

QWL In the Office

By JOYCE M. RANNEY

The overall costs of office system technology are decreasing rapidly. Consequently, there is a mounting belief that the movement toward the automated office will rapidly accelerate in the next decade (Morgan, 1976). Data communications costs are dropping by 11 percent per year. Computer logic costs are dropping by 25 percent per year and computer memory costs are decreasing at a rate of 40 percent per year (Burns, 1977).

While overall computing costs decrease, labor costs in the office increase at six percent per year. Office costs have risen an estimated 20 percent, from 20-30 percent of total company costs to 40-50 percent of total cost in the past few years (Gibson and Nolan, 1974). This can be explained to the extent that offices have not taken advantage of technological opportunities to increase productivity.

The human element is clearly the problem/opportunity area in office automation. People not only need time to make the transition from zero to total familiarity with a new system, but may feel intense resentment at being left out of plans until a new system is completed. Thus, the critical challenge of instituting effective office automation involves socioemotional issues, such as training, participation, interest

building, commitment to a new system and pacing the changeover. Few organizations can afford to underestimate the degree to which employees may become alienated and dissatisfied when their ideas are not solicited during an automation changeover.

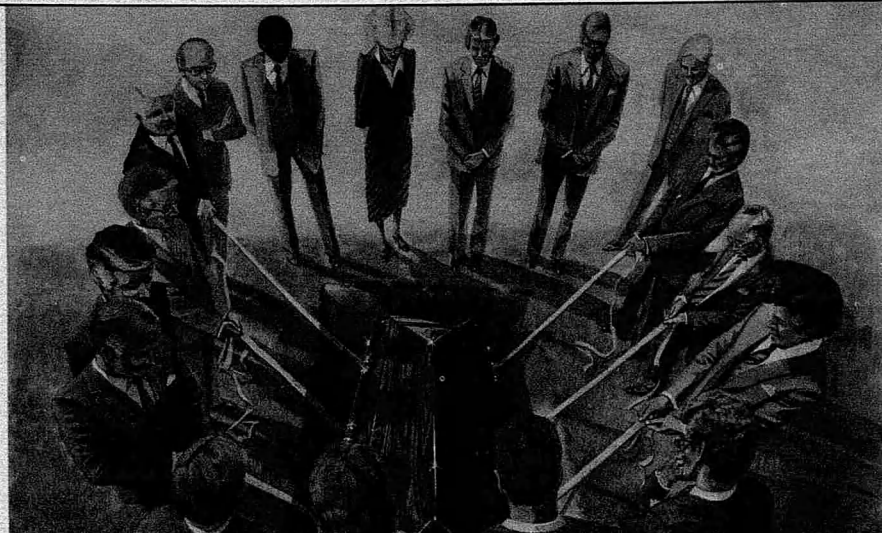
While managers often have a broad view of what's needed from a new system, they generally do not have enough of the day-to-day, detailed knowledge of *how* the work is actually done to best design it for the people who do the job. They are generally less able to discern the key problem areas, as well as those parts of a job considered stimulating. Thus, involving the employees most affected in an automation effort is suggested not only to increase commitment, but to gain practical information about how work actually gets done, what key problem areas or variances are and what the job should consist of to help them be most productive.

Office worker involvement, focusing on building commitment and the actual design of new jobs and/or departments, is called either "QWL in the office" or "participative computer systems design." Participative computer systems design is the focus of this article. The terms "QWL in the office" and "participative computer systems design" are used interchangeably.

We've learned from QWL programs in manufacturing plants that when employees can organize their work in ways meaningful to them, reduced

Few organizations can afford to underestimate the degree to which employees may become alienated and dissatisfied when their ideas are not solicited during an automation changeover.

Joyce M. Ranney is senior organization development consultant at Digital Equipment Corp., Maynard, Mass.



Without effective presentations...

From CEO to supervisor, you invest time and energy in making presentations. Ineffective presentations result in missed opportunities. Presentations That Work (PTW) offers presentation skills that let you maximize opportunities. 90% of companies surveyed say it's "the best!" They include: Gulf Oil, IBM, AT & T, Du Pont, General Motors.

Features

- 2 1/2 hrs. illustrated lecture on VTR
- Customized
- Structured approach to content
- 3-month follow-up with refresher VTR



MR
Communication
Consultants Inc. 261 Madison Avenue -
23rd Floor, New York, New York, 10016

Benefits

- Your trainers concentrate on facilitating.
- Your people work on their presentation topics.
- Consistent presentation style which improves communication at all levels.
- Reinforcement of workshop skills. Aids transfer to the job.

Presentations That Work. It could be working for you!
(212) 661-7847

Circle No. 175 on Reader Service Card

quality-control problems and substantially higher productivity result. These problems also produce employees who are more committed to their work because their jobs are more meaningful. It is apparent that sociotechnical and QWL principles have far-reaching applications in the office as well.

The distributed payroll project case

The case in this article provides an example of a QWL project (participative computer systems design) in an eastern-based electronics corporation's payroll department. The upgrading of the existing payroll system focused on the distribution of computing capability from a centralized batch operation run on a main frame to locally controlled interactive systems run on mini computers. This meant

changing from a centralized payroll run in the East, paying 40,000 employees nationally on a weekly basis, to a distributed payroll system with 30 to 40 local payroll offices (LPO) in existing facilities all over the country. In the centralized payroll system, time cards were shipped from the West and Southwest to the East, and paychecks were returned to facilities in these areas weekly.

Since one-third of the corporation's expenses was paid in paychecks, a faulty system was unacceptable from a financial standpoint. A faulty system was also unacceptable from an employee-relations standpoint because weekly paychecks were considered a principal motivating employee benefit. The reasons for the change in the existing payroll system included:

- The company wanted local

management to run their own payroll to more accurately reflect the company policy of local control;

- There were severe logistical problems with centrally paying 40,000 employees across the country weekly (e.g., a snow storm or air traffic controller's strike affecting paycheck distribution);

- The old batch computer system was updated so often in the past it was increasingly complex to reprogram.

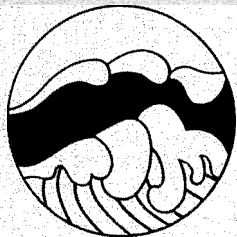
Considering the importance of payroll execution, the goal was to reach zero percent errors in the payroll system. Thus, a smooth transition was critical to the extent that errors in payroll were highly visible and easy to judge from outside the department.

Underlying principles of QWL

The goal of QWL-oriented programs in the office setting is to jointly optimize the business, technological and social needs associated with a change in computing capability (Munford 1979). In joint optimization, the social system that enhances growth, development and job satisfaction is valued. At the same time, an efficient and effective technical system is also valued, as is the meeting of business constraints and/or objectives. Through joint optimization, any change in the business or technical subsystem will affect the social subsystem. Simultaneously, any change in the social subsystem will affect the operation of the computer system, the business needs and the social subsystem itself. Thus, social subsystem changes require management to consider the consequences and repercussions that affect the business, the technology and the employee. Therefore, decisions about employees, computer technology or business needs are ideally made by considering all three subsystems.

Finding a solution that combines all three points of view and recognizes the consequences of not addressing each subsystem's need is the essence of joint optimization. In the data collection

Chautauqua by the Pacific



June 21 - 25, 1982

VANCOUVER
British Columbia, Canada

Professional development workshops for trainers, consultants, and specialists in HRD and OD.

Join a learning community and tailor the week to your work and interests by choosing from among a dozen programs. All workshops will offer quality resource people, and applied learning.

Comments from participants in 1981 Chautauqua:

"Excellent educational opportunity ... some top quality pros".

"Super atmosphere for learning".

"Resource people were excellent. Well organized event".

"Exceeded my expectations".

"Excellent reference materials".

"Quality of seminar leaders top-notch".

"... highly pertinent to my work".

"Valuable learning experience but also a break and energizing experience".

"Excellent. Thoroughly planned. Lots of useful handouts".

Please send me a brochure about

Chautauqua

NAME: _____

POSITION: _____

ORGANIZATION: _____

ADDRESS: _____

CITY: _____

STATE: _____

ZIP CODE: _____

Mail to:

Marie Harris, Centre for
Continuing Education, The
University of British Columbia,
Vancouver, B.C. Canada, V6T 2A4

Circle No. 163 on Reader Service Card

and job design phases of a project, all perspectives must be articulated in terms of trade-offs and solutions that jointly optimize the needs of the three subsystems.

In the payroll department case, there was an objective to establish a balance between the needs for:

- A cost-effective business system with zero percent errors which supported the management philosophy of local control;
- Technological needs for distributed data processing capability to efficiently handle logistical problems;
- The job satisfaction needs of the employees directly affected by the new computer system (e.g., the need for entire tasks to perform and for back-up staffing to facilitate training, career development, attending meetings, vacation schedules, etc.). These needs were identified by payroll clerks in a survey-guided development effort, preceding the job-design project.

Having discussed the critical importance of QWL principles to the effectiveness of the office of the future and to corporate productivity, using the Distributed Payroll Project as an example, it is appropriate to highlight the steps used in the case.

The QWL program: steps and phases

The steps, organized into three phases, use additional examples from the Distributed Payroll Project. The three phases are: *Phase I*, the establishment of a structure to make the transition from the old structure to the new structure; *Phase II*, the collection of information to assist in deciding what new organization design will be most effective; and *Phase III*, the actual designing of the new organization.

When undertaking a project of this sort, it is possible to complete each step in a number of different ways (depending on your preference and style); the order of completion, however, is important. The steps presented suggest an effective process. As

a consultant to this type of effort you will need to modify the steps to suit the particular constraints and sociopolitical situation of your project.

Phase I

The first phase focuses on establishing a structure to help make the transition from the old organization to the future organization. The two most critical components to the transition structure are a *steering committee*, which establishes guidelines and approves recommendations on how the new organization should be structured, and a *design team*. The design team's role is to make a decision on which design should be recommended for approval.

• *Step 1: Contracting and establishing a steering committee as part of the structure to help transition to the new organization.* At this stage in projects of this kind, it is crucial that you secure an explicit stipulation in your contract about consulting to the total change effort. This includes making sure the transition structure will be effective. As a part of this contract, you need a license to interview and talk with all key departments that interact with the focal department and/or organization. The purpose of these interviews is to determine the critical "stake holders." By "stake holders" I mean other parties who can veto or cause implementation problems later on, as well as departments who will be affected substantially by the change. Critical "stake holders" form the basis of a steering committee.

In the Distributed Payroll Project, critical stake holders outside of the payroll department consisted of the personnel and management information systems departments. Personnel provided the weekly compensation status (current salary) of all employees to be paid. Management information systems serviced both personnel and payroll functions on computer systems needs and provided the payroll department with advice on the new

distributed payroll system.

The steering committee, consisting of upper management from finance, personnel and management information systems, acted as the approval forum for the design work completed by the design team. The steering committee also acted as a buffer, giving the design team space to create a new organization within set guidelines.

• *Step 2: Selecting a design team.* After the steering committee was established, a design team was organized, comprised of people directly affected by the computer change. This team consisted of 12 payroll clerks and supervisors. The design team consisted of representatives from all subspecialties from the existing payroll department, formal and informal leaders and skeptics, clerks with experience in more than one payroll job and

payroll clerks from other facilities.

The steering committee acted as a review body for each of the products of the design team. These products are listed below as successive steps in the QWL project.

OD issues of Phase I

- Obtaining role clarity and commitment of various client hierarchical levels is crucial because uncommitted management personnel at any level can easily undermine an effort by allowing either operational or design activities to slip;
- Ensuring that job design work is completed before the computer system is designed is essential to help keep all decisions open so that all three subsystem needs can be developed before making decisions that might hamper joint optimization;

- Obtaining data from as many relevant areas as possible outside of the focal department is important to help establish an effective and committed steering committee.

Phase II

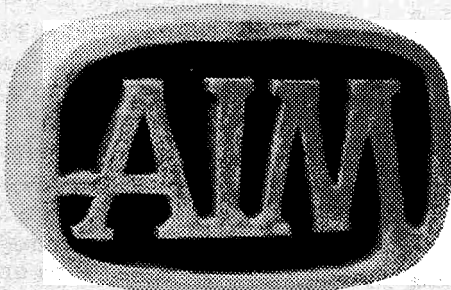
When consulting to a project of this sort, five data collection efforts form the foundation of the design team's organization design effort. These elements include: *step 3*—writing a charter (a statement of the purpose of the new organization); *step 4*—articulation of business objectives (completed by design team to ensure that they understand management's objectives); *step 5*—outside influence analysis (a scan of the external environment's expected future demands for the new organization and the new organization's preferred response to these future demands); *step*

Pre-Retirement Planning Made Easy

Small staff? No time? Low budget? Action for Independent Maturity (AIM), the leader in retirement planning, has the answer to your problems. Give AIM memberships to your "over 50" employees. They'll get the information they need to help plan for retirement.

AIM membership provides:

- Free retirement planning guidebooks
- Low-cost pharmacy service
- Motoring plan
- Car rental discounts
- Money Market Trust
- DYNAMIC YEARS magazine



Giving your employees membership in AIM is the easiest, most inexpensive retirement program available anywhere. (We call it our Employer Gift Membership Program). Write today to find out how you can start this easy-to-administer program for your employees, and we'll send you *free* "AIM'S Guide to Financial Planning."

ACTION FOR INDEPENDENT MATURITY

1909 K Street, NW
Washington, DC 20049
202/872-4850

A Division of the American Association of Retired Persons

Circle No. 101 on Reader Service Card

6—work flow analysis of the current work system to identify key variances to be controlled in the design phase of the project; and *step 7*—a job satisfaction study to determine what aspects of the jobs to keep and what to eliminate. These research efforts provide the data for the design phase, serving to educate a design team as to the overall functioning of the current work system and providing a more objective stance for redesigning the jobs. Before discussing the design effort that assembled and integrated the data, each of the five data collection efforts used in the case are presented below.

• *Step 3: Charter articulation and documentation.* The entire payroll department (39 employees) spent one day listing, discussing and writing the quality of work life characteristics and

service guidelines (charter) that they wanted to reflect in the new LPO. All personnel in the corporate payroll department were involved because the charter formed the foundation for the remainder of the work, thus, total participation was desired.

The charter eventually covered such elements as “cooperation among co-workers,” “responsiveness to employees” and “career development.” During the writing process semantic arguments were encouraged, since these conversations provided clarity about what the new LPO should be like. Since, in the payroll case, the charter was not finished during the first day session, a subcommittee was formed to complete it. After the subcommittee work was completed, the document was again presented to the entire payroll department for

approval before it was reviewed by payroll management and the steering committee.

• *Step 4: Design team articulation of business objectives.* To ensure that the design team understood the business objectives, they documented the business objectives of management for the LPO. The design team added a business objective they considered important: at this point, “the project was to ensure a smooth transition to the new system.” Therefore, the design team made the achievement of a smooth transition their goal, directly addressing the issue of employee commitment to the change.

• *Step 5: Outside influence analysis and reality checking of the analysis.* The charter was focused on the payroll department’s ideas and preferences for the new LPO. To be realistic about the future and the impact of the external environment, however, it was also necessary to obtain the outside perspective of the future demand on the new LPO. Specifically, the educational objective of this step was to help the design team learn about the requirements of its external environment in two years.

When consulting an effort of this type, the steps taken within the outside influence analysis need to include:

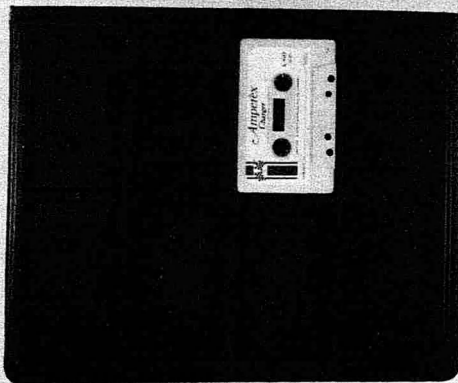
- Listing all outside influences affecting the new organization;
- Prioritizing the most important outside influences and listing their demands for the new organization two years hence;
- Validating through outside sources the messages of the most important outside influences;
- Determining what effect all of the above might have on organization design.

• *Step 6: Work flow analysis to determine key variances.* A central principle of job design is to create jobs so that variances are controlled as close to the origination of the variance as possible. A variance is when an interim product of a system does not meet interim product specifications, thus creating an unacceptable end product. There are two



YOU CAN JUDGE A TRAINING DEPARTMENT BY ITS COVER

And we can provide the cover that will create attention and interest and make people want to look inside. Our years in the industry have shown that a loose leaf binder is the best cover to use. Let our professionals discuss the options and flexibility of our loose leaf covers (in all materials) with you.



**Call Collect
215-684-1000**

3060 W. Jefferson St., Phila., PA 19121

• LOOSE LEAF
• AD-SPECIALTY
• COSSART DIVISION

**Industrial
CORPORATION**

Circle No. 130 on Reader Service Card

"The Original QC Circles Consultants"

Join over 400 client companies with more than 50,000 U.S. QC Circle members. The QCC process teaches workers to identify, analyze and solve work related problems by improving morale, developing leadership skills and tapping the creativity of your work force...an effective process that improves attitude, quality and productivity!

Quality Control Circles, Inc. offers...

- Executive In House Seminars
- Flexible Implementation
- Experienced Professional Consultants

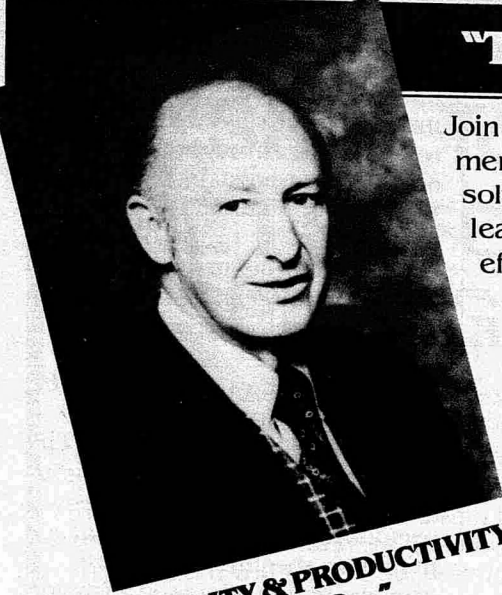
NEW!

- Banking/Office Materials
- Advanced Facilitator Training
July 20-23 Oct. 19-22

FREE...

Quarterly Newsletter on Request

(408) 867-4121 • (408) 358-2711



**"QUALITY & PRODUCTIVITY
HAND IN HAND..."**
...WAYNE S. RIEKER

Circle No. 149 on Reader Service Card



QUALITY CONTROL CIRCLES, INC.

W. S. Rieker, President

Higgins & Root Bldg. • 2nd Floor
400 Blossom Hill Road • Los Gatos, CA 95030

types of variances: the ongoing, or chronic and the episodic. Both variances are troublesome to the extent that they require substantial resources to correct and are ongoing frustrations when they occur.

The work flow analysis serves three purposes:

- To identify key variances so that during the new design of the jobs these variances can be controlled as close to the source as possible;
- To impart knowledge to the design team concerning the work flow of the total function (a knowledge that people who have worked in narrow jobs need to gain before they can design new jobs);
- To help the design team members step back and examine the work flow as a process of activities, unrelated to people and personalities.

The initial step to be completed

in a work-flow analysis is to identify the key outputs of the system. For each of these outputs, the linear steps or individual activities performed to produce each output are identified. The linear steps are then grouped into unit operations, which are a series of linear steps, or conversion processes, with one interim product. All variances are then identified for each interim product. Then, for each variance, "what information is needed to control the variance?" is identified, as well as, "who in the current system has the information needed to control the variance?" After this information is documented, the key chronic and episodic variances are identified.

Although a variance matrix is the conventional method of identifying variances, Pava (1982) suggests this procedure is not appropriate for use in offices with

substantial complexity for two reasons. First, the sheer volume of variances in an office makes a variance matrix unwieldy. Second, in a factory there is only one linear conversion process, which is not the case in an office. In an office, both multiple and simultaneous conversion processes occur. This makes the conventional variance matrix less useful than a more straightforward procedure for identifying variances.

Additionally, the Management Information System (MIS) specialist was added to the design team during the completion of the work flow analysis. The MIS specialist's role was to learn how design team members conceptualized their work and what they considered key variances to be.

•Step 7: Job satisfaction study to determine what aspects of the current jobs are valued and not

TRAINING FILMS

- COMMUNICATION
- MOTIVATION
- MANAGEMENT, ORGANIZATION and SELF-DEVELOPMENT
- LEADERSHIP
- CUSTOMER SERVICE
- SALES TRAINING

PREVIEW PRINTS
AVAILABLE
SEND FOR FREE
CATALOG

SALENGER

EDUCATIONAL MEDIA

1635 Twelfth Street
Santa Monica, California 90404
(213) 450-1300

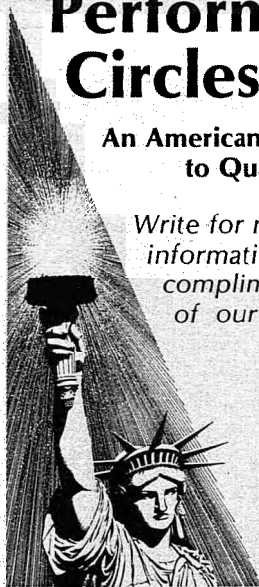
MW-100

Circle No. 153 on Reader Service Card

Performance Circles:

An American alternative
to Quality Circles

Write for more
information and a
complimentary copy
of our newsletter.



Measurable
Performance
Systems

5501 W. North Ave. Dept. ND
Milwaukee, WI 53208
Phone (414) 444-5747

Circle No. 136 on Reader Service Card

valued. To obtain a picture of what characteristics of the current jobs had the desired degree of each job design characteristic (variety, autonomy, whole task, interaction with people, etc.), the *Job Diagnostic Survey* (Hackman and Oldham, 1975) was given to all members of the corporate payroll department, as well as one of the payroll offices in a nearby facility. The results were consolidated by the consulting team, and then given to the design team. After the design team had spent time explaining the information and summarizing learnings, they presented the data to the rest of the payroll department.

OD issues of Phase II

- Familiarizing the steering committee with the products of the design team is important to begin as soon as possible in order to ensure the design team develops an alternative work system generally acceptable to the steering committee;

- Allocating the appropriate spectrum of internal and external consultants is essential to ensure that the skills necessary to conceptualize the project, as well as to manage the various phases of the project, are represented on the consulting staff;

- Shouldering major responsibility for energy until the design team is functioning well may be necessary until the design team understands its mission and begins to feel significant ownership in the project;

- Gaging energy outlay of the design team in the data collection phase is important to ensure energy is available for the design phase;

- Ensuring that reality checking of outside influences is completed in a politically useful manner for overall project success may be crucial to project survival and needs to be discussed with the focal client.

Phase III

The preceding steps (steps 3 through 7) concern data collection and employee education. The design phase uses the informa-

tion collected and key concepts to generate a recommendation. To ensure a design acceptable to management, the steering committee should review the design team's work throughout the process. At this point in the project, you may want to add a member of management to the design team to gain his or her support for the final recommendation submitted to the steering committee.

- *Step 8: Topics discussed in the design phase to transform the data into a recommendation.* The purpose of the design phase is to generate guidelines for the new organization. This means that a minimum specification of the organization is proposed instead of a detailed description of each job. The intent here is to allow more "fleshing out" of the job to occur by the people who actually take the job.

The broad topics discussed in the design phase of the payroll case include:

- LPO functions to be decentralized;
- LPO structure;
- LPO technology;
- Evolution of LPO functions out to local site.

Under *LPO functions to be decentralized*, approximately 50 functions were identified for possible decentralization by the design team. Each function was discussed separately to determine if it could be decentralized from a "feasibility" standpoint. Whether or not it was "desirable" to decentralize each function was also discussed; the cost of decentralizing was discussed later.

Under the *LPO structure*, the following subtopics were included: characteristics desired in the LPO management philosophy (e.g., jobs composed of whole tasks, independent thinking, self-sufficiency); type of decision making desired (e.g., peer decision making with two or more LPO specialists; hierarchical decision making with an LPO supervisor over an LPO specialist; and /or semi-peer/hierarchical decision making with a lead LPO specialist over an LPO specialist);

6 Steps To Higher Profits With THE PROFESSIONAL EDGE IN SELLING

Successful salespersons know exactly what steps to take to close a sale. And they do it more often than their competitors. That's THE PROFESSIONAL EDGE IN SELLING by Gwyn. In 6 step-by-step multimedia presentations, this new training program will teach your salesforce to increase their sales by applying fundamental selling principles to every selling situation—no matter what the product or service and regardless of the customer. And increased sales mean higher profits for your company.

REPLY TODAY

For further information, please phone or write:

Attn: John Roman
SOUTH-WESTERN PUBLISHING CO.
5101 Madison Road, Cincinnati, OH 45227
(513) 271-8811, ext. 413



Circle No. 170 on Reader Service Card

criteria for splitting job responsibilities (e.g., by client groups, by alphabet of payroll population, by specialty or function); and alternative pay structures (e.g., team-peer evaluation only, individual merit only, and/or combination of individual merit and team evaluation). These discussions took place in the project team and used alternating brainstorming, nominal group techniques and large group discussion.

The LPO technology discussion was oriented toward what existing functions should and should not be automated from the design team's point of view. In this discussion, people were subgrouped by their specialty (phone inquiries, garnishments, relocation, etc.). They brainstormed both what they did and did not want to automate in

their jobs. This discussion was crucial to those office workers influencing the new technology and told the MIS specialist their preferences. The specialist then suggested various computer options available.

The topic, *evolution of payroll functions out to the local LPO*, concerned recommending those functions which should be decentralized from a learning and skill acquisition standpoint. The framework was based on the priorities for moving specific responsibilities from corporate payroll to the local site: responsibilities essential for immediate LPO functioning on important recurring tasks; responsibilities vital in shaping eventual LPO priorities while they are still in formative stages; and responsibilities important to LPO semi-autonomy, but which are too in-

frequent and complicated for immediate distribution.

When consulting on an effort of this sort, documenting the design team proposal is important for approval by the steering committee. This proposal is documented after discussion similar to the above topics occurs. The steering committee looks for aspects of the proposal it cannot agree with; these points are discussed and resolved. They address points that are trade-off dilemmas between the business, technical and social subsystems.

OD issues of Phase III

- Coaching the entrance of the department manager if added to the design team is essential to make sure he or she is there to provide options and "bless the outcome," instead of conducting

NEW!

from the producers of
"YOU PACK YOUR OWN CHUTE"

THE JOY OF INVOLVEMENT

16mm/video • 30 minutes • color



This exhilarating Eden Ryl film tackles the most neglected area in training and education:

INDIFFERENCE!

The message — woven into high-speed action — is powerful and specific.

A fast-paced film for today's audience which will get them

INVOLVED!

- transform indifference into enthusiasm
- move listless footdraggers to do more and enjoy it
- turn on your most turned-off people.
- build genuine commitment

WORLDS CAN CHANGE
WHEN
PEOPLE GET INVOLVED

Write or call for details today!

TOLL FREE

800-854-0223, ext. 1046

In California call collect:

714-833-2444, ext. 1046

**Ramic
Productions**

P.O. Box 7530, Dept. 1046
Newport Beach, CA 92660

Ramic is the sole legal source of this film.

meetings or managing the design team;

- Proposing alternative organization structures for the design team to consider may be necessary to broaden perspectives about what is possible;
- Being cognizant of what is occurring in the project's sociopolitical environment is essential to help strategize the timing and content of the job/organization proposal;

An iterative process

A general rule about this step-by-step process is that while the process appears linear in nature, it is actually iterative. When undertaking a project like this, one must accomplish it in a linear manner: each succeeding step brings clarity to the steps before it.

For instance, in the payroll case, after completing the workflow, it became apparent that approximately 50 percent of payroll's key variances were controlled by information possessed by departments other than payroll. This had implications for the need to streamline the areas related to these variances as much as possible in order to assist in variance control and to help the clerks gain more control over the quality of their work. Therefore, in the outside influence analysis, outside departments were discussed. They needed to be discussed again from a more informed perspective once the work-flow analysis was completed.

The human element poses a major challenge in office productivity efforts for the next decade. It can and does become a serious problem for organizations when their programs to automate do not consider a number of key personnel management issues. The problem is not only that people need time to make the transition from zero to total familiarity with a new system, but that people may feel intense resentment and fear about being left out of plans until the new system is completed. Thus, the critical challenge of instituting effective office automation involves the

participation of people with relevant information about the work system, as well as the socioemotional issues of training, office/organization politics, commitment to a new system and the pacing of the changeover.

This project provides an example of what can be done to articulate the conflicts between business, technological and social needs during the institution of a new automated office system. It cites the influence that sociotechnical and QWL principles have in the computerized office, both now and in the future.

Bibliography

- Burns, J.C. "The Evolution of Office Information Systems." *Datamation*, 60-64 (April 1977).
- Gibson, C. and R. Nolan. "Managing the Four Stages of EDP Growth." *Harvard Business Review* (January/February 1974).
- Hackman, J.K. and G.R. Oldham. "Development of the Job Diagnostic Survey." *Journal of Applied Psychology*, 60, 159-170 (1975).
- Katzell, R.A. and D. Yankelovich. *Work, Productivity and Job Satisfaction: An Evaluation of Policy-Related Research*. Harcourt Brace Jovanovich Inc., New York, 1975.
- Morgan, H.L. "Office Automation Project—A Research Perspective," in *Proceedings of 1976 National Computer Conference*. Montvale, New Jersey.
- Munford, E. and D. Henshall. *Participative Approach to Computer Systems Design*. John Wiley and Sons, New York, 1979.
- Pava, C. "Sociotechnical Design for Advanced Office Technology." Unpublished working paper, Harvard Business School, Harvard University, 1982.
- Zisman, M.D. "Office Automation: Revolution or Evolution?" *Sloan Management Review*, 19, 1 (1978).

Circle No. 151 on Reader Service Card