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Abstract

[Excerpt] This report describes findings from a study that we view as a first step in a long term research program conducted by the CAHRS to address sponsor concerns. One of this program's objectives is to identify organization dimensions that predict the success or failure of computer systems in HR. A Second objective is to specify a model that will increase value-added decisions about HR computer system investments and guide the planning and implementation of HR technology strategies.

Keywords

CAHRS, ILR, center, human resource, job, worker, advanced, labor market, satisfaction, employee, work, manage, human resource automation, computer technology, HR, computer literacy, software, computer

Comments

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**Human Resource Automation for
Competitive Advantage:**

Case Studies of Ten Leaders

Renaë Broderick and John W. Boudreau

Working Paper #90-04

**CENTER FOR ADVANCED HUMAN RESOURCE STUDIES
SCHOOL OF INDUSTRIAL AND LABOR RELATIONS
CORNELL UNIVERSITY**

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This paper has not undergone formal review or approval of the faculty of the ILR School. It is intended to make the results of Center research, conferences and projects available to others interested in human resource management in preliminary form to encourage discussion and suggestions.

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Computer technology is increasingly used to help manage human resources (HR) in today's organizations. There are growing numbers of personal computers (PC's) on the desks of HR professionals, and computer applications for HR have expanded beyond their traditional payroll and benefits domain to areas such as strategic planning, staffing, succession planning and training. While only a handful of PC-based software applications for HR management existed five or ten years ago, today there is a huge market of products spanning a broad spectrum of prices, sophistication and quality. Top universities generally include computer literacy as a basic requirement for students hoping to become HR professionals, and seasoned HR professionals are flocking to classes that are designed to enable them to better use PC's in their work. These phenomena all provide evidence of a trend for increasing use of computer technology in HR management.

Not surprisingly, top HR managers are asking where this trend will lead HR. Can computer technology enable HR managers to better support strategic business objectives? Can it drive more strategic, innovative thinking among HR professionals? What gains can be expected from different types of computer technology investments? How are other organizations using computer technology in HR management? These are common questions that reflect a common desire on the part of HR managers: to shape the use of computer technology in ways that provide visible, strategic benefits to their organizations.

Research Gaps Identified

The academic and professional literature offers little assistance to these HR managers. This literature tends to focus on specific software packages, on isolated case descriptions showing how a particular hardware or software application was successfully employed, or on surveys that count the number of PC's in use and the number of companies reporting using PC's for various purposes.

Early in 1989, sponsors of the Center for Advanced Human Resource Studies (CAHRS) informed us that, while they remained interested in knowing the nature and extent of computer systems use in HR management, they were also looking for something more. They suggested that research should focus less on counting the kinds of hardware and software applications used, and more on identifying what organizations have learned from their experience with computer technology in HR management: what business objectives they have met, what approaches they have taken to computer systems development, what has worked and what hasn't, and where they plan to go next. The sponsors emphasized that the missing link in research on HR computer systems is a framework that guides managers to use them in ways that add value to the organization; a framework that could shorten the learning curve associated with computer systems by identifying dimensions of success or failure.

This report describes findings from a study that we view as a first step in a long term research program conducted by the CAHRS to address sponsor concerns. One of this program's objectives is to identify organization dimensions that predict the success or failure of computer systems in HR. A second objective is to specify a model that will increase value-added decisions about HR computer system investments and guide the planning and implementation of HR technology strategies.

PRELIMINARY CASE STUDIES: INFORMATION FROM INDUSTRY LEADERS

Given the gaps in our knowledge about HR experience with computer systems, however, we saw the first step in this research program as one of collecting information. We did this via a set of case studies, based on a day-long interview with the top human resource information systems (HRIS) manager and his/her staff in each of ten organizations. We chose these organizations because of their recognized leadership in the use of at least one aspect of computer technology in HR management. We identified them by reviewing published articles, by contacting CAHRS sponsors, and by asking for peer recommendations.

The ten organizations interviewed were: AETna, ALCOA, Armstrong World Industries, AT&T, Becton Dickinson, Chevron Corporation, Data General, Digital, Mobil Oil Corporation, and NCR. They are all sponsors of the CAHRS and they span a variety of industries and markets. All of them are among the largest organizations in their industry, and rank among the top of the Fortune 500.

In this report, we discuss the findings from these ten interviews. Our discussion is organized around five sections. In the first section we propose some principles that help explain how the different approaches to HR computer system use seen in our interviews can all result in value-added to the business. These principles are taken from theories about the value of information and from contingency theory. The second section describes eight dimensions that influenced the success of HR computer system development in the organizations we interviewed. The next section covers three distinct profiles of HR computer system development drawn from our interviews. These profiles illustrate how the guiding principles proposed earlier can help explain organization differences or similarities along the eight dimensions of HR computer system development. In the fourth section we list some guiding questions, suggested by our findings, for managers charged with developing HR computer systems. We end with proposals for further, collaborative research with CAHRS sponsors.

Throughout this paper, we define HRIS to represent the composite of databases, computer applications that draw on them, and the hardware and software necessary to store, collect/record, manage, deliver, present and manipulate data for HR.

GOOD HRIS INVESTMENTS ADD VALUE AND MATCH CONTINGENCIES

The managers we interviewed described both successful and unsuccessful HRIS developments. Though many variables affect success and failure, we found it helpful to consider organization differences in terms of the value-added of information. Simply put, successful HRIS developments create information value for the organization, contingent on such organization factors as strategic goals, technology, structure, management style, and the nature of the work force.

When is Information Valuable?

HR automation is the latest in a long line of tools to help HR managers gather, process, and use information. Like the calculators and paper filing systems of the past, automated systems can make information faster, more accurate, more widely available, or more detailed--but only at some cost. Information has value to the extent that it either: (1) protects the organization from costly penalties

because certain Government agencies require that it be kept; or (2) improves decisions with consequences that are important enough to justify the cost of the information.

Meeting Government requirements has motivated the vast majority of automation initiatives. Usually, the first aspect of HR to be automated is payroll and benefits, primarily because there are specific reports and legal obligations satisfied by related information. Moreover, such information directly affects the organization's financial reports, which are also legally required. When automation is used to generate information that meets legal requirements, its value stems from its ability to deliver the information at less cost than non-automated systems. Cost savings include fewer administrators, less mailing, less paper, etc. The "paperless" HRM office concept is often driven by the desire to get all required reports into computerized form so that HR managers can more easily and quickly provide the information.

Supporting managerial decisions is currently a less recognized purpose of HR automation, but this purpose contains the potential for producing revolutionary effects. Much automated HR information is not legally required, but is desired by one or more organizational decision makers. Information in this second category has value if it improves decisions enough to offset its costs. The value of such information depends on these factors: (#1) How frequently the information will correct a wrong decision; (#2) the consequences or importance of the corrected decision; and (#3) the costs of providing the information.

An Example of Information Value-Added

Consider an automated system to provide job evaluation information to the firm's job analysts. Suppose we evaluate 100 jobs per year, and 20 of these evaluations are incorrect because they are based on outdated information. Our automated system will correct 18 of these 20 wrong evaluations each year. Thus, the quantity of corrected decisions (Factor #1) is 18. Further suppose we know that a mis-evaluated job tends to increase the pay of 10 job incumbents by \$2,000 per year, and that it takes us about two years to discover our mistake. Thus, each mis-evaluated job costs us \$40,000 (that is, 10 employees times \$2,000 times 2 years), and the value of correcting each decision (Factor #2 above) is \$40,000. Finally, suppose that automating the current job evaluation system to achieve this kind of decision support will require an up-front cost of \$700,000 plus \$60,000 per year to run the new system. If we evaluate the new automated system over a five-year period, the total cost will be \$1 million (or, \$700,000, plus 5 times \$60,000).

Is automating the current job evaluation system worth the \$1 million investment required? To get the yearly value of the system, we simply multiply the number of corrected decisions in each year (18 decisions) by the value of each corrected decision (\$40,000) to get a yearly value of \$720,000. Over a five-year period, the new system will provide roughly five times this value, or \$3.6 million dollars, at a cost of \$1 million. This is a substantial return on the automation investment. In fact, the investment would still pay off even if the new system's cost is substantially higher, or if the number of corrected decisions or the value of each corrected decision is smaller. While this example was simplified, and we assumed that the numbers for the necessary computations were available, the principles embodied in the example can apply in more complex decisions or decisions where the numbers are less easily identified.

Some automation applications produce value by correcting a large number of decisions, though each decision has a relatively limited impact. For example, automated employee benefit and payroll information kiosks affect thousands of employee decisions each month, though each corrected decision may have consequences of under one hundred dollars. Other automation applications produce value by correcting a relatively small number of strategic decisions. Top management succession planning systems, for example, may only be used once or twice each year, but if they cause better candidates to be identified and chosen for top corporate positions, the value of each improved choice may be millions of dollars. Automated information systems, like any other investment, can be evaluated according to their costs and benefits.

This value-added framework suggests that HRIS designers should ask questions such as: (1) What kinds of information are we required to collect and report, and where can automation add efficiency to this process? (2) Who are the key decision makers in the organization that could benefit from automated decision support? (3) Should we emphasize improving a few relatively important strategic decisions at the corporate or unit level, or should we emphasize improving a large number of individual decisions, each having a relatively small impact? (4) Where can substituting automation achieve the greatest cost reduction, and are these tasks truly necessary for reaching organizational goals? (5) How can automation technology reduce information costs enough to make it worthwhile to support decisions that were previously considered too rare or trivial?

Contingency Theory Contributions

Implicit in information value theory is the notion that differences in organizations will influence estimations of information value. Contingency theory suggests specific organization factors --business strategy, structure, management style, centralization/decentralization, labor intensity, work force skills, and so forth-- that will affect the kinds of decisions an organization believes are most important, and the costs of any systems meant to provide information for those decisions. In the case of automated systems, contingency theory suggests that the state of computer technology will also influence the costs of system development. Finally, contingency theory suggests that HRIS will evolve and change with the organization. There is no one, best, monolithic approach to computer systems development for all organizations, nor for any one organization over time.

We found that the principles of information value-added and contingency helped explain much of our interview evidence. The next two sections will describe the results of those interviews. We highlight the results suggesting that successful automation initiatives involve close attention to information value-added, and that differences in organization decisions on the information value-added of HRIS can be related to firm strategy, structure, technology and work force contingencies. We first describe eight dimensions that the organizations we interviewed believed critical to successful HRIS development and implementation. We then describe three HRIS profiles that illustrate how organizations made different decisions on these dimensions.

DIMENSIONS CONTRIBUTING TO HRIS SUCCESS

The HRIS groups we interviewed described their systems' successes in many terms: better, faster and more abundant information, accomplishing more HR related work with lower HR headcount, cost savings,

better response to government or management initiated changes (for example, acquisitions, changes in merit plan administration, changes in IRS regulations), faster diagnosis of HR problems, increased computer literacy in HR, increased computer utilization in HR, review and rationalization of existing HR programs, more consistent understanding/communication of HR policies and more consistent HR practices across the organization.

Eight dimensions of HRIS development and implementation seemed to cut across successful organizations' HR systems. Organizations often made different decisions on these dimensions, as the profiles in the next section will illustrate, but they all acknowledged the importance of each dimension. The eight dimensions are listed in Figure 1 (p. 22). The first four reflect decisions about the computer systems, and the HR decisions and decisions makers the systems should support. The second four dimensions reflect other organization factors that influence HRIS success

System Development Dimensions

System Information Coverage. Figure 2 (p. 23) depicts the major information coverage decisions that organizations make. These include decisions about what information, for which employees, and from what firm locations should be electronically available to support HR decisions. The more extensive the system coverage, the more potential applications the information can support, and the more HR decisions can be integrated across locations, time periods, or HR functions. Extensive information coverage pays off most when key decisions involve broad, strategic issues, and when automating such information will improve these decisions. Less extensive coverage saves resources, and is more appropriate when key decisions involve more focused, local HR issues.

System Availability. Figure 3 (p.24) depicts System Availability decisions. These decisions involve questions about the numbers and levels of HR and non HR employees with access to HR data, the geographic dispersion of systems access, and the types of information use authorized. Extensive systems availability allows HR decisions to be made by those closest to the issues. Extensive availability also increases the number of decisions that can be corrected, so that each individual correction need only produce modest value for widely-available computer systems to pay off.

System Decision Support. Figure 4 (pp. 25-26) depicts System Decision Support alternatives. Near the top of Figure 4 (pp. 25-26) are computer based systems that support relatively simple, routine decisions. These are most powerful for doing routine data collection, processing and storing activities, and are valuable in reducing or controlling overall HR administrative costs. Moving downward in Figure 4 (pp. 25-26), we see computer systems designed to support increasingly complex decisions and provide greater guidance to decision makers who analyze information to recommend action. These systems are often costly and difficult to develop, but because they support more strategic or high level managerial decisions, they also have the potential to provide real competitive advantages to the organization.

System Integration. Figure 5 (p.27) depicts three levels of System Integration. In a fully integrated system (level a) all HRIS data are found in one central database, and all applications draw on data from this central location. In a fully integrated system, PCs are typically used only as terminals for access to mini or mainframe databases and applications. Central data files can be downloaded to PCs for individual

work. The second level of integration (b) we are calling 'relational'. In this level of integration all HRIS data are found in separate databases linked by a common data dictionary and some common elements (such as an employee number). PCs are typically used as terminals just as in fully integrated systems. A stand alone approach (c) is one in which individual databases are developed for independent applications. PCs are often used for both distribution and processing at this integration level.

Of the three levels, fully integrated systems offer the highest control over data quality and security, and are the most technically efficient. These are important considerations for processing high volume, frequent HR decisions such as payroll and benefit changes. The greater systems uniformity of fully integrated systems also makes training for and distribution of new applications efficient. However, maintaining high level integration is costly. Flexibility is also reduced because new data and new applications must be designed for full integration; local or custom needs are more difficult to accommodate.

Organization Development Dimensions

Building Human Resource-Information Systems Bridges. Most organizations have a staff of programmers, systems analysts, and internal consultants devoted to "information system" (IS) development and maintenance. HRIS development, however, must begin with a keen awareness of important HR decisions, and then use technology to support them, rather than starting with the technology and looking for the HR issues that might fit it. Most people we interviewed believed that the HR community sees HRIS as more credible, and more in tune with its needs if an HR manager is in charge of HRIS. Such a manager steers HRIS development toward real HR needs and develops channels for communication and feedback within HR. The HRIS staff assigned to provide HR client service and training were also viewed as more effective if they had HR training or background. In our sample firms, HR community involvement in HR database and application developments improved their usefulness and cut down on costly reprogramming.

Though HR representation is viewed as critical to HRIS success, the more technical aspects of information systems were not ignored in the firms we interviewed. All organizations had a staff with programming and development skills. Consistently assigning this staff to work on related HR projects, or even on particular HR functional areas (such as compensation, staffing or benefits) progressively strengthens the match between HR user needs and existing technology, and also cuts system development costs. Several HRIS groups also emphasized the importance of IS technical 'retraining'. IS people developing HR systems need training with a less traditional focus on programming, mainframe technology, and massive long-run projects, and more focus on flexible, distributed technology, smaller projects, and skill in helping HR users to identify their system needs.

Building HR Community Expectations. Several of the organizations we interviewed stressed that realization of computer technology's potential for HR requires assessment and management of HR expectations about HRIS --from top managers to entry level administrators. Managing these expectations to support HRIS requires thinking about HRIS as a program to be integrated with all other HR programs. HR leaders need to identify priority HR objectives, talk about the role of HRIS in meeting those objectives and spell out the changes that heavier dependence on HRIS may bring about in current HR roles in their organizations. For example, a traditional role for HR business unit staff in many organizations is one of

administering rules, dealing face-to-face with employee issues, and being visible representatives of HR on the production floor. What will the payoffs for a more analytical, business management oriented role be? What will happen to the people who cannot handle this role? What if line managers do not want their HR people to be more analytical? These issues have to be addressed by top HR managers if they want HRIS to be integrated into business unit HR.

Our sample organizations all believed that communications, rewards, and performance objectives should reinforce the importance of HRIS in routine and higher level HR decisions. Communications, in particular, should account for possible HR resistance to HRIS, promoting current HRIS contributions without overselling them.

Despite unanimity about the importance of actively managing HR community expectations to build support for HRIS, our sample firms varied considerably in the resources they devoted to this.

Building HR Community Knowledge. Many organizations agreed that HR community training is critical to the success of HRIS. Training designed to increase HR users' basic computer skills, to showcase different types of computer applications to support all levels of HR decision making, and to introduce and build skills for the actual systems available is ideal. Yet, despite virtual unanimity in these views, only two of the ten firms interviewed had invested in training beyond that required for the installation of a specific computer application. We often asked interviewed organizations, "If you could magically have your ideal hardware, data and software in place tomorrow, would that solve all your system needs?" The answer was virtually always, "No", and the reason was that only a few HR managers would have the skills (and motivation --see above) to use HRIS.

Building HR-Organization Technology Links. Many organizations stressed the importance of a standard HRIS technology strategy -- compatible hardware, software, and data administration -- for balancing today's HRIS needs with tomorrow's technology potential. Several organizations also emphasized the need to integrate the HRIS strategy with the organization's overall technology strategy. Because more complex, strategic HR decisions will require information from areas outside HR (finance, marketing, etc.), HRIS technology that is compatible with the rest of the organization's can enhance HR's ability to exchange information and engage in joint decision making. HR can follow the overall organization strategy or can choose to influence the organization's technology strategy in a direction more to HRIS's liking. The point is to choose, not react.

All the organizations we interviewed also stressed the importance of keeping up with technological advances that might be particularly useful to HR. This can be done through the organization's technical networks and through contacts with other organization's HRIS groups.

THREE PROFILES OF HRIS DEVELOPMENT

The organizations we interviewed had HRIS at different levels on these eight dimensions. Few, if any, organizations can afford to develop systems that reflect heavy investments on all eight dimensions, nor should they. Those achieving the most success fashioned systems that created the greatest value for a given investment, contingent on their organizations' particular needs and available resources.

Overall, the firms we interviewed were moving from centralized mainframe technology toward greater distribution and availability. In most firms, HR, which had previously exerted no formal control over HRIS, had more recently developed independent HRIS organizations managed by "one of their own".

Throughout the 1970s, the firms we interviewed had made investments in mainframe databases and computer applications. These investments provided high volume data processing and program calculations for company wide payroll, benefits, compensation, employee recordkeeping and government reporting. Most firms now considered these essential "threshold" investments. They believe that sizable firms of 10,000 or more employees cannot cost effectively administer these HR programs without automating them. Beyond these threshold investments, we observed three distinct profiles of HRIS development.

The three profile organizations provide vivid examples of different strategies for achieving value-added information system design and organization change. Figure 6 (p.28) (although an oversimplification) illustrates how the three profiles differ on the eight dimensions of successful HRIS development.

Profile One: Traditional, Large-Scale, Central Systems

Profile One firms were the most centralized, had the most capital available for technological investments in the 1980s, and were the least labor intensive of the three profiles. Their corporate strategies during most of the 1980's focused on maintaining historical records --in holding market share, profit margins and industry position. From an internal management perspective, this maintenance strategy emphasizes doing what management already knows how to do, but doing it more efficiently and more productively. This strategy is typically accompanied by centralized, corporate level decision making, and this pattern holds for HR. The skills of the corporate HR community are highly specialized, involving either advanced degrees or substantive firm experience in a particular HR function (compensation, benefits, staffing, etc.). The business unit HR community consists mainly of generalists, many from predominately labor relations backgrounds and experience. The value-added role of HR for Profile One firms has traditionally been one of providing efficient administrative support and establishing the corporation's image as one of "good corporate citizenship".

Information value-added principles suggest that, given these organization contingency factors, HRIS investments to support corporate HR programs and decision makers would be viewed as adding the most value to Profile One businesses. The maintenance strategy focus on administrative efficiency suggests the value of centralized, large scale HR transaction processing systems to handle payroll, benefits and compensation. The education and specialization of corporate staff suggest the value of a comprehensive HR database with good reporting applications and many generic packages (statistical, spreadsheet, graphics, etc.) that will enable staff to analyze, model and report HR information for policy level decisions. Indeed, if we look at Profile One on the HRIS development dimensions in Figure 6 (p.28), we can see that typical investments support these predictions.

Profile One Investments on System Development Dimensions. Firms exhibiting Profile One characteristics invested heavily in in-house development of central, comprehensive databases in the late 1970s and the early 1980s. The key decisions supported by these investments were made by corporate HR

managers who believed that the information provided by the payroll-dominated personnel databases was inadequate to most decisions, not compatible across different company units, poor quality and untimely.

System Information Coverage. The HRIS databases developed in Profile One firms are comprehensive. They typically cover information on all categories of employees; all domestic parent company locations and any domestic subsidiary locations with comparable HR programs; a broad range of information related to all the HR programs currently operating in the parent company; and as much history as possible. Many firms are now adding selected information on foreign subsidiaries.

System information coverage of all categories of employees and locations is ideal to support the most efficient, corporate-wide administration of payroll, benefits, compensation and employee recordkeeping programs. Additional broad coverage of HR functional information and history allows corporate HR staff to do policy level modeling and forecasting on their own. Policy decisions require an integrative perspective that spans multiple units, time periods and HR functions. The information value-added principle suggests that, though such integrative policy decisions may be few in number or infrequently made, each improved decision can have high, strategic value for the firm. Overall, such comprehensive coverage provides an ideal database from which to eventually support the entire range of HR decisions and decision makers. The tradeoff, of course, is the expense of such coverage.

System Availability. In Profile One firms, the HRIS databases and system applications reside on a mainframe and are available through PC or terminal connections to HR users at corporate offices and in the business units. Individual employees also have controlled access to HRIS via Employee Direct Access applications that provide benefits and payroll information and allow employees to make authorized changes to their own records. Most HR staff are authorized to capture and update data on their employees, make inquiries and reports, and pull together files.

Extensive availability allows Profile One firms to have local units gather, update and report data, allowing efficient administration of centralized HR programs and external reporting. Like comprehensive coverage, extensive availability also provides a foundation for information flows throughout the firm, and thus, for improved decision making and communications at all levels and locations in the organization. However, for most HR users, moving beyond the simplest data capture/editing and generic applications to systematically tap the HRIS database requires that they either acquire skills in programming, or turn to the HRIS people with these skills. One Profile One firm is now developing more user friendly access to their "treasure trove of data", while simultaneously providing basic training in the analytical concepts and skills needed to use these data. Their focus is on the HR business unit staffs.

Extensive availability, like comprehensive coverage, is expensive. However, once the HRIS databases and the basic applications for access are established, extending availability is cheaper than it would be for firms who have not already made such investments. For example, Employee Direct Access systems can extend information to thousands of individual employees. In terms of information value, these systems affect a large number of decisions, though the value of correcting any one decision may be relatively small. For Profile One firms, with major coverage and availability investments, the sheer numbers of such decisions may make the investments in Employee Direct Access systems especially attractive.

System Decision Support. Profile One firms emphasize the transaction processing, office automation and tracking systems that support less complex decisions (see the top of Figure 4 (pp. 25-26)). These firms first developed applications to enable HR units to capture and update data, to do program calculations for compensation, benefit and pension plan administration (for example, changes in savings plan earnings potential under different investment options), and to produce summary lists and reports relevant to unit employees. Applications that track data trends were typically added next --to enable users to trace turnover, accident and sickness, absenteeism, daily time cards, career potential ratings, and so forth. Within the last few years, Employee Direct Access applications have been developed in several Profile One firms; these provide a simple expert system environment for employee inquiries as described above.

The Profile One firms' initial emphases on corporate level decisions are consistent with their investments in the large-scale, transaction processing systems most valuable for automating important, but routine, programs such as payroll and benefits reporting. This emphasis makes sense from an information value-added perspective. Such programs are usually the responsibility of corporate-level managers, and these transaction processing systems can typically reduce the costs of administering these programs. The databases supporting these transaction processing systems also provide a wealth of information to corporate managers, and, in most firms, they soon ask for more complex information summaries and for reports tracking deviations from goals. These requests are now driving Profile One organizations to develop applications toward the bottom of Figure 4 (pp. 25-26) in order to better tap the wealth of data in their HRIS databases.

System Integration. Profile One firms typically have HRIS that are very close to being fully integrated. Most databases and applications reside on a central mainframe, run from the mainframe and interface with one another. Data quality is protected by numerous automatic edit checks; security controls are comprehensive. Integrated systems assure data accuracy, timeliness, and compatibility throughout the HRIS. Such data quality is important in realizing the administrative efficiencies of a centralized, large scale system. However, high integration does limit the flexibility of the HRIS for local users. Custom data and applications cannot be added quickly and at low cost. The central HRIS group is thus often under pressure to satisfy local requests, while at the same time maintaining a resource intensive system.

Profile One Investments on Organizations Development Dimensions. Profile One firms typically have moderate levels of HR representation in HRIS development, and moderate investments in building HR-IS bridges in comparison to the other two profiles (see Figure 6 (p.28)). HRIS is always managed by someone with substantial HR experience, or at least, high credibility in the HR community. The HRIS staff is usually large (as many as 200) with predominately IS backgrounds. These staff members learn HR 'on-the-job' via development assignments, answering HR user requests and conducting training. HR system development does involve HR user input, but there is not the emphasis on user involvement seen in the other two profiles.

HR management investments in building HR community expectations to support HRIS are low to moderate in Profile One firms. HRIS knowledge investments or training investments are targeted to

specific applications and their use. Links between HR and Organization technology strategies are strong with an emphasis on internal, as opposed to vendor-based, technical development.

We speculate that, while attention to these dimensions was considered important to HRIS success by Profile One firms, the involvement of very large portions of the HR community was not as necessary to the success of centralized, large scale mainframe systems as it is in our other two Profiles. Profile One firms focus primarily on supporting corporate decision makers who have already accepted the need for computer support for payroll, benefits, compensation administration and government reporting. These HR programs are already well defined, so the HRIS group does not need extensive HR involvement in the development of computer systems to manage these programs. Corporate decision makers are using the talents of their own staffs to do more sophisticated analyses; these analyses are considered part of the staff role, so HRIS does not have to worry about changing that role or training people to accomplish it. Finally, the HRIS staff needs a high proportion of IS people to maintain its highly integrated systems, and it needs good links with the organization's technology strategy in order to continually improve maintenance and reduce costs. In short, the organization has effectively managed organization dimensions in a way that supports the current HRIS.

Specific Successes. Profile One organizations reported that their greatest initial successes came in reducing the cost of traditional information processing activities, such as preparing payroll, benefits and government reports. Later, as the HRIS database was expanded, these organizations achieved success as a handful of HR managers with skill in analyzing and understanding the HRIS data began to use the data with generic packages to support strategic policy decisions. Finally, the investments in computer programmers and other system support personnel have allowed these organizations to develop extremely user-friendly access to the payroll and benefit information for all employees, through "Employee Data Access" systems.

Future Directions. HRIS groups in Profile One organizations face the need to demonstrate increasing value-added in order to offset the costs of high levels of system information coverage, availability and integration. Some firms are planning to do this by further refining their administrative processing capabilities. Others are planning to increase HRIS utilization beyond its current corporate HR focus. At the corporate level, these plans involve making user interfaces more friendly so that top corporate officers can use the system without having to go through skilled data analysis experts. At the unit level, the plans involve user-friendly systems, as well as extensive training in how to think analytically about using information to support HR decisions. Finally, for employees outside the HR function, the plans mean refining and increasing the number of applications like Employee Direct Access systems. Earlier investments in HRIS coverage and availability provide an excellent foundation for future support of a wider range of HR decisions, and for controlled end user development.

Profile Two: PC-Based, Distributed Systems

Profile Two firms were typically more decentralized, had less capital available for HRIS investments during the 1980s, and were more labor intensive than Profile One firms. These firms typically let each business unit define its own approach to the market, and gave each business unit development, and profit

and loss responsibilities. Such a decentralized strategy means that business unit line managers have more decision making influence than corporate staff decision makers. While HR corporate staffs do make policy and administer corporate-wide programs, HR staff in the business units often customize policy and develop their own programs to meet their line managers' needs. In Profile Two firms, HR staff people were generally younger, more technically oriented, and more analytical, than in Profile One firms. Profile Two firms were also less likely to be unionized. HR was viewed as a business partner; employees were viewed as important stakeholders in the firm.

With these organization contingency factors, information value principles would suggest that HRIS investments to support business unit HR managers would add the most value to Profile Two businesses. The business unit strategy would put a premium on system flexibility and contributions to unit level issues such as employee performance, recruitment, training and an integrated approach to managing all unit level HR programs cost effectively. The more technical, analytical orientation of HR staff suggests that they could use computer applications designed to support decisions, model and forecast, and diagnose problems. They could also generate new ideas for HRIS development. The HRIS developments for Profile Two shown in Figure 6 (p.28) support these predictions.

Profile Two Investments on System Development Dimensions. Profile Two firms typically invested in a few mainframe databases and transaction processing systems, and in many stand alone applications supporting specific HR programs in several business units. Top management perceived a need for business unit level systems support, but knew that no single business unit could muster the resources to effectively develop its own computer systems. They wanted to avoid having redundant, poorly designed or purchased stand alone systems, so a small, central HRIS group was established to manage HRIS development for business units.

This HRIS group began with a payroll dominated personnel database, located on a mainframe controlled by the organization's Information Systems group. Thus, neither data nor mainframe time were easily accessible to HR. When mini computers became available in the early 1980s, the HRIS director loaded HR information from the mainframe into an HRIS-owned mini computer, and answered corporate HR requests for summary reports, for compensation and benefit analyses, and for basic data processing. When PCs became available in the mid 1980s, the HRIS director actively canvassed HR people in the business units to generate ideas for PC-based applications that would help them do their jobs. This approach allowed the HRIS group to have a big impact on many highly visible HR decisions, at a relatively low cost. Certain data in the unit level databases can also be aggregated at corporate level to support payroll, benefit, compensation and general recordkeeping requirements. Other data are not always comparable or transferable across applications or across business units. However, each business unit does have the data and the applications it needs to support key HR decisions.

System Information Coverage. Profile Two firms provide information for a specific application and the HR decisions it supports. There is no single database covering as wide a range of employee categories, history or HR information as the central database described for Profile One firms. The Profile Two approach to systems coverage has the advantages of meeting local data needs for specific programs,

allowing the aggregation of necessary HR information to support these programs at corporate, and minimizing development and maintenance expense. It does, however, limit integrated, organization-wide analysis, since data have to be pulled from many different sources and translated.

System Availability. Profile Two firms make their HR systems available rapidly to unit level decision makers. Decisions about who gets what data and applications are tied to the specific applications and the HR programs they support. For example, employment staff would have access to recruiting applications and internal skills inventory and posting applications, while compensation analysts would use the job evaluation applications. These computer applications are typically on diskettes that can be used by any authorized HR employee. One firm also has several Employee Direct Access applications that are available on diskette to any employee with access to a PC.

System Decision Support. Profile Two firms are particularly notable among our three profiles for their broad decision support. These firms typically provide their business unit HR staff with applications that cover the entire range of decision support listed in Figure 4 (pp. 25-26). For example, in one firm, the first computer applications allowed HR business unit and corporate representatives to capture data and update a database of basic employee records for corporate processing. These same applications also enabled each unit to quickly answer questions about their employees and run local summary reports. The HRIS group then developed computer applications to support more complex HR decisions. These include: succession planning; analyzing, describing and benchmarking unit-level jobs according to company-wide standards; coordinating college recruiters' campus trip schedules and results company-wide; and estimating pension payout changes in response to employee questions about different retirement dates, contributions, etc. HRIS and Finance staffs worked together to develop an application that helps unit-level sales managers estimate the effects of changes in training, sales quotas, headcount, and turnover on their sales revenues and new contracts. The HRIS organization has also developed an Employee Direct Access system for the flexible benefits program. This wide range of decision support provides tangible examples of HRIS' potential contributions to many types of HR decisions. They help to stimulate both ideas and enthusiastic HR community support for HRIS. Line managers are also impressed.

System Integration. Profile Two firms usually have stand alone systems (see Figure 5 (p.27)). with their own databases, their own user screens for data capture and updates, independent reporting menus, and so forth. Such systems are more flexible and less resource intensive than fully integrated systems. The HRIS organization can, for example, more easily use vendor products and customize them for their business units without worrying about overall system integrity. However, users are responsible for making sure an application's database is current and accurate. Quality training for users is thus critical since poor quality data represents a significant problem in realizing any value-added from the transaction processing systems typical of payroll, benefits and compensation administration.

Profile Two Investments on Organization Development Dimensions. The Profile Two firms we interviewed invested heavily in building HR-IS staff bridges; they had high proportions of HR-experienced staff in their HRIS groups. These groups were most often small (for example, 16 persons), and the top HRIS manager was always someone with considerable HR experience and the respect of the HR

community. HR trained analysts with some systems background were often assigned as intermediaries between IS staff and HR users. These HR analysts would answer HR user requests for data, channel development requests through HRIS, and resolve problems with current applications. All application development projects involved relevant HR users. HR analysts were directly involved in installation and training for new applications.

The HRIS groups in Profile Two firms engaged in active, but informal, management of HR community expectations concerning the role of HRIS in HR management; they emphasized a client and service oriented approach to HRIS. They developed networks of knowledgeable HR computer users in the business units to discuss user needs and frustrations. HRIS communications were always targeted to user needs, with at least moderate levels of 'selling HRIS' to the HR community. They also stressed that the broad range of their computer applications provided tangible examples of the potential contributions of HRIS.

Investments for building HRIS knowledge in the HR communities of these Profile Two firms were typically limited to application specific training. One firm did, however, include information about the role of HRIS in defining new competencies for HR in the 1990s. Profile Two firms also focus on hiring new HR people with analytical skills.

Finally, HR-Organization technology links were only moderately developed in Profile Two firms. Most kept up ties with external vendors, professional associations and universities, but did not have the resources for ongoing, formal evaluations of new technology that might meet HR needs. Formal technology evaluations by internal committees and task forces were more common for the other two profiles.

It seems that for Profile Two firms, the involvement and support of a large portion of the HR community was considered essential to HRIS success.

Specific Successes. Profile Two organizations can point to highly visible unit level applications that support important HR decisions. Their successes are measured by the importance of the unit and the unit-level managers who benefit from the HRIS decision support, and by the heightened awareness about these applications found among other unit level managers. A successful unit level application also serves as a prototype for similar applications in other units, eventually becoming a standard HR application across many units. A key advantage of the Profile Two HRIS development strategy lies in allowing firms to achieve early, visible successes in individual units, without first requiring a long-term investment in an integrated, comprehensive database and applications.

Future Directions. As Profile Two organizations develop more successes, the efficiencies of integration and wide coverage become apparent. Exporting successful applications across units is much easier if there is some standardization in the data, hardware and software used by different units. As units get a taste of the power of automation to support specific decisions, they want to expand their analyses to more types of information, more time periods and across units. Finally, successful unit level applications are now motivating corporate level managers to request similar tools for their own use. Several of these firms are now undertaking company-wide data modeling, and developing a data dictionary that provides

standard definitions for HR data. They are now insisting on a standard technology platform --that is, compatible hardware and software throughout the HR community.

Profile Three: Centralized Systems with a Focus on End User Development

Profile Three firms were generally less centralized than Profile One, but more centralized than Profile Two. One of these firms was the most labor intensive of our sample; others were not highly labor intensive. They did not have as much capital for HRIS investments as Profile One firms, but they had more than Profile Two firms. Their corporate strategies clearly focused on gaining market share and a more competitive industry position. This typically meant delegation of profit and loss responsibilities to the business units. At the same time, however, there were often corporate-wide efforts to foster employee identification with corporate goals and to revitalize employee performance throughout the corporation. For HR, this meant that key HR decision makers were located at both the business unit and at corporate levels of the firm, with business unit HR staffs supporting their line managers and corporate HR staff developing strategies for performance management. The HR business unit staffs in Profile Three firms were typically generalists, and the corporate staffs were functional specialists. The role of HR in these firms was traditionally most like that seen in Profile One --emphasizing administration and good corporate citizenship. But since the mid 1980s, firm expectations of HR have escalated. HR is now expected to lead performance management, to control HR costs and work force growth throughout the corporation, and to support better decisions and flexible programs in the business units.

Information value principles would suggest that, given these organization contingencies, HRIS investments that support HR administrative efficiency, better decision making in the business units, and more flexibility would add value for Profile Three firms. These firms need to combine the efficiency power, broad database coverage and extensive systems availability of Profile One firms with the flexibility, visibility and range of system decision support found in Profile Two firms. Figure 6 (p.28) illustrates that Profile Three firms do combine some of the HRIS development characteristics of the other two profiles.

Profile Three Investments on System Development Dimensions. Of the three profiles, Profile Three firms have most recently made major revisions to their HRIS. Thus, they have more recent technology. Most Profile Three firms have made substantial investments in mainframe HRIS databases and applications since the mid 1980s. The impetus for these investments has come from top management. In one case, merger and acquisition activity revealed major HRIS administrative inefficiencies and redundant, poorly designed stand alone computer applications. In other cases, top management called on HR to play a central role in 'revitalizing' the organization --through performance management programs, quality efforts, and more flexibility in HR business unit programs. HRIS were viewed as critical to this HR role. These firms clearly believe that all HR employees must understand and use HRIS, if HR is to provide significant competitive contributions to the business; thus they focus on end user development.

System Information Coverage. The HRIS databases developed in Profile Three firms have been relatively comprehensive across categories of employees, HR functions, organization locations, and history, but cover less information than is typical in Profile One firms. In Profile Three, the HR community was heavily involved in defining the HR functional information for the corporate-wide HRIS databases. Local

units can add their own data as needed. This approach to systems coverage allows information coverage sufficient to support a wide range of HR decisions, but at lower cost than seen in Profile One. Making this tradeoff work well, however, requires a technology that allows for local additions to the database and the training of local end users to make such additions.

System Availability. In Profile Three firms, system availability is extensive; it is comparable to that seen in Profile One. All potential HR community users can access HRIS via PC connections to a central mainframe. Local HR administrative staff can capture, update and edit information on payroll, benefits, compensation and employee demographics. Most HR staff can do information inquiries and reporting; authorized staff can use generic packages for modeling, forecasting and analysis. In contrast to Profile One, most Profile Three firms have not made any HRIS available to individual employees via Employee Direct Access or Executive Information Systems. Extensive availability allows Profile Three firms to develop cost efficient payroll, compensation, benefits and employee recordkeeping systems. It also provides the network needed for information flows, which can improve decision making and communication, throughout the firm.

Systems Decision Support. Profile Three firms' HRIS applications supported less complex HR decisions, like those seen at the top of Figure 4 (pp. 25-26). As in Profile One, the computer applications in Profile Three firms were mostly for transaction processing, office automation, reporting, and tracking. Generic spreadsheet, word processing, and statistical analysis packages were also part of the HRIS. Profile Three firms focused on meeting a range of end user needs in designing or purchasing computer applications. For example, one firm provides HR users three generic reporting packages: one that is difficult to use without programming knowledge, but generates complex files, custom calculations and report formats; a second that makes it easy for the user to generate fairly complex files and do a variety of prespecified calculations and types of reports; and a third that allows users with no programming knowledge to make ad hoc requests for simple employee statistics and reports by typing requests in English.

System Integration. Profile Three firms use HRIS that are not as technically efficient as the more fully integrated systems of Profile One, but they avoid many of the data quality, comparability and aggregation problems associated with stand alone systems like Profile Two's. Relational systems involve a series of linked, but independent databases each with its associated computer applications. The information in each database is collected to answer HR questions about a particular functional area (for example, benefits), but all databases are constructed according to the same standards. Data from any one base can be pulled into another via a common, unique identifier such as an employee number. Relational technology makes it relatively easy for the user to manipulate files and do reports because virtually all the necessary information is already part of an independent database. By contrast, in fully integrated systems, a file needed to answer training questions, for example, may have to be constructed using higher level programming skills to pull data from many parts of a hierarchical database. Relational technology also makes it relatively easy to add information to any particular database or to combine information from several databases, since all are standardized and linked. This technology makes it easier to satisfy local requests and still maintain relatively high efficiency in administering corporate-wide HR programs.

Profile Three Investments on Organization Development Dimensions. Profile Three firms outdo all the others in their investments to involve the HR community in HRIS (see Figure 6 (p.28)). Their end user focus makes such investments critical for success. The HR-IS bridges in these firms are solid and extensive. The HRIS group director typically has substantial HR or strategic planning experience, always reports directly to top HR managers, and is visibly supported by them. The HRIS staff is relatively large (70-150); its an even mix of HR and IS people permanently assigned to HRIS work. HR people handle client services, canvass local units to identify HR system needs, and develop documentation and training materials.

One Profile Three firm insists that local HR staffs designate two to three people responsible for HRIS training, systems support, and client service. The HRIS group then trains and supports these people. This approach provides on the spot service for HR users. These HR users are directly involved in systems development through task forces. A representative from each user group is assigned to a development task force, and works in the same building with the HRIS staff during development efforts. This proximity and intensity helps HR users better understand systems and increases their computer skills. This firm also trains IS people in Computer Assisted Systems Engineering (CASE) technology, information engineering approaches to system development and other more recent methods for helping HR users quickly and accurately define their system needs.

Profile Three firms also invest heavily in building positive HR community expectations about HRIS. Top management in these firms has clearly emphasized the importance of HRIS in delivering competitive value to the business. This means that HR performance rewards reinforce involvement in HRIS activities, and line managers try to accommodate HRIS efforts by their units' HR generalists.

One Profile Three firm developed a 'marketing' strategy to promote HRIS; the strategy includes an array of videos, brochures, documentation, orientations and logos targeted to different HR decision makers. The HRIS director has also enhanced HRIS visibility and credibility via a review structure that places HRIS issues on committee agendas at all levels of management.

HR community knowledge about HRIS is developed in all Profile Three firms through training programs designed to introduce HR employees to basic computer skills, to data administration concepts, to the potential of different types of computer systems to solve their working problems, and to develop skills for specific HRIS applications. In one Profile Three firm, any HR employee who wants to use any part of the HRIS is required to take these courses.

Profile Three firms also invest heavily and formally in linking HR-Organization technology strategy. There is usually a standing committee which includes HRIS representatives charged with evaluation of new technology and long term planning for organization technology investments. HRIS does not always follow the rest of the organization in its technology choices, but typically makes compatible choices. HRIS also gains exposure to new technology that might be useful for HR.

The differences in degree of development between Profile Three firms and the other Profiles in our sample on these HRIS organization dimensions are startling (see Figure 6 (p.28)). All the firms we interviewed agreed that these dimensions were important to HRIS success, yet only Profile Three firms

make major investments. It seems clear that the end user development focus of Profile Three firms is one reason for this difference. Profile Two firms needed support from a broader portion of the HR community than Profile One firms, and thus made relatively higher organization investments. But Profile Three firms need the support, understanding, and active involvement of the entire HR community in HRIS development in order to pull off their HRIS strategy.

Specific Successes. Profile Three firms have a shorter track record than the other two profiles. They have been successful in achieving many of the cost efficiencies of traditional information processing systems for payroll, benefits, compensation and recordkeeping that we described for Profile One firms. They have laid a foundation of HR information and made this information available to support a wide range of HR decision making. They have some early successes in end user development. For example, some local HR staff are successfully customizing their own screens and menus for data capture and updating, independently using reporting packages, asking for additional HR information, and learning how to add information locally.

Future Directions. Profile Three firms will continue to push end user development by getting HR more involved in the development of computer systems for modeling and decision support at both corporate and business unit levels. It remains to be seen whether end user development will be feasible for these more complex decision support systems. The HR community will have to be assessed to determine analytical skill requirements --as in Profile One-- and decisions made about buying or building these skills.

USING THESE FINDINGS TO IMPROVE HRIS INITIATIVES

Our three profiles indicate that HRIS can support HR strategic objectives. Profile One firms provided administrative efficiencies and broad-based support for corporate level policy decisions. Profile Two firms were supporting business level HR decisions and stimulating HR staff to think of new ways to address unit level HR program management. Profile Three used HRIS to support the firm's overall revitalization policy and HR's role in supporting it. These three profile were distinct, suggesting that different gains arise from different computer technology investments. Decisions about which investments are best for a particular organization can be more easily made using the principles of information value and contingency theory. Look for the key decisions makers and direct HRIS investments to them. Scan organization contingencies to determine factors that might hinder or reinforce HRIS developments. Finally, consider the eight system and organization dimensions shown in Figure 1 (p. 22) in developing HRIS.

These findings also suggest several questions that HR managers should ask as they consider using computer technology. Answers to these questions will stimulate discussion of important issues and possibly uncover issues that might have been missed.

1. Have we reached the "threshold" level of HRIS use? Do our basic HR administrative costs about equal our competitors'? Do we automate most of the same programs? For example, are there required internal or government reports that could be better produced using computer technology? Is the use of third party administrators for payroll, savings plan, pension or group benefit programs still efficient? Are there less obvious, but still routine administrative tasks such as updating and distributing policy manuals, or having local units capture and update hiring, pay change, transfer, etc. data that could be more cost

effectively automated? Before we move on to investments in more complex decision support systems with wider coverage and availability, do we know that we're reaping the full benefits of more traditional HRIS activities?

2. As we move beyond the threshold level of HRIS investments, who are the key decision makers in our organization? Where are they located in the hierarchy? Considering our firm's overall business strategy, where will the key decisions be made in the next three to five years? How can we measure computer system benefits in ways that are precise and relevant to the key decision makers?
3. In what HR functional areas will the key decisions be made? What data will be needed to support key decisions in these areas? What kinds of analysis will be needed? If data from several HR program areas (benefits, compensation, training, etc.) must be integrated to support decision making, what level of systems integration and what database development standards will be required? If many types of analysis will be required (modeling, forecasting, simulations, etc.) what computer based decision support systems will be needed?
4. Are the target users (decision makers) of our HR computer systems ready for them? Are they hostile, dubious, friendly? How can we convince users of the gains from these systems? Are the key decision makers convinced of HRIS' value for HR? Are they willing to take risks to make HRIS valuable tools for all levels of HR decision making, or do they need to be convinced through several focused, but visible, examples of system value?
5. What are the anticipated skills of HRIS users at different decision making levels in the firm? What mix of training programs will be required to develop the needed skills? Will training be enough, or do we need to recruit people with these skills and carefully place them?
6. Is our HRIS group sufficiently independent, visible and credible? Do we need additional HR skills on the HRIS staff? Are the IS people, who work with HR, able to help users define their system needs? Are they trained to work with less traditional, non mainframe technologies and system development methods?
7. What is the organization's technology base? Are our HR systems compatible with this base, or will we need to develop our own systems in order to meet HR needs? Do we want to use data from other areas like purchasing, manufacturing, marketing, and finance? If so, what data modeling and administration standards must be set?

A FRAMEWORK FOR COLLABORATIVE RESEARCH

These preliminary results suggest several fruitful directions for future research. All of the research directions can profit from collaboration between CAHRS researchers and managers in sponsor corporations. Such collaborative research has the greatest potential to uncover findings with lasting importance to both business and academia.

Do The Profiles and Patterns Identified Here Fit Other Situations?

These ten interviews have revealed a number of interesting findings, but they did focus on large organizations with well-developed HRIS. It would be interesting to know if the same patterns occur in

smaller organizations, organizations just beginning to automate their HR function, public-sector organizations, or organizations with their home base in other countries.

Do Other Organizational Stakeholders Perceive the Patterns Similarly?

We focused our initial interviews on the top HRIS manager and his/her staff. This perspective is useful, but others might have different views about the measures of HRIS success, the dimensions most important to consider in HRIS development, and the general role of HRIS in HR management. Likely people to interview include line managers at all organizational levels, HR professionals and others who use the system, and even customers. For example, research might focus on the ways that the more analytical members of the HR community use the firm's HRIS, and how to effectively extend such uses throughout the firm.

How Can Automation Support the Human Resource Role in Globalization?

These initial interviews focused primarily on domestic U.S. operations. It would be interesting to explore HRIS initiatives that are successfully supporting globalization strategies. Do the same dimensions and value-added principles hold, or is international HR automation different?

How Can Models From Other Business Areas Improve Human Resource Applications?

We frequently encounter very sophisticated decision support systems in non-HR areas, such as expert systems for diagnosing illnesses; graphical models that simulate the effects of oil field drilling operations, automobile performance, or manufacturing processes; flight simulators, and even video games. It's obvious that the principles behind such applications might well apply to human resource decisions, but there's little cross-functional development to tap this potential. Research might focus on identifying such models, translating them into the human resource management field, and developing applications based on these principles.

What Are the Actual Effects of Automated Systems?

While having experts report on their impressions of HRIS value-added is useful, do these impressions really reflect the actual effects of automated systems? What are the effects of such initiatives as Employee Direct Access, unit-level HR applications, extended decision support systems, and enhanced information coverage on the performance, behaviors and attitudes of the key constituents? There is precious little research that actually documents both the costs and benefits of such systems, yet this is precisely the kind of information managers need to make better HRIS investments.

How to Ask the Questions: Alternative Research Approaches

Interviews. As this report shows, interviews produce highly detailed and intensive information. They allow the researcher to probe and question in an unstructured way, and they are especially valuable for initially describing patterns, formulating theories, and suggesting directions for future research. However, interviews are also time consuming and expensive, and they rely primarily on the opinions and statements of those interviewed, rather than on objectively-tested results.

Survey research. Survey research can collect more structured, quantitative (sizes of staff, numbers of PCs per HR capita, costs, etc.) information across a much larger sample of organizations and constituents. Surveys can be constructed based on the patterns and findings of previous interviews. For example, with

the findings from our ten interviews, it will be possible to construct a set of survey items that would help us better understand the reasons for HRIS development, what works, why it works, and where the field is going. A large stratified-sample survey of organizations would provide such data very quickly. Our findings suggest that such a survey must go beyond simple counts of the hardware and software being used to identify trends and relationships that can help managers better anticipate the future, and design systems to capitalize on it. Such surveys might also be used to identify applications in other areas whose principles would be valuable to HR managers.

Field Experiments. Both surveys and interviews can provide information about what people think is happening. But sooner or later, organizations must gather information on the effects of actual computer system initiatives. "Field Experiments" are carefully designed studies, using measurements of important variables taken both before and after the initiatives are undertaken. Such experiments provide information on a focused set of variables and constituent reactions, in response to a controlled set of automation initiatives. Because information is gathered in a carefully controlled experiment, the findings are more valid and interpretable. The CAHRS has already initiated two such studies involving the effects of communicating benefit information to employees through automated systems, and the effects of analytical training and improved analytical decision support systems on HR managers and their clients. Extending this approach could provide a wealth of objective evidence of the effectiveness of HR automation.

Business Area Reviews. Other disciplines and management areas (such as engineering, manufacturing, and finance) have long used automation as a value-added tool. Literature reviews could focus on the contributions computer technology in these areas have made to business competitive advantage. Reviews of history and trends in computer technology use in these areas can reveal the lessons they have learned, and summarize their implications for HR managers. It was just such a review that established the information value principles and the interview strategy used in this report.

Technical Reviews. Several of the HRIS groups we interviewed wanted to meet and share ideas with others active in developing HRIS. They wanted to know other's experiences with particular types of hardware and software, whether other's had developed satisfactory evaluation guidelines for technology purchases, and so forth. The CAHRS and its Extension affiliates could provide a venue for such consortia and act as a clearinghouse for the results.

Figure 1 Summary of the Dimensions Contributing to HRIS Success

System Development Dimensions:

System Information Coverage

System Availability

System Decision Support

System Integration

Organization Development Dimensions:

Building HR-IS Bridges

Building HR Community Expectations

Building HR Community Knowledge

Linking HR-Organization Technology Strategies

Figure 2
HRIS Development Dimensions: System Information Coverage

Information Coverage Categories

Employee Status	Locations	HR Functions	History
Applicants	U.S. Parent -cost ctr.	Employee records Pension	#Yrs saved
Active/Inactive	-profit ctr.	Group Benefits Compensation	#Yrs online
Hourly/Salaried	U.S. Subsidiary -cost ctr.	Accident/Safety EEO	Date sensitivity
Retirees	-profit ctr.	Job Inventory Job Performance	
Terminees	Non U.S. Affiliate -sales	Career Development College Programs	
Benefits Dependents	-other	Recruitment Selection	
Benefit Survivors		Training Illness/Absenteeism	
Contractors		Labor Market Wages Labor Relations	
Multiple statuses			

Figure 3
HRIS Development Dimensions: System Availability

Availability Categories

<u>Employee Level</u>	<u>Geographic Locations</u>	<u>Types of Use Authorized</u>
HR Administrative Staff	U.S. Parent	Data Query, Capture and updating/editing
HR Professionals	U.S. Subsidiaries	Reporting
HR Managers	Non U.S. Affiliates	File downloading
Non HR Professionals and Managers	Supply Sources	Modeling/analysis
Executives	Contractors	Can send data within firm
Individual Employees	Plan Administrators	Can send data outside firm
	Insurance Carriers	
	Sales Distributors	

Figure 4 HRIS Development Dimensions: Systems Decision Support

Transaction Processing

High-volume data processing involving sorting, listing, merging, editing and updating data, plus some simple calculations, such as percentages, sums or averages. This function allows many administrative reports and calculations to be done very quickly and efficiently. Such applications would include large-scale processing, such as payroll and benefits statements. For employees, examples include applications that aid in retirement planning, benefit enrollment decisions, or career planning.

HR Examples: On-line reporting of merit pay guidelines and costs, determining employee eligibility for benefits, preparing OSHA, EEO or other governmental reports. Employee benefits enrollment and career planning programs that automate step-by-step instructions for employees.

Value Added: Reduction in time, people, paper necessary to accomplish routine tasks. Increase in accuracy and timeliness of reported information. Not necessarily focused on decisions, but can enhance decisions if data is used properly.

Office Automation

Provides expanded networked access to standard office documents, files, schedules, and so forth. Often based on electronic mail and word processing software, but some include simple spreadsheet and data base capabilities as well. May incorporate information from transaction processing into simple on-line reports.

HR Examples: Online HR policy manuals, job descriptions, and benefits guideline manuals.

Value Added: Reduction in time, people, and paper necessary to accomplish routine communication. Increased accuracy and timeliness of reported information. Not necessarily designed for decision making, but enhances many routine decisions if used properly.

Tracking Deviations From Goals

Lower-volume data processing that involves using information from transaction processing, but adds goals for comparison. This function goes beyond simple report generation, and requires that the user establish plans and examine deviations from goals. Such goals may include head count, budgets, and performance targets.

HR Examples: Calculating current over and under-spent merit pay budgets, comparing planned to actual medical benefit costs, identifying safety or employment areas that fail to reach pre-set goals.

Value Added: Better managerial decisions as to when and how to adjust practices to better achieve goals. Better communication of the status of goal attainment. Faster and more efficient goal attainment reports.

Modeling and Forecasting

Lower-volume data processing that goes beyond simply tracking deviations from goals, to attempt to predict future deviations using past data. Simple expert systems that direct the analyst toward potential causes of deviations and/or suggest courses of action. Statistical analysis and graphics capability are often included here, to facilitate efficient use of past information to predict future trends.

HR Examples: Forecasting the effects of work force demographics on future compensation and benefit obligations. Forecasting effects of retirement incentives, turnover reduction programs, or wellness programs on future head count and costs. Expert systems that aid analysts in determining appropriate job evaluation levels.

Figure 4 HRIS Development Dimensions: Systems Decision Support (Continued)

Value Added: Enhanced decisions through better anticipation of future trends. Highly affected by the importance of the decisions supported and the user skill available. Can have revolutionary effects on strategic policy decisions that may affect thousands of employees.

Decision Support Systems

Very low-volume data processing that takes models previously used by skilled analysts and creates automated systems that capture the analyses for executives. These systems use automation to guide decision makers through the analysis, so that even less skilled users can use and experience the value of analytical approaches. Sophisticated versions of such systems may include natural language inquiry, expert systems, and interactive modelling. Sophisticated executive support systems would fall in this category.

HR Examples: Managerial data system that presents current compensation budget or head count trends, notes deviations from goals, and projects future deviations. Application linking HR outcomes such as training time, turnover, hiring levels, and productivity to bottom-line outcomes such as costs, revenue and profits.

Value Added: Better-quality strategic decisions by executives. While the system affects relatively few decisions, those it does affect are critical to organizational survival and growth. Value lies less in cost reduction and much more in enhanced decision quality.

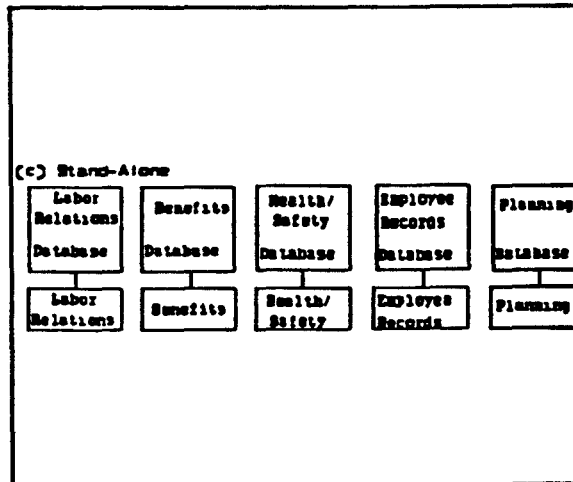
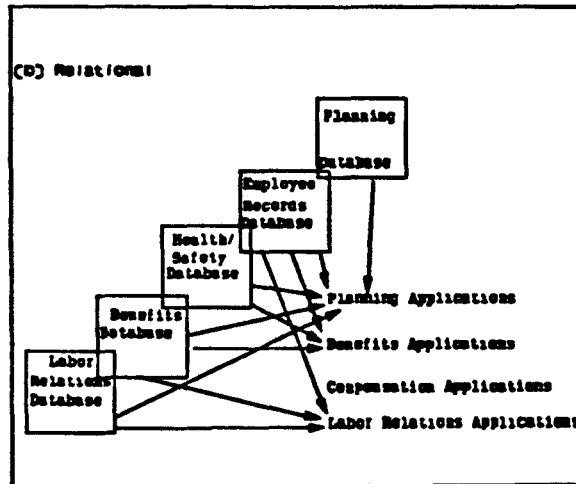
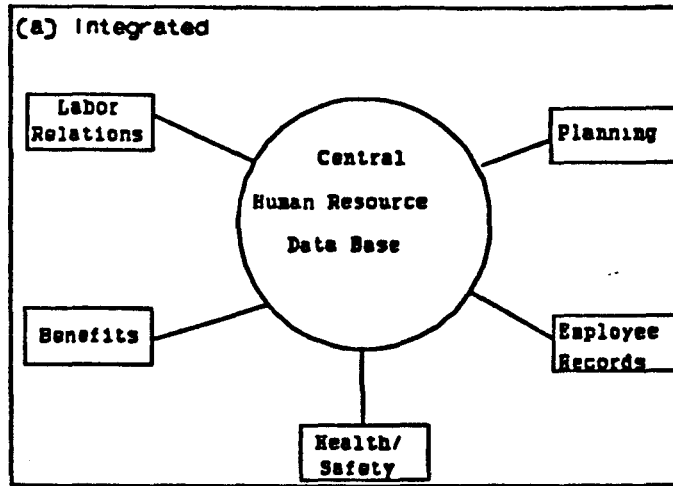


Figure 6 Three Profiles of HRIS Development

	Profile One	Profile Two	Profile Three
	Traditional, Central Mainframe	PC-Based, Distributed	Central Mainframe, End User Development Focus
<u>System Development Dimensions</u>			
1. Database(s) Coverage	Comprehensive	Application Specific	Comprehensive with local additions
2. Availability	Extensive, HR and non HR users	Application specific, most HR business units	Extensive for HR users
3. Decision Support	Focus on simpler, administrative decisions	Support range of HR decisions from simple to complex	Focus on simpler, administrative decisions
4. Integration	Full	Stand alone	Relational
<u>Organization Development Dimensions</u>			
5. HR-IS Bridges	HR manages HRIS, but IS influence high	HR controls HRIS	HR control HRIS, HR staff in units given HRIS duties
6. HR Expectations	Low investments	High, informal investments	Very high, formal investments
7. HR Knowledge	HR training specific to applications	HR training specific to applications; investment to bring in new skills	Across the board training, mostly required
8. HR-Org. Technology Links	Formal links, high investments in internal development	Informal links, moderate investments in vendors and internal development	Formal links, high investments in vendors