter 3.

Summary

The implementation of an HRIS goes beyond simply placing a new technology into the organization. This chapter focuses on several of the many different organizational, people, and technical issues that must be addressed. The first section considers the important internal and external users or customers of the HRIS and organizational goals. In the second section, four different types of HRIS architectures are enumerated. The evolution of technology, from legacy "dinosaur" systems to contemporary N-tier architectures and cloud computing, has dramatically affected the scope and influence of HRISs in organizations. Therefore, the strengths and weaknesses of each architecture are discussed. Next, a brief overview of mobile HRIS and security is provided to make the reader aware of their importance in any HRIS adoption process. The third section of the chapter discusses the best-of-breed approach to HRIS adoption and the pros and cons of this approach in different functional areas. Finally, the chapter concludes with a general discussion of the steps that organizations might take to plan and implement an HRIS and of the factors that can affect these processes. In summary, organizations that are able to manage the people, processes, and technology involved in an HRIS implementation should be more likely to find that the new HRIS is able to meet their goals more effectively in terms of budget, functionality, and usability.

Key Terms

analysts or power users 26
bandwidth 30
best of breed (BoB) 34
cloud computing 32
configuration 33
customization 33
enterprise resource planning (ERP) 23
eXtensible Markup Language (XML) 35
human resource management (HRM) 24
Hypertext Markup Language (HTML) 30
implementation team 24
infrastructure as a service (IaaS) 32
load balancing 30
multitenant 33
N-tier architecture 30
on-premise 33
operating systems (OS) 30
optical character recognition (OCR) 34
platform as a service (PaaS) 32
semantic level 35
single tenant 33
software as a service (SaaS) 32
sourcing partner organizations 28
syntactical level 35
three-tier architecture 29
two-tier (client-server) architecture 29

Discussion Questions

1. Identify the various types of users or customers of an HRIS.
2. What are the three broad categories of data that an HRIS manages?
3. How does network bandwidth affect a two-tier (client-server) architecture?
4. How does an N-tier architecture simplify the IT department's task of maintaining client software?
5. Research https://hropenstandards.org/. How many software vendors are involved with the organization? What are the benefits of open standards?
6. Take a specific industry, say the K–12 education industry. How might HireRight's integration with Oracle's PeopleSoft assist the process of hiring employees such as bus drivers, janitors, or campus security?
7. When might a BoB approach not be the "best" solution for an organization?

Case Study: HRIS in Action Revisited

This case is revisited with some additional information that involves the understanding of the material in this chapter. The additional information will be added to the situation described in the vignette at the beginning of this chapter.

A billion-dollar retailer with more than 4,000 stores finds that it cannot move fast enough to beat the competition. The organization's senior management arrives at the conclusion that it would be easier to achieve the strategic goals enumerated by the board of directors if the various organizational functions would share information. Shared information would enable them to develop and deploy new actions and tactics more quickly. The

CEO and the president have therefore ordered the major functions to immediately update their information systems so that data sharing is possible. The senior vice presidents (SVPs) of accounting and human resources immediately decide that the only solution is to decide jointly on an ERP product. ERP software applications are a set of integrated database applications, or modules, that carry out the most common business functions, including human resources, general ledger, accounts payable, accounts receivable, order management, inventory control, and customer relationship management. To speed the installation along, they will install it using a rapid implementation methodology that a company down the street used. The goal is to have the new systems operational in nine months.

Shortly after this decision is made, the SVP of HR calls you into his office and tells you that you will be management sponsor for this project. You have to decide on everything. You sit back in your nice office and think:

> What's the problem with this scenario? It shouldn't be difficult to select a vendor and then borrow the methodology from down the street. It worked for them; it should work for us! We'll call a few vendors in the morning and find out about cost, time frame, and implementation methods. In the meantime, I should find out a little more about how to do this and who will be using it. I remember from my information systems class in college that this is a reasonable first step when it comes to buying software.

What do you think your response would be to this inquiry? Has your response changed now that you have read this chapter? If so, how?

New Information for the Case: Part 1

After some discussions with department heads from all the departments in the organization, you realize that a large number of people (stakeholders) will be affected by the new systems. Furthermore, you come to realize how important HR data really are to these stakeholders. Based on this information, you think, "Wow, there are far more people who could be potentially using this information system than I expected!" The old textbook and the vendor information should provide a lot to think about.

Using the information from the section of this chapter titled "HRIS Customers/Users: Data Importance," please answer the following questions:

1. Identify some of the customers who would be logical members of the implementation team and explain why.
2. Think through an HR process and sketch out what data are necessary to complete your sample process well. How much history does the organization need to convert to continue functioning?
3. Pick one area of the HR function (e.g., recruiting), and make a list of processes that will need to be mapped and possibly reengineered during this implementation.

New Information for the Case: Part 2

Over the next month, as you continue to obtain information about the design and implementation of the new system, you are still somewhat confused about what to do. Once again, we find you in your office thinking:

> There are so many potential decisions to make with regard to hardware! I wonder what we need to schedule, if we need to buy hardware, and how we should configure the servers to ensure maximum security. And this "bring your own device" stuff is going to drive us nuts! It's time to make another list of questions!

Based on the information in the section of the chapter titled "HRIS Architecture," please respond to the following:

1. Make a list of questions for each of the following individuals: lead hardware technical expert, network manager, and chief software manager.
2. What configuration should the company use? Make a suggestion and support it!
3. Make some recommendations about security and bring your own device.

New Information for the Case: Part 3

As part of your investigation, you have uncovered a system concept called "best of breed." You are in your office again trying to decide what to do, and you think, "Perhaps best of breed might be the easiest and best way to go."

1. Make a recommendation as to whether a BoB option should be chosen or a more standardized option with simpler interfaces between hardware and software should be selected.
2. Think about what the best answer should be when you have to connect your system with accounting and finance. Make a recommendation and support it!

New Information for the Case: Part 4

You have just sat down in your office feeling as if there is way too much to do! Your IS software professional has given you the information from one of the potential vendors about the various steps that need to be taken in implementation of the HRIS. Your immediate reaction is, "Man, am I going to be at work late for the next many months!"

Case Study Questions

Based on the information in this chapter, answer the following questions:

1. Develop the first few steps of the project plan.
2. Discuss the potential political necessities outlined in this section as they relate to this type of implementation.
3. Think about and create a list of steps that make sense for your organization.
4. Is the nine-month rapid-implementation time frame feasible? Or will it just lead to failure?