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Personnel Considerations in Library Automation

Introduction

The clinic's theme, "Human Aspects of Library Automation," implies that personnel considerations will be addressed throughout the conference. Other speakers have addressed and will be discussing certain personnel aspects—e.g., fear and resistance, ergonomics, training, and staff involvement. Earlier clinics have addressed personnel topics also, particularly the 1983 clinic on professional competencies.¹ This paper will expand on some of these topics and address the impact of technology on library personnel in the context of traditional areas of human resource management.

Personnel issues can be viewed in two ways—from that of the employer or employee. Sometimes these viewpoints are divergent, sometimes in harmony. Administrators tend to be concerned more with organizational structure, work flow, personnel costs, and productivity. Workers are concerned more with questions such as, "Will I lose my job because of automation? Will I be reclassified? Will I be paid more? What effect will this have on my health? Will I feel less valued, dehumanized because of machines?" I hope to address both sides.

In preparation for this presentation, I reviewed the literature, talked to a number of people, and conducted an informal survey of approximately thirty selected library personnel officers and administrators. It appears that human aspects of automation are beginning to be looked at more closely in the library world. Unfortunately, this is sometimes in hindsight or when specific problems surface—not always during preliminary planning for introduction of automation into the library.

Some aspects have been explored in the library and information science literature but others have not been addressed to any extent. In the

March 1985 *Information Technology & Libraries*, John Olsgaard has an excellent literature review of library automation as a socio-organizational agent of change. He states that the library and information science literature still concentrates on the technological ramifications of various systems. While some progress has been made into the organizational problems of library automation, little attention has been given to the human concerns. Olsgaard suggests that the introduction of computer-based information systems in an organization or literature of the discipline affected follows a linear progression. First come problems concerning primarily technological or physical considerations, then organizational considerations, and finally behavioral aspects of computerization.²

In the world of library automation and personnel issues, there appear to be some trends but also contradictory things happening. The library workplace is certainly still in transition, still changing. To some librarians who began automating in the 1960s, computers are "old hat" but some are just beginning to automate. Even in libraries which have been in the automation business for awhile, however, personnel issues are still evolving. It appears that in some workplaces, automation creates stress and negative reactions. With others it brings excitement and enhanced feelings of job enrichment and achievement.

Change caused by technology is not the only factor that has an impact on personnel. There are a large number of social, economic, political, legal, and regulatory factors, both external and internal, that affect personnel in libraries. Sometimes it is difficult to sort out the issues since they often intertwine. Some personnel problems may be attributed to the introduction of automation in libraries but, in fact, the personnel problems develop because there are simply no clear, written basic personnel policies and procedures when automation begins. Adding a layer of issues related to automation on top of poor or ill-defined personnel practices or unresolved staff problems can cause chaos. Automation will not suddenly change a department with serious morale problems or inefficient work flow into a well organized unit.

Let us address some of the specific personnel functions, namely, organizational/staffing patterns, job design, position classification, selection and training, performance evaluation, working conditions, staff welfare, management/labor relationships, and professionalism issues.

Organizational/Staffing Patterns

In writing on the impact of automation on library organizational structure, most everyone mentions "blurring" of the distinction between technical and public services and questions the traditional separation of

these functions. The argument is that units have been organized traditionally around different physical files (such as cataloging, acquisition, serials check-in). As a single, integrated online system becomes possible and one online authority file eliminates the need for multiple paper files, anyone can tap into these files if a terminal is available. There is less need for the more rigid divisions as these functions can be integrated.

The new Association of Research Libraries (ARL) SPEC Kit on *Automation and Reorganization of Technical and Public Services* speaks to this issue. Interestingly enough, however, of the eighty-two respondents to a survey, forty-six indicated that they are currently organized along traditional technical/public service lines. Thirty-six report some integration but none indicates complete integration. The introduction or movement toward integrated systems was ranked first as a possible factor contributing to organizational change but other automation-related activities did not receive high rankings. Changes in administration ranked second followed by need for improved staff performance, introduction of online catalogs, economic factors, and increased emphasis on service to users.

The conclusion of the survey is that although some experimentation with modifications to the traditional organizational structures has occurred, libraries seem reluctant to make significant changes to these structures. More information is required with respect to how change comes about, who is involved in decision-making, how better use can be made of existing staff, and what measures can be used to determine the success of any reorganization.³

Even though formal changes may not have materialized, libraries are finding that communication has increased among the departments. For example, systems designers need to turn to reference librarians to learn about how users are dealing with new systems; public services librarians need to get more information from the technical services staff as reference librarians find that instructional work increased with teaching people to use machines.⁴

The ARL study did find some integration of staff through assignment of multiple roles, dual function positions, or job rotation (doing part public services/part technical services work).⁵ A number of writers have alluded to the fact that technical service professionals are being deployed into public services. Gorman, in his ecumenical library model, suggests professionals should be defined by specific user groups (such as subject, age, or educational level) and carry out all aspects of professional work (such as selection, collection development, cataloging, reference, bibliographic instruction). In this model, the professionals are more decentralized while the clerical group is more centralized.⁶

Job Analysis, Design, Classification

In the areas of job design/redesign, job analysis, position classification and job evaluation, there is change occurring in terms of job descriptions, professional/support staff roles, reclassification, etc. Introduction of automation is a good time to take a thorough look at all jobs. Administrators may wish to conduct a full-scale job analysis to describe systematically the exact nature of the duties and responsibilities of each job and the knowledge, skills, and abilities needed to perform successfully. If only a limited review is made of some positions, one might find demands from persons in other jobs for review of their positions relative to any jobs that have been reclassified because of automation. Administrators may feel it is difficult to determine in advance what will happen to jobs until the automated procedures have been in place for some time, however. In this case, an initial look can be made with the understanding that a more in-depth review should be made at a specific time later in the process.

The basic difficulty in job evaluation is definition of responsibility. In the literature and in talking to a number of librarians, one finds that the trend appears to be toward moving more responsibilities downward to paraprofessionals, particularly the more routine aspects previously performed by professionals. At the same time, however, other functions are moved upward as more planning, coordination, and specialized subject analysis is taking place at the professional level.

A number of libraries report fewer professionals and more paraprofessionals because of automation. Some report elimination of a few lower-level clerical positions. Some report they have hired new staff, particularly data processing department personnel, but also part-time hourly staff for circulation or temporary employees for retrospective conversion projects.

In the informal survey I conducted, some libraries had made no changes in position classification but had revised a number of job descriptions to reflect an automation component. These libraries considered automated activities as requiring new tools (i.e., terminal instead of typewriter) but no change in duties and responsibilities warranting reclassification.

A variety of libraries mentioned reclassifying library assistants to a higher level as they were given more authority to approve catalog production. One library reported changing a circulation/page supervisor from a paraprofessional to a professional Librarian I position on the basis of systemwide responsibility and supervision of more clerical staff. Others mentioned promotions of a senior clerk to EDP (electronic data processing) computer operator, a Librarian IV cataloger to a database manager, a secretary to head, word processing, and a management information specialist to senior management information specialist.

New positions resulting from introduction of automation included a professional authorities librarian position, and a new category of Library Assistant (LA) V as a training supervisor of LA IIIs and IVs in OCLC operations. A new training coordinator was mentioned by one library. Many libraries have hired a variety of computer and systems personnel such as senior data transcriber, EDP control clerk, computer operator, etc.

A problem in trying to reclassify positions may arise in libraries which are part of larger position classification systems such as city, campus, or corporation umbrella plans. As pointed out by Hugh Atkinson in the October 1984 *Library Journal*, civil service systems often are not responsive to changes. Direct supervision is usually the main path to advancement under civil service. Many librarian jobs that are changing with automation may mean increased administrative responsibilities (in the sense of planning, coordination, or financial management) but not necessarily an increased supervision load.⁷

Library administrators may find it necessary to spend more time educating city or campus officials (who have control over library classifications and salaries) on what library workers do. This has come about not only because of automation changes but because of other factors such as decreased emphasis on formal educational credentials. The increasing number of pay equity cases in librarianship depend heavily on librarians convincing the officials in their jurisdictions that library worker skills, effort, responsibilities, and working conditions justify salaries on a par with other occupations and professions with similar qualifications and duties. One librarian compared her typist/clerks using terminals with EDP operators in other city departments doing similar work. She found the library clerks were paid considerably less yet the work in other city departments was much more circumscribed. Atkinson states it is difficult to demonstrate to civil service analysts that the use of, acceptance of, and evaluation of cataloging data from an online utility is not the same as work done by data-entry clerks in a computer center who simply transcribe manual data into machine-readable data. There is more judgment used by the library workers in their work on the terminals.⁸

Besides the questioning of skills by outside agency personnel, the questions can come from internal staff as well. For example, as older workers are retrained, they may say, "I've learned a new skill. Why am I not paid more?" Younger, newer workers may be more apt to take computer skills for granted. In some word processing pools, support staff have found themselves downgraded since the jobs are more routine and they are not using other secretarial skills. Likewise, librarians who find themselves doing more specialized work—such as more original cataloging of specialized materials in foreign languages—may question if they should not be reclassified upward.

Professional/Support Staff Roles

Professional/support staff roles and relationships come under closer scrutiny with the introduction of automation. Generally, support staff are involved with more verification of bibliographic data in technical services and participate more in the first line of reference/information work in the public services area. As pointed out by Allen Veaner, some professionals are reluctant to give up former duties to support staff and support staff become restive, perceiving they are doing the same work as librarians.⁹ When I spoke in summer 1984 at a meeting of the Council on Library/Media Technicians, this was evident when LTAs (Library Technical Assistants) stated they were taking on increased responsibilities but this was not always recognized by professionals or administrators.

LTAs depend on librarians for the definition of their roles. At the moment it is an evolving one. At ALA we still get requests for a booklet published in 1948 on professional and nonprofessional duties even though it is out-of-print. Few publications since that time have adequately addressed the distinction. The 1974 book, *Personnel Utilization in Libraries*, defined professional, technical, and clerical duties, but these need to be looked at again in light of automation changes.¹⁰ However, as Veaner has stated, we need to abandon any static concept of librarianship as a fixed body of knowledge with preconceived distribution of tasks, duties, and responsibilities, since librarianship is an evolving profession and must continue to evolve.¹¹

Library administrators need to look carefully at jobs, particularly at the time of a vacancy and prior to recruitment, as to whether a job which traditionally required the MLS can be carried out by someone without this education or whether the position is still truly a professional one. One library, for example, found that its interlibrary loan position no longer needed to depend on a professional person with extensive knowledge of collection strengths around the country. The duties could be handled by a paraprofessional with knowledge of how to manipulate the bibliographic network data.¹²

Another example of changing roles is in the reference department. As reference librarians find they need to spend more individualized time with users who request online database searches, they are assigning routine reference questions to paraprofessionals. With the advent of automation, library department or division heads often find they need to spend more time in coordination, training, and answering questions from staff in other divisions because of automation. These enlarged duties sometimes leave a gap in day-to-day operations. One library solved the problem by assigning a library assistant as clerical supervisor.

Although the trend seems to be on increasing responsibilities for LTAs, one librarian mentioned that the library reduced its LTA positions

because LTA training instruction is failing to evolve to meet the changing needs of libraries in computer literacy. Another librarian felt that many technicians (i.e., LTAs) are better trained in technical aspects than most professionals. Many librarians have found that placing greater reliance on support staff as a result of library automation has helped do away with many repetitive routines formerly performed by professionals.

Competencies

Automation has an impact on the qualification requirements for library positions. Various studies of job vacancy announcements have shown that anywhere from 20 to 50 percent require some knowledge of automation or online searching skills. Many feel computer literacy is or will be as important to a librarian's success as reading and writing. Different levels of computer literacy are required for different jobs, however. These include: "computer literate" librarians who understand basic concepts and have some hands-on experience; "computer knowledgeable" librarians who use the knowledge extensively; and "computer professionals" who have responsibility for management of computer resources, teaching, designing, and decision-making relating to systems.¹³

Some argue that we need the same competencies as previously even though the tools may be different. For example, Nitecki argues that public services librarians still need to have communication skills, the ability to analyze information needs and retrieve needed data, and skills in instruction and management. What changes, she states, is a rising sense of accountability because of the costs calculated with each instance of use and the visibility of errors because of incorrect logic and improper selection of terms and files.¹⁴ Most writers feel that managerial and communication competencies, planning/problem solving, and financial management abilities increasingly are required with automation. There is need for professionals to deal with more outside people such as vendors, electricians, and network people. Professional librarians in the automated work setting write performance specifications and work procedures, spend more time preparing and training staff, and concentrate on selling their programs. The change in emphasis can cause problems for people who find themselves less comfortable with these new duties. This may be one reason why there are more technical services job openings than applicants in recent years.

Automation sometimes requires more abstract thinking, but at the same time it requires adherence to standardized procedures and conformity. In my survey of librarians, one librarian mentioned that virtually all levels of the staff must have computer skills. To some extent this has had an equalizing effect on staff. One librarian mentioned that supervisors need to

update their own technical skills even if they are not using these skills on the job. This is necessary to avoid a credibility gap where many staff are apt to be more expert than the supervisor regarding technical aspects.

Some librarians report increased emphasis on training, teaching, and interpreting skills; increased interpersonal skills; and the ability to cope with constant change. Those who cannot cope with change tend to leave, although one library said a shift from clerical duties to more substantive contributions had led to less turnover.

Some libraries require knowledge of specific database systems such as RLIN searching skills. It is important to think through, however, whether knowledge of a specific system needs to be a condition of employment prior to hiring or whether the skill can be learned fairly easily on the job.

Training

Although others will be addressing training during the conference, I did want to make a few observations. A UCLA study which looked at costs of 300 automation projects over a seven year cycle showed 10 percent of the costs was for hardware, 40 percent software, 50 percent for employee training, and 30 percent was for retraining and procedural updates.¹⁵ Although these were not library projects, it is possible costs would be somewhat similar in libraries.

Almost all continuing education needs assessment surveys by library groups have found management and technology training as the highest priorities cited by librarians as desired continuing education topics. Perhaps this will shift somewhat as more graduates come out of library schools with computer backgrounds. There will always be a need for updating and retraining as new systems emerge, however.

The ARL SPEC Kit in *Staff Training for Automation* found few libraries doing formal needs assessment surveys before embarking on staff development in the automation area. There was no clear pattern of assignment of responsibilities for training—some libraries primarily used vendors, some sent staff outside to workshops, some assigned training responsibilities to a staff development committee or ad hoc task force, and some trained selected staff in-depth by the vendor and these staff in turn trained others.¹⁶

From my informal survey, I found the trend is toward more intensive, structured, formalized, and centralized staff training. Primarily this results from the need for increased standardization and accuracy because of national standards, as well as the national exposure of the individual library output. When I asked what changes libraries had made in staff training, one library administrator responded, "More! More! More!" Many also mentioned the need to develop a substantial body of procedural

documentation and standardized written instructions to supplement vendor-supplied materials. The *Training and Development Journal* has on occasion mentioned dissatisfaction with computer-company training manuals because of lack of knowledge of concepts involved in adult education.

Several librarians mentioned that training for automation takes longer and that they had underestimated the time it would take staff to be comfortable and conversant with hardware and software. Administrators may expect proficiency more quickly than perhaps is feasible. One librarian reported the need for more cross training of staff to fulfill multiple functions. In addition, more extensive training in offline procedures was needed for those who were limited in the amount of online time that could be spent each day on the terminals. Another library has used the approach of thoroughly training a team of six persons from different branches; as each new branch came online, this team was assigned to be on duty during the initial weeks to help as needed.

Performance Monitoring and Evaluation

Training has as one of its goals improving the efficiency and effectiveness of staff. This brings us to the issues of performance monitoring and evaluation. There have been claims about automation improving efficiency, productivity, and worker satisfaction. There has been some evidence, however, that worker productivity can actually decrease when VDT (Visual Display Terminal) operations are coupled with speed-up expectations and strict monitoring by management. One librarian indicated in my survey that all staff learning the new automated system at one time provided the basis for comparison in performance evaluation. Another library, however, decided not to evaluate employees at the time of initial training in order to reduce the pressure experienced by employees. Many librarians reported they have made no changes in their method of performance evaluation, although some have added new criteria for reviewing performance—e.g., performance of the automated system, ability to train others.

Many reported that automation made it easier to have quantitative measures because the extent of available statistics is much greater than in the past. However, not all librarians use these data in establishing quantitative performance measures even though it is easier to do so. One librarian said a review of printouts was only done on a spot-check basis for new employees. One said it was difficult, however, to monitor work of data entry operators because it was immediately absorbed and could not be easily reviewed. Some commented that expectations have risen because of the greater scrutiny of each employee's work necessary with adherence to

national standards. One mentioned that the increased quantitative reports made it possible to free up a supervisor's time to observe better the qualitative aspects of staff/patron communication.

It is important for administrators to recognize that staff may feel more pressure and uncertainty over performance evaluation during changes to automated procedures. It becomes more important than ever to establish clear expectations in advance so they are understood by staff and do not come as a surprise at performance appraisal time.

Working Environment

Many changes have occurred in the working environment due to automation. There is a large body of literature on the relationship between humans and tasks, equipment, and environment. It is just beginning to be reflected in the library literature, however, as library staff and administrators become more aware of the health and safety aspects of VDT workplaces. Use of visual display terminals is a controversial topic. Some in the computer, scientific community insist that this VDT use is harmless. There are increased efforts, however, by many women's groups and white-collar unions to influence legislation on VDT use and to push for more research on the relationship between VDT work and health problems. Insurance companies are beginning to get worker's compensation claims from office workers because of problems caused by VDT work. In June 1985, the National Institute for Occupational Safety and Health started a study of reproductive hazards associated with VDT use. This is pushed by 9 to 5, the National Association of Working Women. The Service Employees International Union (SEIU) and 9 to 5 are pushing for a model state VDT Information and Training Act which would require all employers to provide VDT workers with information on equipment and job changes resulting from automation. It would also mandate health and safety training, eye exams, transfers for pregnant women, attention to ergonomic guidelines for equipment, and rest breaks. There is legislation pending in over fourteen states.¹⁷

During National Secretaries Week in 1985, 9 to 5 organized a contest in 100 cities to pick the best and worst employers on how they introduced and used office technology. These were named the "online" employers and the "out-of-line" employers. (An example of an "out-of-line" employer is one who fired a worker via her VDT screen and another who wrote "You're stupid" on the screen!)

Library employers need to take steps to ensure that operator health issues are addressed, or morale problems may result in turnover, absenteeism, and lowered productivity. The National Institute of Occupational Safety and Health recommends a fifteen-minute break after one hour of

high-demand work load and fifteen minutes after two hours of moderate work load.¹⁸

My informal survey showed a number of libraries have policies that limit workers to two hours at a stretch on the terminal, and no more than four or five hours per day at a VDT. One even had breaks after 15 minutes of continuous work on the CRT (cathode ray terminal). Several mentioned policies honoring requests for transfers away from terminal work by pregnant women. One reported a pay-grade increase for workers exposed to CRTs for a certain number of hours. This was not because of the increased skills but a recognition of more hazardous working conditions.

Many librarians reported changes in working hours because of the flexibility needed in scheduling use of terminals and the need to make maximum use of the computer time. Some cited increased night and weekend work. One library accepted volunteers to work earlier or later in order to take advantage of decreased costs and better response time in off hours. One assigned shifts by seniority, although this caused trauma for some people. New people were required to work the 3 P.M. to midnight shift. Some libraries have computer-operator personnel around the clock.

A number of librarians cited the need to make changes in seating and lighting, to improve the airflow, and to add screen shields. Several mentioned staff study committees to develop recommendations for further interior design changes due to automation. One administrator commented that the ergonomics aspects were not planned as systematically as they should have been. Obviously, changes in equipment after purchase make automation projects more costly.

Automation can result in the enhancement of jobs through job rotation and assignment of a variety of tasks or can lead to more routinization, less control, less variety, and fewer social contacts. Initially, one librarian found support staff had a variety of duties because they were running both manual and machine systems. As less variety occurred when procedures became more mechanized, there was growing absenteeism and discontent. This has been resolved to some extent by cross-training the circulation and cataloging staff so they can rotate public contact with machine tasks.

Quality of work life is now discussed frequently in the personnel and business literature. One example is a National Science Foundation study which showed that only about 20 percent of the price advantage by Japanese automakers was due to advanced use of industrial robotics. Eighty percent was attributed to superior management and collaborative management/worker relationships such as incentive pay, job enrichment, decentralized decision-making, and quality circles.¹⁹

Technology has been described as having the potential to radically alter centralized workplace arrangements, creating a high level of desire for *flexplace* arrangements as well as flextime. Many data transcription jobs

are suitable for transfer to the home, so physically handicapped persons, older persons, or parents with small children can participate more readily in the workplace. The National Commission on Working Women, however, sees "telecommuting" or this most recent form of "homework"—linking home to office terminals—as a potential risk. Even though it might seem as a solution to barriers many persons face, working at home often has negative characteristics such as no benefits, advancement, or collective bargaining as well as few grievance procedures and worker isolation.²⁰ Some unions have gone on record as opposing this use of homework. I am not aware of librarians using staff in this manner, except for a few professional/managerial persons who may choose to spend some time at home on a terminal. But flexplace arrangements may be a possibility in the future for libraries as well.

Labor/Management Relationships

Automation has had an impact on a variety of labor/management relationships. Obviously, unions are most active when they perceive any movement toward reallocation of personnel and redefinition of work. There is always concern about layoffs. Some unions have asked for proof that negative employment consequences will not arise from computerization. Unions have issued model contract language concerning VDT use and checklists for negotiations related to health and safety protection. They have pushed for the right to negotiate classification specifications and wage rates for new or changed classifications resulting from automation.

In my survey of librarians, many reported there had been no changes in labor/management relations as a result of automation. Some mentioned union demands for limited time on VDTs and pregnancy transfer rights, plus involvement of union representatives on staff committees to assess further applications of automation. Some who anticipated union objections found these did not materialize. One administrator described the need to counsel and coach people who were unable to make the change to automation by helping them obtain lateral moves or even lower-level jobs where there was less stress. Peer counseling also was found effective in these cases.

Most librarians I have contacted have not experienced terminations because of automation but achieved reduction-in-force through normal attrition over a period of time. Librarians have relied on retraining to prepare staff for transfers or made appointments on a fixed-term basis to meet temporary needs. One librarian estimated a 5 percent personnel reduction due to automation in the last ten years. In one city, staff reduc-

tions are required for all city departments whenever a major task is automated. This creates serious staff resistance to further automation in the public library and less incentive for management to use automation effectively. The administrator said he was trying to change this attitude through education of city officials.

A 1980 survey of library personnel policies by Van Zant showed that in 900 libraries, only 261 had specific criteria or a plan for eliminating positions.²¹ This points to a need for library administrators to develop written procedures for reductions-in-force. While robotics has not made an inroad in libraries as it has in manufacturing, there might be a future need to deal with this issue. Technology might make it feasible to use robots for shelving books, delivering materials, and even checking out books. A new ALA Library and Information Technology Association Committee on Emerging Technologies has this as one topic for future consideration.

Professionalism

I do not think we need fear robots will replace librarians. The increasing use of automation in libraries, however, has caused some discussion in the library literature and at conferences on the role of the librarian in the future. This is still a controversial topic. Lancaster predicts the librarian role will be enhanced to the extent that he/she can get out of the library and become part of a research team.²² Nielsen and others have explored the online searching role of reference librarians. Some feel the increased visibility with patrons has enhanced the image and status of librarians, while others worry that the librarian's intermediary role in the future will be removed as more users perform their own searches.²³

Certainly computer literacy skills combined with bibliographical skills have created an increased number of career opportunities outside of the traditional library setting. Several surveys show approximately 4 to 9 percent of librarians are moving into such positions, using their information skills in nonlibrary settings either as free-lance entrepreneurs or in other information management positions.²⁴ Perhaps librarians view the future depending on whether they are optimists or pessimists. As has been stated by others: "Automation is the pessimist's great fear and the optimist's great hope."²⁵

Conclusion

In summary, librarians may wish to answer the following questions for their own organizations. Automation affords an excellent opportunity to review personnel policies and make them more formal, creating sound, workable, and clearly articulated procedures.

Have you looked at existing personnel policies prior to an automation project to determine if any of these might cause problems when a layer of automation is added? Have you reviewed job descriptions recently or at least on an annual basis and when a vacancy occurs? Have you reviewed performance evaluation criteria and communicated any changes due to automation assignments to library staff? Are you sensitive to staff fears about whether or not they may lose their jobs? Do you have a written policy on reduction-in-force? Have you conducted a needs assessment survey to determine what knowledge and skills are required prior to development of an automation training program? Have you developed policies on the amount of time workers should spend on the terminals or policies regarding pregnant workers and the use of VDTs? Have you studied and implemented ergonomically sound practices and made appropriate changes in seating, lighting, and equipment? Above all, do you have an overall human resources plan at the beginning of the automation program rather than one which is done in hindsight or as a result of emergency "firefighting"?

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