

Human Resource Management, Information
Technology, and the Competitive Edge

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and

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Working Paper 91-19

Center for Advanced Human Resource Studies
Cornell University

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 other interested in human resource management in preliminary form to encourage discussion and suggestions.

Support for this research came primarily from the Center for Advanced Human Resource Studies. Additional support came from the U.S. Army Research Institute, contract SFRC #MDA-903-87-K-001. The views, opinions, and/or findings contained in this article are those of the authors and should not be construed as Center or Official Department of the Army policies, or decisions.

HUMAN RESOURCE MANAGEMENT, INFORMATION TECHNOLOGY, AND THE COMPETITIVE EDGE

EXECUTIVE OVERVIEW

Global competition is putting more and more pressure on U.S. managers to make faster and better business decisions. Investments in information technology are often touted as a critical means of speeding up and improving management decision making. Yet it has proved distressingly difficult to realize the potential of information technology investments. This is particularly so in business areas such as Human Resources (HR), though the longer lead times traditionally associated with changes in HR systems mean that HR is a prime candidate to benefit from information technology.

In order to pull into the lead in global competition, managers must control labor costs, motivate employees to high quality, customer oriented performance, and continuously search out new and better ways of doing both. These objectives must be met in the face of shrinking head count and a global environment in which employees are more culturally diverse and located throughout the globe. Even the relatively routine tasks of employee record keeping and legal and regulatory compliance are geometrically intensified in this context. Such complexity also demands more sophisticated applications of technology that go beyond simply improving the management of routine tasks.

All managers thus have a stake in exploiting information technology to better manage their human resources. We propose a framework to help managers consider how HR information technology can improve human resources management and contribute to competitive advantage.

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Alice could never quite make it out in thinking it over afterwards, how it was they began: all she remembers is, that they were running, and...the Queen kept crying "Faster! Faster!"...till suddenly, as Alice was getting quite exhausted, they stopped...Alice looked around in great surprise. "Why I do believe we've been under this tree the whole time!...in our country, said Alice, you'd generally get somewhere else-if you ran very fast..." "A slow sort of country!" said the Queen. "Now , here, it takes all the running you can do, to keep in the same place. If you want to get somewhere else, you must run at least twice as fast..." (Lewis Carroll, *Through The Looking Glass*).

Alice's run and its surprising results must strike a chord with many managers of U.S. firms. Accustomed to "getting somewhere else" when running fast in the competitive race, they are now finding that their best time only keeps them in place. Anxious to outrace others, managers search for the combinations of strategy, motivation, technology, and work method and design that yield a competitive edge: sustainable, above average business performance. Their search covers information technology and its management applications. Many managers are especially interested in applications designed to better manage human resources. They want investments in such applications to pay off by contributing to firm competitiveness.

No one has yet proved the effects of information technology on a firm's competitiveness, but the HR Information Technology Project in the Center for Advanced Human Resource Studies at Cornell suggests how technology can enhance HR contributions to competitiveness. Our basic research on the use of information technology in HR, our interviews with Fortune 500 firms to discover what they've learned from their investments in Human Resource Information Systems (HRIS)¹, and our use of information technology in Human Resources (HR) training² suggests that information technology has enormous potential to make HR more competitive. This paper focuses on one issue involved in realizing this potential: the match between HR competitive

objectives and the types of HR computer applications in which a firm invests. There are many other issues involved in realizing information technology's potential, such as planning and investments in work force skills, in databases and equipment, and in organization and work design³. Unfortunately, discussions of these issues is beyond the scope of this article; we will touch on them only in passing, as they relate to our major focus.

The Competitive Potential of Information Technology

The competitive advantage of information technology became a widely accepted idea in the 1980s⁴. Computer technology had by then led to creation of new products and services. Citibank had raised the costs of entering the consumer deposit market by developing Automatic Teller Machines (ATMs). American Airlines' had locked-in customers via its Semi-Automated Business Research Environment (SABRE). Information technology's ability to improve management decisions with better information had also been demonstrated. For example, computer applications designed to inventory all the parts used in specific manufacturing settings reportedly enabled managers to reduce inventory, purchasing and design costs, while also reducing the time needed to meet production and delivery targets. Such systems could propel a manufacturer into a strong market position by redefining the industry standard of 'low-cost, high quality producer.'

In HR, information technology can be used to develop competitive products or services⁵, but, to date, it has mostly been used to improve HR decisions with better information. In interviews with the HRIS groups in ten Fortune 500 firms⁶, we found that the majority had invested in computer applications to manage employee records, payroll, and compensation and benefits administration. A common payoff to such investments was more efficient information management. At NCR, automated pension record keeping applications eliminated several layers of 'paper and pencil' entries and manual calculations, and helped cut pension administration costs by increasing the accuracy of pension payout estimates nearly ninety percent. Armstrong

World's benefits management computer applications enabled the parent company to self insure and better control health benefit costs via targeted claims monitoring. ARCO's investments in computer systems to store and process HR information improved its accuracy and timeliness. Better HR information has led managers to ask more questions about how head count, turnover, skills inventories, or performance ratings affect their units' business objectives. Mobil Corporation's managers developed computer applications that helped them select among several major work force relocation alternatives to choose the one that best met Mobil's cost reduction targets. NCR's Finance and HRIS managers jointly developed a computer application that shows how decisions about hiring and training in sales units can affect sales revenues and profit. Now HR and line managers can more effectively hire and train sales forces to optimize these objectives.

These examples demonstrate that information technology can improve HR administrative, operational, and planning decisions. Unfortunately, most organizational investments in HR information technology support only a narrow range of administrative decisions, such as those associated with payroll and record keeping⁷. In many cases the competitive potential of even these narrowly focused investments has not been fully exploited. To reduce this investment myopia, we need a framework that helps managers think about how HR information technology --specifically different types of computer applications-- can help achieve competitive objectives. We develop this framework in the sections that follow by:

- 0 Defining HR competitive objectives and related decisions;
- 0 Describing types of computer applications and the decisions they are designed to improve; and
- 0 Matching HR competitive objectives with the computer applications that best support them.

HR Competitive Objectives and Related Decisions

Schuler and Jackson's 1987 article in *The Academy of Management EXECUTIVE*, identified three firm-level competitive strategies as primary drivers of HR competitive objectives: Cost Leadership, Quality/Customer Satisfaction, and Innovation.

In a Cost Leadership strategy, a firm strives to become the low-cost producer in its industry. Sources of cost advantage include economies of scale, proprietary technology, or favored access to important supply sources (people, raw materials, etc.). A Quality/Customer Satisfaction strategy emphasizes improving existing work methods, products/services, and customer relations as a means of commanding premium prices. This strategy, like the Cost Leadership strategy is concerned with cost reductions, but only in areas that do not directly affect customers' perceptions of quality or value. The Innovation strategy emphasizes differentiation through the creation of new operations and management methods, technology, or products/services. The Innovation strategy could yield long term results that support either Cost Leadership or Quality/Customer Satisfaction strategies, such as a new technology that makes the firm the industry's low cost producer, or new work methods resulting in substantial increases in product or service quality.

To achieve these strategic objectives and realize competitive advantage for the firm, HR must first apply strategy to its own house --that is, within the HR function itself. Restructuring in most firms has left HR with a smaller work force, yet equal or greater responsibilities and new demands. Time has become as critical a resource as talent and money. HR must review its work to define strategic priorities. What work must continue to be done? Of that work, which can be done better by searching out efficiencies and economies of scale (Cost Leadership); which can be done better by delegating and collaborating with line managers and employees or other functional staffs (Quality/Customer Satisfaction); and which would most benefit from creative time, talent, and resources (Innovation)? In short, how can HR best work harder, smarter, or with more vision?

Exhibit 1 illustrates how HR can divide its work and address related decisions for each competitive strategy. To achieve Cost Leadership, HR could streamline processing of employee records, payroll, and benefits by standardizing and eliminating unnecessary paper handling and reporting. HR thus becomes the low cost provider for critical administrative work, as well as a more accurate and timely provider of HR information. To achieve Quality/Customer Satisfaction, HR can collaborate with line managers or other 'clients', to become more responsive to their needs. For example, HR could replace a merit pay process requiring line managers to follow an imposed, standard set of guidelines with a system encouraging HR and line managers to jointly customize pay increase plans for their units. HR contributes the incentive design expertise. Line managers contribute their 'hands-on' understanding of customer demands and the rewards that would best motivate employees to achieve those demands. Under an Innovation strategy, HR could allocate 15-20% of staff time to exploratory, creative projects with uncertain short term payoffs. Perhaps HR could reach new customers by providing expertise to other organizations, thus making HR a profit center.

In most cases, work division will not be so clear cut as in Exhibit 1, but assigning HR work to Cost Leadership, Quality/Customer Satisfaction, and Innovation strategies reveals how resources might best be allocated to support one strategy over another.

Types of Computer Applications and the Decisions They Support

Information technology encompasses hardware, software, and peripherals, providing management with increasing capacity to record, store, manipulate, and communicate information across far flung geographic boundaries, with access by many users. We focus on computer applications that can improve HR's ability to access, manipulate, or present information. Such computer applications exist for all types of hardware --mainframes, stand alone PCs, or PCs operating as a network.

We consider three types of applications: Transaction Processing/Reporting/Tracking Systems, Expert Systems, and Decision Support Systems. In Exhibit 2 each type of application is briefly described, and classified in terms of the complexity of the decisions it is designed to address, and the level of the demands it makes on a user's analytic and computer skills. Transaction Processing/Reporting/Tracking systems are associated with the least complex decisions, and the fewest demands on user analytic and computer skills. Decision Support Systems are associated with the most decision complexity and highest demands on user skills⁸.

Match Computer Applications and HR Objectives for Competitive Advantage

In Exhibit 3, we match HR objectives from Exhibit 1 with the types of computer applications listed in Exhibit 2 to suggest how such matches offer competitive benefits for the firm. The cells in Exhibit 3 show the potential benefits of these matches. The diagonal, shaded cells represent the matches with the highest potential benefits; the off diagonals illustrate other possible benefits.

In the sections that follow, we use HR examples of the three major types of computer applications in Exhibit 2, to illustrate the decisions these applications support. We then elaborate on the benefits of matching HR objectives and computer applications.

Transaction Processing/Reporting/Tracking Applications

Transaction Processing/Reporting/Tracking applications best support routine, high volume HR decisions with well defined information needs and outcomes. The work associated with such decisions is very common in HR, including: calculating overtime pay under the Fair Labor Standards Act, reviewing and documenting employee transfers, calculating employee pension benefits at different retirement ages, and comparing current payroll levels against budgets. The rules governing these decisions have been predetermined by the firm or by law. Transaction processing, reporting and tracking

applications can also be used effectively by people with minimal analytic or computer skills.

How do these applications improve the decisions associated with such routine tasks? Some of these applications directly improve transaction processing. An application for managing information on employee pay and benefits can improve HR decisions by handling data processing and reporting quickly and accurately, thus improving aggregate estimates of the firm's pay and benefit obligations. Other applications increase information available to decision makers by providing easy access to information from many sources (including sources external to the firm), and reporting it in many formats (including graphs, tables, and charts). Such reporting applications are typically aimed at higher level managers and executives. For example, managers frequently ask about the distribution of employees in exempt pay grades by major business divisions. A sophisticated reporting application handles this question by allowing managers to type the question into their computer in English, and by reporting the answer back to them in simple summary sentences, statistics, and graphs⁹. HR tracking applications enable managers to compare unit or departmental performance against goals in areas such as performance appraisal completions, merit budget allocations, turnover, and hires.

Transaction Processing/Reporting/Tracking Applications MATCH Cost Leadership

As Exhibit 3 shows, transaction processing, reporting and tracking applications primarily support cost leadership objectives --especially those that require reducing administrative costs. They enable HR to decentralize much administrative work and to eliminate layers of paper handling while increasing administrative standardization, accuracy, and auditing controls. Most transaction processing applications enable HR information to be entered directly into a computer at the point of transaction --new hire information would be entered by the hiring unit, for example. Direct entry can eliminate several layers of paper shuffling, yet still provide an aggregate record of

transactions. These applications can thus free up some HR time to pursue other, more productive work, and may even decrease required HR head count. Transaction processing applications typically have built-in audits that warn users when any information they input falls outside acceptable ranges, thus reducing errors at entry points, and minimizing later data checking. When tracking applications signal deviations from goals, they provide early warnings that allow faster and more effective corrections. For example, one application might tally total monthly pay increases allocated, compare them to targeted annual pay increase totals, and report the units where actual increases are running well ahead of target. Such early warnings allow HR and line managers to act before variances become costly. In short, transaction processing, reporting, and tracking applications can support a firm's cost leadership goals by helping HR work harder with fewer people.

Exhibit 3 also suggests that these applications can support quality and innovation strategies. By reducing the time HR must spend on routine administrative tasks, transaction processing, reporting, tracking applications can free time for concentration on quality and innovation issues. The more advanced applications enable individual units to customize reports and maintain special databases, often increasing their satisfaction with HR, and potentially providing important information for the firm. By signaling deviations from current policy goals, tracking applications can even lead to discoveries supporting Cost Leadership or Quality/Customer Satisfaction strategies.

Expert System Applications

Expert system applications improve decisions for which the 'right' outcomes are determined through expert knowledge and experience. Like the applications described above, expert system applications are based on rules, but the rules are complex, derived from careful analyses of expert decisions. Once programmed, these applications can distribute this expertise throughout a firm, without the presence of a human expert. Expert systems can be applied

to many HR decisions. For example: using historical data on the number and quality of recruits from various sources, where should we recommend our new division recruit to meet its hiring goals? Do labor market factors justify higher professional salary offers in our West Coast offices? Should the content of performance appraisal training differ for managers in different units? There is no one 'right' outcome for these decisions, but experience and expertise within the firm will dictate a specific set of alternatives.

There are at least two kinds of expert system applications: 'black box' and 'training'. 'Black box' applications simply provide a recommended decision outcome without educating users about how the decision is made. An example HR application is one that prompts employees covered by a flexible benefits plan to input personal information (such as their other sources of insurance or income), and then recommends a 'personalized' package of options available for their fixed benefit dollars¹⁰. Such applications make only minimal demands on user analytic and computer skills.

In contrast, 'training' applications guide users through a series of questions and information displays designed to educate them on the reasoning experts use in reaching a decision. For example, some expert system applications help line managers conduct better performance appraisals. The application prompts the manager to consider information that experts believe important to appraisal --employee performance history, sources of rater bias, firm or unit performance norms, special personal circumstances, and so forth. Given this information, the application suggests an 'expert' appraisal outcome, which the manager may either use or override. This 'training' application improves managers' appraisal decisions by providing both recommendations and interactive expert feedback throughout the decision process. Such applications require that users be analytic enough to diagnose their own situations, using the guidelines of the expert system. Often, only minimal computer skills would be required.

'Black box' systems are, to date, the most common expert systems. However, we believe that 'training' systems have the most potential to improve HR decisions, by combining expertise with education.

Expert Systems Applications MATCH Quality/Customer Satisfaction

As shown in Exhibit 3, expert system applications allow firms to delegate some of the HR decisions that are critical to a firm's quality and customer satisfaction initiatives. Expert systems can also enable HR to track delegated decisions so that major deviations from 'expert' opinion or approved designs can be investigated. These strengths are especially true of the 'training' expert systems. Such systems could assist team building efforts, for example, in the form of training modules that apply and demonstrate the management and problem solving skills needed for effective team work. Individual team members could review these modules as needed. These systems could also help teams design 'custom' performance evaluations or compensation programs that reflect goals tied to customer demands. Expert systems could assist team members conducting performance appraisals or allocating pay increases by letting them know when their decisions deviate from approved designs. Using expert systems, HR could delegate many traditional HR responsibilities to teams, while increasing the likelihood that team decisions are informed ones. Moreover, by using expert systems, team members may better understand how the firm's HR systems work, and thus be better prepared to suggest improvements based on the team's understanding of customer demands. Such suggestions then become part of the firm's HR expertise. This is the essence of people working smarter.

Expert system applications can also contribute to cost leadership goals. Earlier, we described a 'black box' type expert system that recommended 'personalized' option packages to employees covered by a flexible benefits plans. Such systems can provide recommendations that optimize employee demographic risk factors, thus controlling an employer's costs for any one benefit option. These systems also accurately record and quickly report

employee choices. They may eliminate the need to train HR generalists to answer complex questions on benefits and pensions, or enable the firm to redeploy staff benefit experts and better use their time. The overall result could be an increase in HR productivity. It is not difficult to see how widespread use of expert systems --to assist line managers' decisions in hiring, performance appraisal, promotion, career development, and so forth-- could decrease the number of HR experts needed by a firm, free up the time of remaining experts to support other issues, and thus enhance HR's ability to support cost leadership goals by working harder with fewer people.

Also, if expert systems liberate HR time and capture new information on HR practices from the line managers and others most directly involved in business operations, the new perspectives and information produced can support HR innovation objectives.

Decision Support System Applications

Decision support system applications improve decisions for which the rules are changing or not well defined, and the 'right' outcomes are unknown, such as: what is the right level of sales force hiring and training to maintain optimal sales? Which combinations of people and skills will produce the most productive teams in our major business divisions? Which assignments and career development experiences produce executives best able to manage diversity and change?

Decision support system applications package computer tools that allow a user to pull together information, analyze it, and represent it in many forms (graphs, reports, etc.), and also assist the user with electronic memory aids and references. Although there are undoubtedly talented HR people currently using such applications, HR examples are scarce. Perhaps applications designed to facilitate group 'brainstorming' offer a glimpse of decision support system potential¹¹. These applications enable a group of users, working simultaneously, to call up a wealth of information on the issue of interest, to display this information in many ways, and to consider and

capture new information as it emerges during brainstorming. An HR group charged with 'defining the new competencies needed for effective HR management in the 90s' might use a brainstorming application to help them more quickly achieve consensus on a concrete set of such competencies¹². The results of one such brainstorming session suggest that the set of HR competencies the group chooses will reflect a more thorough examination of the information and the alternatives than would otherwise be possible. Moreover, because the system allows everyone to 'talk' at once by entering their ideas and having them displayed immediately to the entire group, substantial time savings can result.

Decision Support Systems MATCH Innovation

Exhibit 3 suggests that achieving innovative strategies in HR requires attracting creative people, and supporting their time for research and risk taking. User analytic and computer skills are critical to effective use of decision support system applications, but the applications themselves also represent powerful exploratory tools for such users. These systems can step up the pace of organizational discovery and learning. They can help attract creative, analytic talent, support innovative work, and make the fruits of innovation more readily available to HR and the firm.

For example, in the process of helping to set team performance targets based on quality goals, suppose an HR group starts to question those targets, guessing they are based on too narrow a view of customer satisfaction. Using a computer database from the firm's customer service group and a statistical analysis package, the HR group could design a statistical model to predict customer satisfaction from the narrow performance targets (time to delivery, low returns rate, time to fill service requests). If their results suggest that these targets predict only a modest percentage of customer satisfaction, then the HR group might decide to explore other possible performance related predictors of customer satisfaction, and to solicit ideas from the firm's marketing and sales groups. Using computer data from

marketing, the HR group might revise its model to include two new variables: one representing sales force promises about what a product will deliver, and one representing problems reported during product installation. The revised model might substantially improve prediction of customer satisfaction.

Thus a creative and skilled HR group, armed with information from electronic databases in other functional areas of the firm and statistical packages that allow modeling and analysis, might make discoveries leading to: a broader set of the team performance targets more likely to influence customer satisfaction, training indicators for sales and installation people, and, a broader definition of desirable team skills. The original model could be tested in other parts of the firm, revised, and eventually made part of an expert system to assist teams in setting performance targets. Spinoffs from this modeling process might include external information systems that enable customers to electronically input team performance assessments to the firm's databases, or meetings between team members and major customer representatives in which important variables affecting team-customer relations are discussed and visually charted with the assistance of brainstorming software.

As Exhibit 3 shows, decision support system applications could also lead to discoveries that reduce costs, or to marketable innovations in technology, products, or services. These applications are tools that make the exploration involved in discovery less tedious and time consuming, that enhance the prompt dissemination of results, and that document learning. In short, decision support systems can speed up the organizational "learning cycle" from discovery, to expert judgment, to established facts that feed operating routine. They do require research, computer, and analytic skills, but they also offer considerable support to those who have these skills. They support HR people working with vision.

Staying in Place Versus Getting Somewhere

We began this article with a quote from *Through the Looking Glass*. That quote highlights the difference between staying in place and getting

somewhere: running faster versus running twice as fast as that. We believe this is an apt characterization of the competitive business race, but even more so of the challenge managers face in applying information technology to win that race. Information technology appears to advance almost daily. Management needs to consider the role of information and information management in the firm's competitive strategy, in order to use these advances in ways that not only keep them in place, but add to the firm's ability to get somewhere, to sustain above average industry performance. We have focused on applications in HR, but our framework applies to all management areas.

Both survey work and our own research suggest that the vast majority of HR information technology investments are in transaction processing, reporting, and tracking computer applications. Though these applications can support cost leadership objectives, we believe that the competitive potential of investments in other types of applications has been neglected. We know that firms differ in competitive environments they face, and thus, in the strategic objectives they emphasize. They should not overlook the advantages that matching investments in computer applications to strategically driven HR objectives could offer them in the competitive race.

Matching computer investments and strategic objectives, however, is only part of realizing information technology's potential. In our interviews with the HRIS groups in ten Fortune 500 firms, we found that those who were most successful in using information technology made additional system and organization development investments. These included: developing good information databases, updating operating software, making computer equipment available to critical users, educating users about computers, developing the organizational expertise to manage information technology, building relationships with other information technology users in the firm, and so forth. The magnitude and timing of these additional investments appeared to vary with HR's strategic emphasis, and with the firm's structure, culture, and work force.

A complete treatment of these investments is beyond the scope of this article. We can offer some observations from our research about conditions critical to the successful implementation of the three types of computer applications we have discussed. First, transaction processing, reporting and tracking applications require comprehensive databases, and the applications, themselves, must be available and easy to use for a wide range of users. Expert system applications require good expert system builders, good experts, and user confidence in system recommendations. Decision support systems require good analysts and researchers, high quality comprehensive databases, and an organization climate receptive to research and innovation.

Finally, we point out that estimating the true (net) valued added and the sustained competitive advantages possible from information technology investments requires concrete measures of their benefits and costs. Viewing these investments in terms of their contributions to cost leadership, quality/customer satisfaction, or innovation can point to potential areas of benefit measurement. The more difficult, but critical work of establishing concrete measures still remains.

ENDNOTES

1. We define Human Resource Information Systems or HRIS as the composite of data bases, computer applications, and hardware and software necessary to collect/record, store, manage, deliver, present, and manipulate data for HR.
2. See J.W. Boudreau, "Building a PC-Based Human Resource Management Curriculum at the School of Industrial and Labor Relations, Cornell University," Proceedings of the Forty Second Annual Meeting of the Industrial Relations Research Association, December, 1990, 441-453. (Madison, WI: Industrial Relations Research Association); R. Broderick and J. W. Boudreau, "Human Resource Automation for Competitive Advantage: Case Studies of Ten Leaders," Working Paper #90-04, Center for Advanced Human Resource Studies, School of Industrial and Labor Relations, Cornell University; G.T. Milkovich

and J.W. Boudreau, Personnel/Human Resource Management: A Diagnostic Approach, (Plano, TX: Business Publications, 1991).

3. For more information on the dimensions of organization and system development considered important in successful HRIS investments see R. Broderick and J.W. Boudreau, endnote 2.

4. There was a spate of articles on information technology, computer applications and their competitive potential in 1984 and 1985. For examples see F. W. McFarlan, "Information Technology Changes the Way You Compete", Harvard Business Review, May-June, 1984, - ; M. Porter, Competitive Advantage, (New York, NY: Free Press, 1985), 116-172; K.C. Laudon and J.P. Laudon, Management Information Systems: A Contemporary Perspective, (New York, NY: MacMillan, 1988), 61-82.

5. For example, Tesseract developed the first relational database management system designed specifically for HR and mainframes, and for many years has dominated the market for such systems.

6. For more information on these interviews see R. Broderick and J.W. Boudreau, endnote 2.

7. See surveys of HRIS in many firms, such as: C. Richards-Carpenter, "The Computerized Personnel Information Systems Survey Results, 1989." Personnel Management, August, 1989, 21: 48-49; and KPMG Peat Marwick, Computer Usage In Human Resources: A Competitive Advantage. (Dallas, TX: KPMG Peat Marwick, 1988).

8. See K.C. Laudon and J.P. Laudon, endnote 4, 34.

9. Developments in data capturing capabilities may soon enable users to ask questions using voice commands (Voice Recognition Systems) or hand writing (Optical Character Recognition Systems).

10. See J.M. Hannon, G.T. Milkovich, and M.C. Sturman, "The Feasibility of Using Expert Systems in the Management of Human Resources," Working Paper #90-19, Center for Advanced Human Resource Studies, School of Industrial and Labor

Relations, Cornell University, for a more detailed description of expert system applications currently used in HR management.

11. The brainstorming software used in the IBM Executive Development labs at Cornell is "GROUPSYSTEMS". It was jointly developed by IBM and the University of Arizona.

12. Such a brainstorming session was recently conducted at Cornell with Center for Advanced Human Resource Studies researchers, and line managers, HR managers, and other functional staff representatives of a Fortune 500 firm.

Author Bios

Renae Broderick is currently a Senior Research Associate in the Center for Advanced Human Resource Studies, School of Industrial and Labor Relations at Cornell University. Her professional experience is in compensation and personnel strategy and planning; it includes consulting both independently and for The Wyatt Company, teaching and research at the Anderson Graduate School of Management, U.C.L.A., personnel planning work on the corporate staff at General Motors, and HR generalist work at Philip Morris, USA. Her research examines the role of compensation, human resource information systems, and other personnel systems in achieving organizational strategy and design goals. She has published several articles on compensation strategy and pay for performance plans, and has presented research ideas to professional groups such as the American Compensation Association and the Human Resource Planning Society. Dr. Broderick holds a B.A. in psychology from Macalester College, and her M.A. (1978) from the University of Minnesota and Ph.D. (1986) from Cornell, both in Human Resources/Industrial Relations.

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DECISION COMPLEXITY SUPPORTED

HIGH<----->LOW

TRANSACTION PROCESSING/REPORTING/TRACKING SYSTEMS

BEST AT: High Volume Sorts, Lists, Merges
Editing
Simple Calculations
Displaying Information
Auditing & Spotting Discrepancies

EXPERT SYSTEMS

BEST AT: Codifying Knowledge & Experience
Distributing Expertise
Recommending Action
Educating

DECISION SUPPORT SYSTEMS

BEST AT: Supporting Research
Optimizing Decision Alternatives
Speeding Up Discovery

DEMANDS ON USER SKILLS

HIGH<----->LOW

Exhibit 2

Types of Computer Applications

FIRM LEVEL COMPETITIVE STRATEGIES			
	Cost Leadership	Quality/Customer Satisfaction	Innovation
HR Competitive Objectives	Higher output for given labor cost PEOPLE WORKING HARDER	Continuous improvement PEOPLE WORKING SMARTER	Workable discoveries PEOPLE WORKING WITH VISION
HR Decisions and Actions	Streamline Standardize Decrease production time/headcount Reduce costs (e.g. increase accuracy)	Educate line managers and other 'clients' Delegate/share decisions Use customer driven performance criteria Increase flexibility	Define vision Attract creative talent Reward risk Provide opportunities/tools for exploration
HR Division of Work	Administration	Operations	Planning/Creative

Exhibit 1

HR Competitive Objectives and Related Decisions

HR Competitive Objectives	TYPES OF COMPUTER APPLICATIONS		
	Transaction Processing/ Reporting/Tracking Systems	Expert Systems	Decision Support Systems
Cost Leadership: People Working Harder	<ul style="list-style-type: none"> • Reduces paper handling • Standardizes entry and reporting • Increases processing accuracy • Increases report turnaround • Early warning of goal deviations 	<ul style="list-style-type: none"> • Decreases need for HR experts • Helps spread database and training costs over entire workforce 	<ul style="list-style-type: none"> • Increases chance of innovation for HR cost controls
Quality/Customer Satisfaction: People Working Smarter	<ul style="list-style-type: none"> • Increases time for HR quality initiatives • Enables custom reports and data entry • Increases awareness of HR information and can lead to its improvement 	<ul style="list-style-type: none"> • Enables line employees to make HR decisions informed by HR expertise • Increases customizing of HR programs • Increases line satisfaction with/understanding of HR 	<ul style="list-style-type: none"> • Increases chance of innovations for HR quality/customer satisfaction
Innovation: People Working with Vision	<ul style="list-style-type: none"> • Increases time for HR innovation • Awareness of goal deviations sparks discoveries 	<ul style="list-style-type: none"> • Increases time for HR innovation • Line understanding of HR sparks collaboration and discovery 	<ul style="list-style-type: none"> • Powerful support for discovery • Shortens discovery process • Fast testing, reporting and documentation of new finds

Exhibit 3
Matching Computer Applications with HR Competitive Objectives