Deane B. Gradous
Editor

Systems Theory Applied to Human Resource Development

Fourth in the Theory-to-Practice Monograph Series

Contributors:

Barry A. Boothe
Neal E. Chalofsky
Oliver W. Cummings
Henry L. Dahl, Jr.
G. Richard Hartshorn
Carolyn D. Holt
Ronald L. Jacobs
Patricia A. McLagan
Fred Nickols
Edmund H. Rieger
Karen E. Watkins

Published by the
University of Minnesota
Training and Development Research Center
Department of Vocational and Technical Education
and the
American Society for Training and Development
Research Committee

Human Resource Development Theory-to-Practice Monograph Series

This monograph is a joint project of the Training and Development Research Center of the University of Minnesota and the Research Committee of the American Society for Training and Development. It is the fourth in a series of theory-to-practice symposiums and monographs that involve both distinguished scholars and human resource practitioners. The symposium that led to this monograph was held on the University of Minnesota campus in St. Paul, September 25–26, 1988.

The first three symposiums held at the University of Minnesota resulted in the following monographs:

Swanson, R. A., & Gradous, D. (Eds.). (1987). *Human resources and organizational change.* Alexandria, VA: American Society for Training and Development.

McLean, G. N., & DeVogel, S. H. (Eds.). (1988). *The role of organizational development in quality management and productivity improvement.* Alexandria, VA: American Society for Training and Development.

Sleezer, C. M. (Ed.). (1989). *Improving human resource development through measurement.* Alexandria, VA: American Society for Training and Development.

Published by:

American Society for Training and Development
1630 Duke Street
Box 1443
Alexandria, VA 22313
703/683-8100

Contents

SECTION 1

Introduction

Preface to the Monograph

Deane B. Gradous
Training and Development Consultant
Wayzata, Minnesota

Fall comes early to Minnesota, and in late September of 1988, the leaves were already turning when a group of senior practitioners in training and development gathered to discuss systems theory applied to human resource development (HRD). They were responding to a paper on the topic, presented by the selected distinguished scholar, Dr. Ronald Jacobs of the Ohio State University. Richard Swanson, professor at the University of Minnesota, developed the symposium process used on this occasion. Although the process may be somewhat unorthodox, it works. The monograph you have in your hands is the evidence.

The Symposium Process

First, ASTD's Research Committee and the University of Minnesota's Training and Development Research Center (TDRC) agreed on potential topics for the monograph series. In this case, the topic for the monograph was selected after those involved wondered about the role of theory in an applied field such as training and development and about the criteria that could be used to evaluate that theory. Jacobs agreed to put his views to the test by submitting a paper to senior practitioners in the field. Writing the initial manuscript commanded quite a bit of what might otherwise have been an idyllic summer for Jacobs. He did manage to spend a little time sailing, but even some of that time was spent revising drafts

of the manuscript. Nevertheless, in September, he had sent the paper off to be read by the distinguished practitioners who were invited to the symposium.

In the meantime, I was selected to be the editor for the monograph. The selection criteria were that the editor had to be knowledgeable about the topic and able to guide the manuscripts through to submission to the publisher. I shared with the symposium participants a great enthusiasm for using systems thinking when working with individuals, groups, and organizations. The events of the symposium unfolded as follows:

On Sunday evening, Jacobs and the practitioners gathered at the TDRC on the St. Paul campus. Swanson, Bonnie Knapp, a TDRC research assistant, and I were set for the meeting. After a round of introductions and a light supper, Jacobs opened the discussion on the topic. He talked about the genesis and the development of his ideas over a period of time. (He has several publications on the theoretical foundations of the profession, the latest of which is the chapter in this monograph.) At first, the comments and questions from the practitioners came slowly. "Why propose human performance technology as the major theory for the human resource development?" "Does the field have to have an overall theory?" "We believe that systems theory is bigger than human performance technology." The practitioners knew that Jacobs would not be present the next day, and thus they spent their time with him wisely.

At 10 p.m. the scholar's work was done, and all were tired. The van left for the Sunwood Inn. A few of the practitioners stayed up late to get better acquainted and to carry on the discussion. Most retired early because they knew the next day's schedule would be demanding.

Bright and early on Monday, the practitioners met with Swanson and me. We again invited them to share their reactions to Jacobs's paper. Around the table, the practitioners expressed their appreciation for the opportunity to think about and to consider the role of systems theory in the HRD field and in their work. They all asserted that their use of systems theory differed from that of Jacobs. Most thought practitioners in the field ought to use systems theory in a variety of ways and not limit themselves to human performance technology. We encouraged talk about what they wanted other practitioners to know about applying systems theory in the field.

As we recorded the practitioners' ideas on sheets of newsprint, we all began to see the beginnings of a monograph. Three of the participants considered exploring whether or not a theory was needed for the field. Two were interested in writing about systems theory as they knew it. Four wanted to describe how they had applied systems theory in their organizations. Finally, one or two decided to explore how systems theory fits with other, larger frameworks that could be

applied to problems and opportunities in the field. In a surprisingly short time, each participant had a title and a topic for his or her contribution to the monograph. The morning had flown by, and it was time for lunch.

After lunch, more work. I distributed handouts about the editing process and about using the third edition of the American Psychological Association's style manual as our authority in matters of formatting and citations.

Although participants were given the choice to co-author manuscripts, each decided to write alone. We divided them into groups by sections of the monograph and asked them to plan their chapters right then and there. Everyone took several sheets of newsprint and a couple of markers and went off to various locations to work on their outlines. Some chose to develop their ideas in their small groups before writing their outlines. Others began to sketch out their ideas immediately. Soon each person had filled one, two, and sometimes three newsprint sheets with a chapter outline. A flurry of productivity ensued. Again, the symposium process had proved effective. About an hour before leaving for home, the symposium participants gathered to share their outlines and to decide where to place the chapters. "Let's put Henry's chapter up front." "Pat's chapter belongs after Neal's." And so on.

In the final step, we collated and stapled copies of the outlines in the order the chapters would appear in the monograph. In this way, each participant left the symposium knowing where his or her chapter would fit in the published monograph.

According to our timetable, the practitioners were to take one month to write their chapters and the editor one month to edit the monograph. Deadlines came and went. Inevitable client demands on practitioners' time, overly busy word processors, the need to seek permission to use a graphic or two, and the absence of several references to a book nobody could track down caused many delays. At last, however, the manuscripts were completed and were delivered to ASTD for copy editing and printing.

We are proud of the result of our long process and hope the ideas in this monograph are applicable and useful to you in your work as a training and development professional.

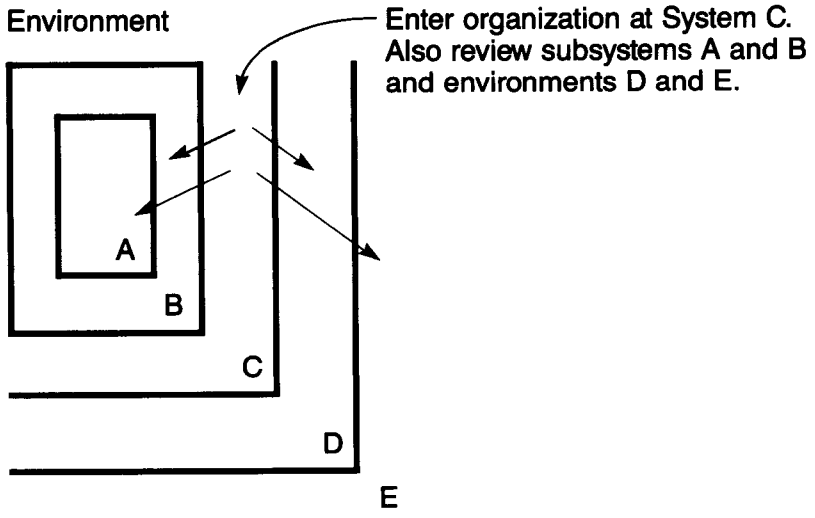
Systems Thinking

A symposium is an educational experience for all, even for the distinguished practitioners and academics who may rightly be considered experts on the topic. As the symposium participants expressed their ideas about systems theory and its applications, they discovered many similarities and many differences in their thinking. When we gathered on that Sunday evening in September, most of

the participants knew they did not view systems in the same manner as Jacobs, but they did not realize how much they differed from one another. They did not resolve their differences through discussion, nor should they have. The richness of experience and the variety of backgrounds they brought to the subject only added to the quality of discussion.

However, the passage of time and the vantage point of being able to review all the chapters together has helped this editor understand that many of the differences between their approaches to systems theory are the result of differences in how they chose to frame the systems they described. For example, Jacobs put a rather tight frame on his human performance system (see Frame B in Figure 1). To some HRD professionals, human performance technology is, as he describes it, a simple, closed system, consisting of input, process, output, and feedback. On the other hand, many of the symposium participants described systems with much larger frames (see Frames C and D in Figure 1). They saw that an intervener in any system had to understand the concepts of subsystems and environments. They viewed organizations as open systems that contain subsystems and exist within still larger environmental systems.

Figure 1—Framing organization systems



Many of the symposium participants described their need to look at the possibility that problems and opportunities in systems belong to smaller or larger frames than most first impressions would indicate. For example, the trainer who responds to management's demand

that operators be trained should first initiate a thorough needs assessment that takes into account an organization's various systems levels. The trainer who responds to such a management request with careful data gathering and analysis may encounter a situation in which the manager who made the request or the manager's manager is in need of training and development. It is far too easy for managers to blame their workers for systems problems. No one has said it better than Geary Rummler: "Put a good person in a bad system, and the system will win every time."

Training managers and organization development professionals will benefit from learning how to frame the problem or opportunity situation and then to reframe it at one or two levels larger or smaller. Expert interveners know that it is important to find the leverage points that will yield the most gain and to avoid intervening where little or no permanent gain will result.

The Monograph

The first three chapters of the monograph set the stage for considering the application of systems theory to the field. Henry Dahl introduces the monograph by declaring that the field needs a unifying theory of human resource development. He offers several criteria for judging the usefulness of such a theory. Neal Chalofsky then adds to our perspective on the field by describing the evolution of the practice of human resource development. Barry Boothe's unique chapter is a classic in its own time. It both teaches and pokes fun at systems theory. Don't skip this one.

The next three chapters discuss systems theory from three vantage points. Ronald Jacobs looks at the usefulness of systems theory in developing a subtheory of human performance technology. He takes a hard look at whether human performance technology satisfies the criteria of a good theory. Patricia McLagan's chapter is a lucid primer on using systems theory to intervene in small, large, and mega systems. If applied, the ideas in her chapter could revolutionize intervention planning and strategy. Richard Hartshorn offers an insider's perspective. He suggests that HRD practitioners and management should work with systems consultants and learn to appreciate the complexities of cause-and-effect thinking in a large company.

Four chapters on applying systems theory to real-world problems and opportunities follow. First, Fred Nickols proves the utility of systems theory in making work productive. He urges HRD practitioners to use systems theory because it holds the most promise as a "reliable approach to understanding, changing, and developing organizations." Second, Carolyn Holt narrates the story of a major systems intervention in a division of Union Carbide. She describes

how systems theory was used to introduce a systematic change in management thinking. Third, Edmund Rieger tells us what he learned by developing five high-performance systems organizations. He thoroughly delineates the differences between those five organizations and traditionally managed organizations. The differences are instructive for the organization designer. Fourth, Oliver Cummings describes Arthur Andersen & Company's systematic method of designing instructional packages for client education. Without a system, the magnitude of Arthur Andersen's training operations would be impossibly chaotic.

Finally, Karen Watkins wraps up the monograph by urging us to look beyond systems thinking. She develops five metaphors for analyzing the work of the HRD practitioner, one of which is the problem-solving, systems-thinking professional. The other four metaphors provide additional food for thought.

Human Resource Development Needs a Unifying Theory

Henry L. Dahl, Jr.
Director, Corporate Employee Development and Planning
The Upjohn Company

Why is human resource development (HRD) so important to developing the competitive advantage of an organization? Because most organizations spend more money on their people than they do on any other productive resource. Hiring, maintaining, developing, and managing employees are the largest investments most organizations make. Studies conducted by The Upjohn Company show that whenever a new position or a new employee is added, the company commits to an investment equal to 160 times* the initial salary, assuming the employee remains with the organization for the next 30 years. Thus, a new employee earning

- $20,000 per year represents an investment of $4,200,000
- $40,000 per year represents an investment of $6,400,000
- $60,000 per year represents an investment of $9,600,000

Besides noting the huge investment costs of human resources, we should also realize that all the other resources of the organization—money, facilities, land, time, technology—are managed by these same human resources. Organizations that are concerned with developing their competitive advantage must contend with rapidly changing jobs, new technologies, and a diminishing supply of qualified people in the labor market. Then, too, our organizational leaders need new knowledge and skills for global leadership. The leaders at Upjohn and all leaders of U.S. organizations must become global leaders in order to help their organizations survive and grow in the world marketplace.

The people we call our human resources, besides deserving to be managed effectively, should be seen as important stakeholders in our organizations. Their dual role as contributors and stakeholders increases the challenge of managing them. Some managers who manage their people as if they were expendable resources tend to take the short-term focus of getting the most for the least investment. Such managers provide less-than-optimum quality of worklife, pay less than the competition, use punishment rather than reward to stimulate effort, and show little concern for the personal goals,

Footnote
*Includes salaries, benefits, and employee-related taxes only. Hiring costs, training costs, employee services are additional costs.

motivations, careers, satisfaction, and overall quality of life of their people. Other managers who treat their people as a valuable resource and as stakeholders in the organization tend to take a long-term view. They are committed to helping all employees achieve their full potential and, at the same time, work to achieve organizational goals.

Management's goal is, or ought to be, to find and develop ways to build the human resources of the organization into a significant competitive advantage. The HRD practitioner's role is to contribute to this effort by helping line managers fulfill their responsibilities for developing the competitive skills and knowledge of organization employees—now and in the future.

Concerns About the Function

Why has the HRD function apparently not achieved its full potential for working in partnership with management? Why do line managers and HRD professionals not pursue together a common endeavor to build human resources into a significant competitive advantage for the organization? Several possible reasons exist:

1. The many questions that arise about HRD indicate that managers and HRD lack a common understanding of what human resource development is and how it fits into larger management concerns.
   - What is organization development?
   - What are the differences between education, training, and development?
   - How do we measure return on human resource development?
   - What competencies are required to prepare HRD professionals?
   - Why don't managers understand what we are capable of contributing and ask for our help?
   - Can you show me the evidence that human resource development contributes to the success of the organization?
   - What are the differences between human resource management, human resource development, and human resource planning?
   - What is instructional design?
   - What is training evaluation?
   - What research should be done to develop better ways of doing whatever it is we are trying to do?
   - Why do so many trainers push programs and products rather than focus on the skill and knowledge needs of our people?
2. Management doesn't understand the role of HRD, nor do decision makers understand the potential value of HRD contributions to the current and future success of the organization.
3. The tools human resource development professionals use are complex, frequently misunderstood by management, and sometimes of questionable benefit relative to their cost.

What Is Needed?

I believe that a unifying theory of human resource development can address these issues. A unifying theory will:

Provide a common language. When all parties interested in human resource development can understand one another, communicating the goals, methods, and benefits of HRD will be easier. Imagine the benefits of our being able to talk to other HRD professionals as easily as chemists, airplane pilots, or space explorers talk to each other! Using common terms, concepts, methods, principles, and technologies will lead to shared understandings.

Provide a basis for understanding human resource development competencies. Have you ever posted an internal job notice to fill a training position and then noted the range and variety of skills of those who applied? The jumble of skills and experiences from which one must select a qualified applicant clearly demonstrates the need to develop a standard set of competencies for professionals in the field. [Editor's note: ASTD's 1989 competency study fills this gap nicely.]

Stimulate research. Given a common language and common concepts, methods, principles, and technologies, researchers will have a field day proving, challenging, and improving all areas of HRD so it may contribute more effectively to achieving high-performance organizations.

Help line managers understand the value of human resource development efforts aimed at achieving their short-term and long-term goals. Can you imagine line managers actually promoting knowledge-and-skill acquisition in order to build a significant competitive advantage? When managers realize the true value of HRD to their organizations, they will provide the necessary visibility and support to the function.

Provide a firm basis for diagnosis and evaluation. Using a theoretical basis for diagnosing the need for and evaluating the achievement of job knowledge and skills will increase organizational effectiveness. In the process, it will help individual employees achieve their personal goals as stakeholders.

Why One Theory?

I believe that having a unifying theory can help us achieve organizational effectiveness. HRD professionals must strive for a consistent framework for conceptualizing the field. This framework must identify HRD's links to all business and human resource management, including strategic planning, organizational design, staffing, performance management, rewards options, succession planning, and career development.

What Criteria Will Determine the Most Useful Theory?

The following criteria seem very important:

The theory should be dynamic and evolutionary. It should promote improvement and change, as new research and new organizational experiences dictate. It should not restrict creativity by overdefining various parts and relationships within the organization.

The theory must be usable by line managers in the process of meeting organizational goals and strategies. Any theory, no matter how elegant and sophisticated, that is not usable by line management is unacceptable.

The theory should apply to and be of value to various levels of the organization. A theory that can be applied only to first-level supervisors as they work with individual employees is not as useful as one that can be applied to larger, broader aspects of the organization.

The theory must meet the tests of a good theory. In this monograph, Ronald Jacobs proposes eight such tests, which are:

- importance
- preciseness and clarity
- parsimony and simplicity
- comprehensiveness
- operationality
- empirical validity or verifiability
- fruitfulness
- practicality

The theory must be result-driven rather than activity-driven. Too much of what is written for the HRD field focuses on activities, such as training, management development, instructional design, career planning, organization development, computer-assisted instruction, and programmed learning. I believe we would accomplish more if we worked harder to describe the performance need and focused on what HRD activities are supposed to achieve for our organizations. Some examples of HRD achievement are

- helping employees acquire the knowledge and skills needed to perform their jobs effectively, as opposed to doing training
- helping our organizations become more effective, as opposed to doing organization development
- helping all employees achieve their full potential, as opposed to doing career planning

In summary, a unified theory of HRD is needed. Because of the importance of HRD to organizational success, we practitioners need more effective means for communicating with management and with each other. We need better diagnostic tools. We need to continue developing the competencies of practitioners in the field. We need to distinguish human resource development from human resource management. We need to be more effective in helping line managers

achieve organizational goals. I have suggested several criteria that could be used in selecting a unifying theory for our field. Other contributors to this monograph will set forth their ideas for using theory to guide practice in the field.

What Is HRD?

Neal E. Chalofsky
Associate Professor of Human Resource Development
The George Washington University

The evolution of the field of HRD has reached a point where, to emerge fully as a profession, practitioners need to build a conceptual framework, identify a body of knowledge, establish entry points, and develop a theory base. The purpose of this chapter is to discuss the evolution of the field, to describe a conceptual framework for HRD, and to examine several critical elements that HRD must have to be considered a profession.

Evolution of the Field

The first major publication that empirically examined the field was an article by Gordon Lippitt and Len Nadler. The authors identified three roles of the training director, which had emerged in chronological sequence. The earliest training activities were conducted during World War II by teachers who had been recruited out of their classrooms by industry to be technical instructors (Role #1, learning specialist). Those trainers who stayed in business, industry, or government after the war found themselves slowly assuming administrative responsibilities (Role #2, manager). Eventually, many trainers realized that some organizational problems warranted a broader approach than that furnished by the usual learning techniques. Thus, the third role emerged—that of contributor to organizational problem solving (Role #3, consultant). What had begun as a set of tasks performed by instructors who provided job information and training eventually evolved into a set of three roles based on instruction, supervisory principles, and group dynamics—all under the guidance of people with the title of training director.

As the field matured, several related specialties began to emerge. Instructors with behavioral backgrounds became instructional technologists. Those with humanistic backgrounds became human relations and sensitivity trainers. Many trainers left their organizations to enter consulting. Eventually, the sensitivity trainers/consultants moved into the specialty area of organization development.

While the new specialties or subroles were being established, the three basic roles of learning specialist (instructor), manager (administrator), and consultant (organization problem solver) remained constant. In 1970, Nadler published his now-classic book *Developing Human Resources*, in which he defined the term "human resource development" (HRD). The term and its accompanying description advanced the field forward on its trajectory as an emerging profession.

Figure 1—Evolution of the practice of HRD

HRD provided a conceptual umbrella under which the field could begin to unify, using the three-fold notion of *training, education,* and *development.* HRD also provided purpose and direction for the continued growth of the field: *organized learning to provide the possibility of performance change.* It further identified a core discipline from which a field of study could develop: *adult learning in the workplace.*

One additional major role has emerged since the early seventies—that of the career development specialist. This role has had a more distinctive evolution than that of the other three. Professional counselors traditionally provided career guidance and counseling in schools, as members of recruiting firms, and in private practice. Concurrently, in the private sector, industrial psychologists made efforts to select high-potential employees and to plan for the career progression of employees. Their goal was to ensure a steady supply of managers and leaders for their firms. Both employees needing advice on

how to pursue their career moves through the organization and top management needing advice on the status of its workforce before making major organizational changes turned to the HRD specialist as the best available resource for those needs.

Eventually, human resource planning emerged as a human resource management specialty for dealing with top management's need. HRD specialists began to provide primarily individual career counseling and sometimes personal counseling. Fortunately, professionally educated career counselors also began to recognize the needs of employees for career-development services. Their services were integrated into the HRD function fairly quickly. Today, most personal counseling is provided by clinically trained counselors, and career counseling is beginning to be provided by people with joint HRD/career counseling degrees from the graduate academic programs that have formed on several campuses. The integration of career-development services into the HRD function is now very common, and groups such as ASTD's career-development professional practice area continue to grow.

ASTD's most recent roles and competencies research has identified a greater number of roles than previous research, although the newer roles could all be considered subroles of the four major roles discussed above. The new ASTD competency study, which as of this writing is still in progress, identifies 11 subroles that fall under these four major roles:

Learning Specialist:

1. Needs analyst
2. HRD materials developer
3. Instructor/Facilitator
4. Program designer
5. Evaluator

Manager:

6. Marketer
7. Manager
8. Administrator

Consultant:

9. Researcher
10. Organization change agent

Career development specialist:

11. Individual career-development adviser

Many business people believe that these four major roles form the foundation of what HRD specialists do on the job. The roles and their corresponding competencies could also form the basis for an academic discipline that is representative of the field of practice, which would provide for some consistency among graduate HRD programs across the country. At issue is the fact that although the four roles have been identified since 1975, they have never been fully accepted by the field as the definitive major roles of the HRD profession.

It is now time for the field to move to the next stage of its evolution—to move from focusing on what is *performed* to what is *produced* and to be concerned with the quality of the products and services produced. Defining that stage is the purpose of the ASTD study currently nearing completion. Yet another shift is taking place in the field. The focus on *individual learning* is shifting to *organizational learning* as the primary activity and goal of the field. HRD is no longer primarily in the business of running training courses to improve individual skills. It is now more concerned with helping the organization strategically plan and implement change to improve organizational effectiveness. The new approach requires a more sophisticated view of HRD in terms of its responsibility to develop the total organization.

The figure below summarizes the major evolutionary shifts in how HRD people have perceived the purposes of their field. These shifts have provided the impetus for developing a conceptual definition that reflects the growth of the profession.

Figure 2—Evolutionary shifts in HRD

From	To
Roles and competencies	Outcomes and standards
Individual learning	Organizational learning
Instructional skills	Organization change skills

Conceptual Definition of HRD

In the October 1986 issue of the *Training & Development Journal,* Ralphs and Stephan presented a study of the HRD functions in *Fortune 500* companies. In one item of the study, respondents were asked to identify the human resource areas they would include under the label of "human resource development." Four highly ranked activities clearly stood out from the rest:

- training and development
- organization development
- human resource planning
- career development

It was not the first time that organization development and career development had been closely identified with HRD. The two practice areas have been represented in ASTD subgroups for years. But it was the first study to acknowledge publicly what I believe was, and is, a widespread, but unspoken consensus in the field.

In August 1987, ASTD convened a task force to revise its 1983 *Models of Excellence* (McLagan) role-and-competency study and to examine the issue of setting standards of performance for the field. Because the 1983 study team did not want to tackle the "What is HRD?" issue, its study was based on a narrow spoke of the human resource wheel entitled "training and development" (see Figure 3). Training and development seemed the safest area to study, as it was the only part of the wheel that everyone agreed was a definitive part of HRD.

The 1987 task force decided to examine the "What is HRD?" issue. To everyone's pleasant surprise, the members unanimously agreed on a conceptual framework to define the field. They proposed that HRD comprises the following three areas (not in any priority order):

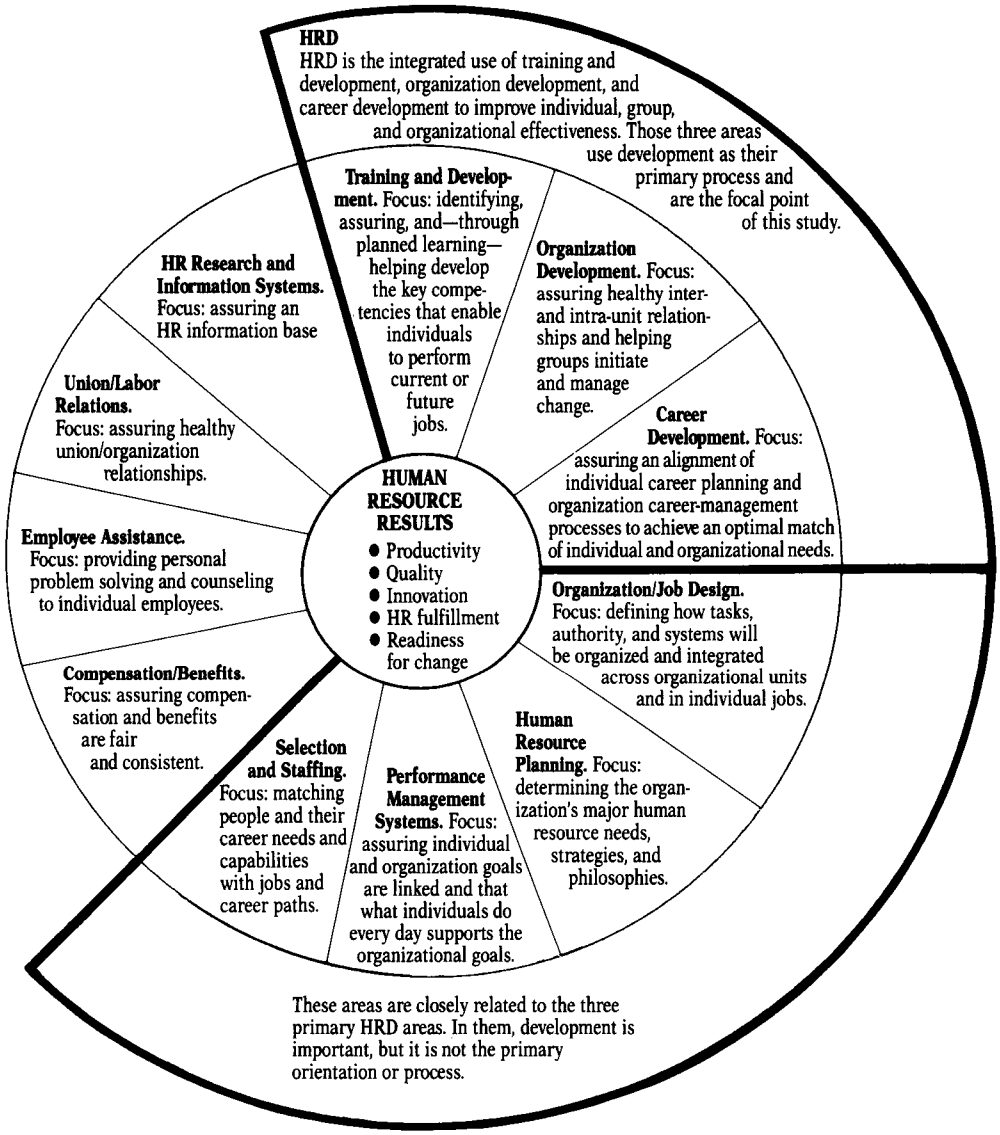
- training and development
- organization development
- career development

The study team then developed and proposed the following narrative definition of HRD based on the adopted framework:

> HRD is the integrated use of training and development, career development, and organization development to improve individual and organizational effectiveness.

HRD is the integrated use... means that for optimum effectiveness, the three activity areas are to be used as parts of a total integrated HRD system. The activities must be planned both strategically and tactically and should be congruent with the mission and the needs of the organization. The HRD plan must allow for flexibility and creativity, as well as provide direction. The strategic HRD plan

Figure 3—The human resource wheel



should encompass a total system picture of the organization's needs and visions. The implementation of HRD activities should be based on an action plan that flows from the organization's strategic plan, and the activities should be monitored and evaluated against the objectives of the action plan.

. . . *to improve individual and organizational effectiveness* means that we in HRD should be concerned with the development of individual human potential *and* with organizational productivity and effectiveness. We are in a unique position to see a holistic picture of the organization. We also must be vision oriented as well as problem oriented. We need to help our organizations define and solve today's problems and to create and achieve tomorrow's goals. We must to be able to anticipate organizational problems, issues, and opportunities by scanning the environment constantly so that we can alert top managers and help them choose the best course to reach organizational goals and to avoid potential HRD barriers along the way. We must have a holistic perspective of HRD so that we may combine training and development, career development, and organization development into an integrated approach to the development of the human resources of our organizations.

Philosophically, this definition implies that we are responsible for helping both the individual and the organization learn to reach their highest potentials. ASTD's strategic plan (April 1987) includes a section entitled "beliefs that represent a value system for the profession":

- The worth, equality, dignity, and potential of the individual must be recognized in the work place.
- Creativity and ingenuity are enhanced by diversity.
- The development of people and groups is critical to organizational effectiveness.
- Organizations are responsible for providing work-related development experiences.
- Ultimately, growth and change are the responsibility of the individual.

We have matured into a field that now has the basis for a solid body of knowledge, a conceptual framework, and visibility within the world of work. What else do we need to consider to be recognized as a full-fledged profession?

The Study of HRD

Many people entering HRD still "fall" into the field by being assigned to an HRD position within their organizations because of their technical skills or managerial abilities. Many more obtain

entry-level jobs based on their previous experience as teachers or counselors. People in both situations ask themselves, "What do I do now?" Most pursue some kind of training or education at institutions of higher education, where they encounter people who have *chosen* to obtain a certificate or a degree in HRD *before* they look for a job in the field. Such preparation for the field is relatively new to HRD, and many employers remain skeptical of potential employees who come armed with a degree but no related experience. Until hiring organizations recognize and demand an HRD certificate or an advanced degree, employers will not see such programs as valid entry points into the field. Further, the field will not progress into a profession without the research and the study that takes place on academic campuses. We need to think of HRD as a field of study, not just a field of practice.

A related issue pertains to HRD as an emerging academic discipline: There is a general lack of consistency between graduate HRD programs. Not only is there no core curriculum to which all programs adhere, but HRD programs are based within a variety of academic departments at each university. Existing HRD programs were developed by academic faculty who saw the need, whether they came from education, industrial relations, business management, or psychology. Therefore, each program reflects the core curriculum of its department of origin. Unfortunately, the result of this diversity is that employers cannot be assured that a prospective employee with an HRD degree has sufficient background in the essential areas of HRD. No standards exist.

The roles and competencies that ASTD is identifying through its current research provide the framework for an academic discipline The definition of HRD provides the conceptual purpose for the discipline.

References

Lippitt, G., & Nadler, L. (August 1967). Emerging roles of the training director. *Training & Development Journal, 21*(8), 2–10.

Nadler, L. (1970). *Developing human resources.* Houston, TX: Gulf Publishing Co.

McLagan, P. (1983). *Models for excellence: The conclusions and recommendations of the ASTD training and development competency study.* Alexandria, VA: ASTD Press.

Ralphs, L., & Stephan, E. (October 1986). HRD in the Fortune 500. *Training & Development Journal, 40*(10), 69–76.

Are We Taking Ourselves Too Seriously?

Barry A. Boothe
Training Manager
Caterpillar, Inc.

Before we jump headlong into this scholarly work, let's step back and put things in perspective. Do we really know where we're going with this thing, and will some useful purpose be served by getting there? Or are we making a mountain out of a molehill?

Unifying Theory

The proposition before us is that HRD needs a "unifying theory," and that something called "systems theory" is a likely candidate. Most of the reasons given for the "need" boil down to providing tools for practitioners. Now, I can't argue with that. I *am* a practitioner. But what bothers me about this "unifying theory" business is that it implies that we need to identify the *one* perfect tool—sort of a "one size fits all" mentality. We seem to have this burning desire to put everything in a box, tie a ribbon around it, and offer it up as the definition of the universe in four short chapters. And the case is closed.

Why do we have so much trouble with loose ends, fuzzy edges, and unanswered or unending questions? What will be gained by boxing-in the expansion of applicable theories, methods, and tools? If we accept *a* unifying theory, won't we put a clamp on finding *more* tools that can be used to do the job at hand?

History is filled with stories of "clamps" on exploration and innovation. First, somebody comes along with a theory. Usually it's at either end of the comprehension scale. That is, it's so simple that it's "obvious" or so complicated that no one but the author understands it. In both cases, the unwashed risk ridicule (or burning at the stake) if they challenge it. Next, a following is galvanized, and before you know it, there's general acceptance. It may take years, decades, or centuries before something that is "generally accepted" can be debunked.

Personally, I don't have that much time. I like trying to use all the tools plus a new one or two for each problem. And actually, unanswered mysteries don't trouble me all that much. It's comforting to know there are unexplored areas left to be enjoyed. I like challenging the "obvious" without being ridiculed for doing it. And on top of everything, mumbo jumbo bores me.

Do we need a unifying theory for HRD? I think not—and for the same reasons that are given to support its development. We need to keep searching for *additional* theories, deriving from them additional methods and tools for our "tool box."

Others obviously believe differently. At the very least, I suggest you enter into this monograph without blindly accepting the need for a "unifying theory" as a foregone conclusion.

Systems Theory

Now, what about this "systems theory" business? Does it qualify as a usable theory (unifying or not)—that is, as a basis for problem solving for HRD practitioners? That's a good question.

After examining the ruminations of systems "gurus" and their disciples, you may be hard put to identify a comprehensive definition. I'll try to help. First, they say, "everything is a system—from an atomic particle to the universe, and all or anything in between." Well, OK, if they want it to be. Next, we're told that "in a system [remember, a system is *anything*. . .or is it something else?] every part affects every other part." Wow! Heavy! I guess what they mean is if an inflated balloon can be used as a model for a system and if you poke the balloon one place, it'll bulge out somewhere else. . .or everywhere else. . .and all of the balloon and its air will be stressed. Gee, what a revelation!

Now that they've created a theory that's so obvious that no one dare argue with it, they go on to elaborate ad infinitum. These elaborations appear to be an effort to define, expand upon, extend to practical use, or some other such benefit to mankind. Actually, most of the books and papers on this subject (and a thousand others) are the output of a common administrative mandate to professors—as well as the vengeful response they pass on to doctoral candidates. One easily concludes, after scrutinizing the writings, that those people are trying to think too hard.

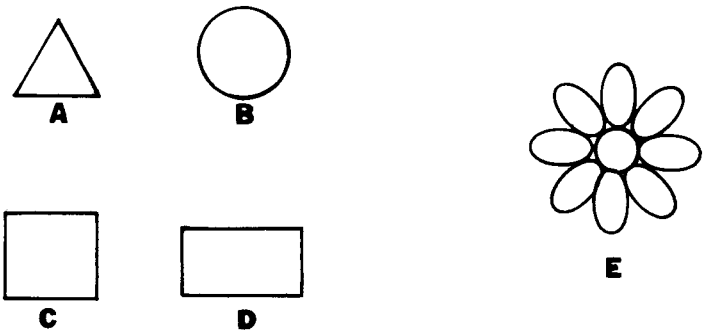
Another expected product of this effusion is that others who are looking for something to believe in and who aren't fussy about what "it" is, think they've found it. These "born again" systems types (in this case) busy themselves trying to justify their beliefs and to attract more converts. [This effort is sometimes manifested through symposiums and monographs.] Some proselytes attribute any and all experientially derived truths (that is, common sense) to the present catechism (Kauffman, 1980). That technique is used to render impotent the tenets of earlier prophets who used the same tactic on behalf of *their* "unifying theory."

Of course, some good comes from the efforts of the disciples. They try to find ways to simplify the rambling complexities created by word-driven gurus. They try to reach us simple-minded folk who

respond better to visuals than to page after page of letters, spaces, and punctuation. How many times have I heard myself ask, "Ain't there any pictures in this thing?"

A reasonable substitute for a picture is the accompanying diagram. Most theory diagramming follows a standardized form. First, you pick one of the following APA-approved shapes in Figure 1.

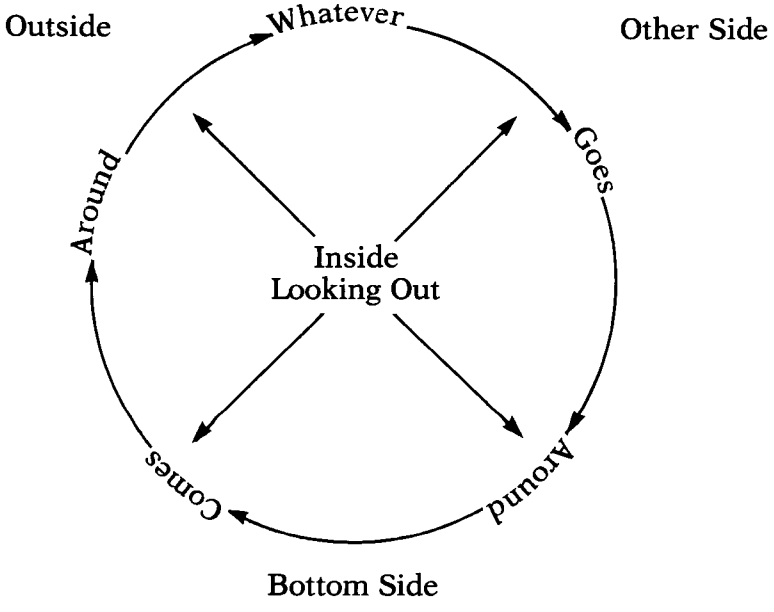
Figure 1—Accepted shapes



Shapes A, B, C & D have been in use since they were first accepted in the eighth century. Shape E was added during our lifetime to allow "Organizational Development" to emerge as a real profession.

Next, you write words or phrases in, around, and *through* the figure. . .and add some arrowheads for good measure (see Figure 2).

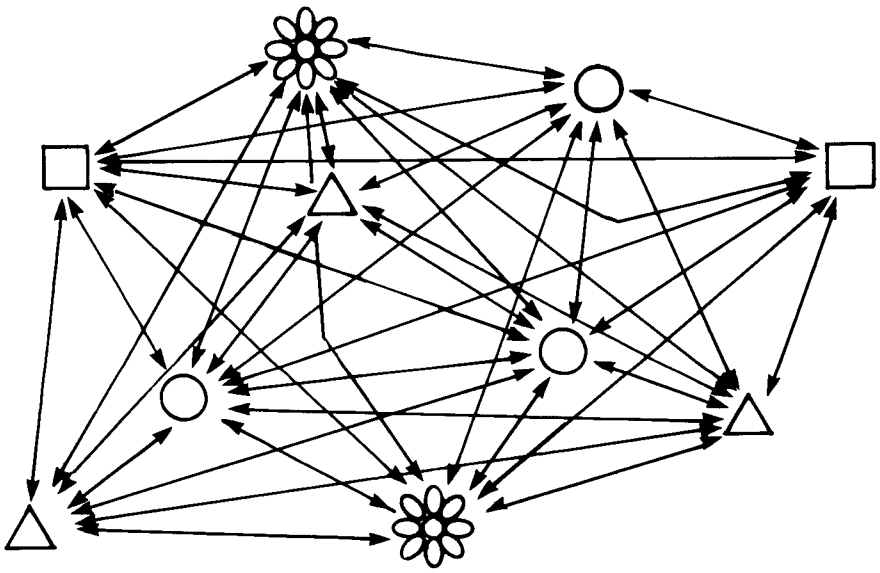
Figure 2—Approved method of diagramming a theory



The process can continue until you either exhaust the approved shapes or until all text is replaced by visuals—at which time your paper becomes a "job aid" (and you have to move from ASTD to NSPI to get it published).

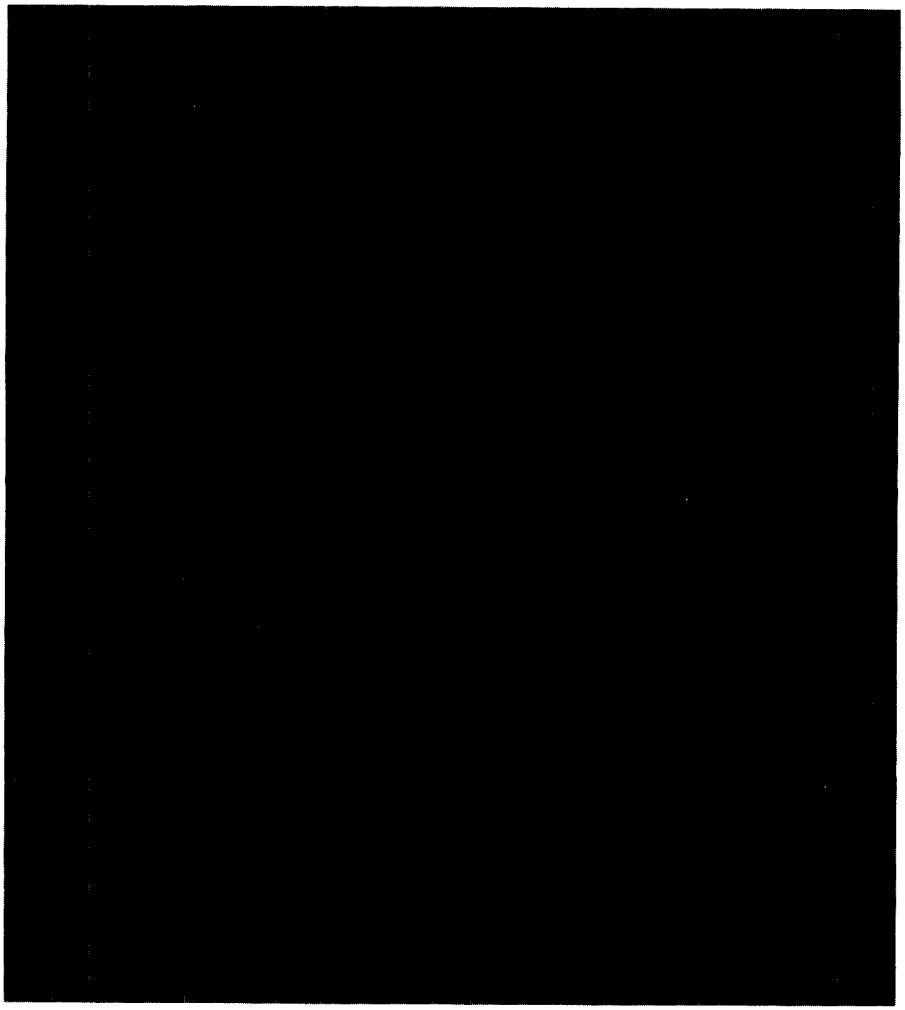
The last rule of diagramming is that you must create one or two unique figures based on the characteristics of your *now favorite* theory. Systems theory offers me a wonderful opportunity to illustrate what I mean. In Figure 3 I have diagrammed that profound statement, "Everything is connected to everything."

Figure 3—A system



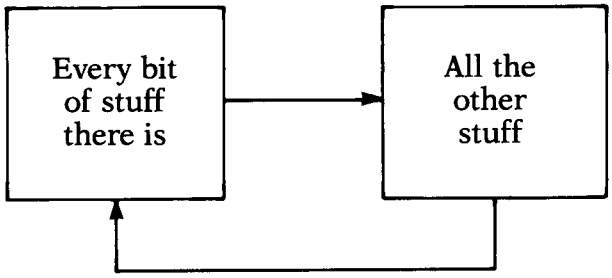
Now, to see that we understand each other, Figure 4 shows the same thing for a universe-sized system (reduced somewhat here to allow for page size). This is called the "macro view" in today's business terminology.

Figure 4—A really big system



Another impossible-to-resist diagramming trick is to use the standard "micro view" theory diagram to wrap up your visual presentations. These are available preprinted, so you only have to add the words. You can get these with anything from two to five boxes, all with the pre-arrowed feedback loop. That final feature eliminates 90 percent of the objections to your favorite theory. This diagram has successfully sold more theories than all the others combined. And, as you can see by Figure 5, it works big time for systems theory.

Figure 5—Micro view of sytems theory



Well, one thing is for sure: systems theory *is* a theory. It literally has everything. While being obvious, it is at the same time unexplainable. It provides people who are compelled to write with an indisputable need for explanation and, at the same time, the assurance that they will never succeed. It's a lot like being in dermatology, the world's best occupation. Your patients never die, and they never get well. Furthermore, if a fault-finder pokes a hole in systems theory, by definition, the theory bulges out somewhere else. In fact, it could be said that the fault-finder is just functioning as expected within a "larger system."

Faced with that sobering realization, I'm not sure any of us can contain the growth of systems theory as the explainer of all. Systems theory will rule the world by the turn of the century. The question isn't whether or not systems theory *should be* HRD's unifying theory, but rather, whether or not HRD, or anything else for that matter, will be able to escape its grasp. Sounds a lot like the killer-bee problem, doesn't it?

"Not to worry," as they say. Our saving grace is in systems theory itself. I quote from Kauffman (1980):

- There are no simple solutions.
- Good intentions are not enough.
- Every solution creates new problems.
- There are no final answers.
- Don't make rules that can't be enforced.
- "Obvious solutions" do more harm than good.
- Nothing grows forever (p. 38).

I feel better now. Go ahead and make systems theory whatever you want. It'll take care of itself. And while you wade through all this gobbledy-gook, I'm going to see what effect a pizza-and-beer system has on my system.

Reference

Kauffman, D. L., Jr. (1980). *Systems one: An introduction to systems thinking.* Minneapolis, MN: Future Systems, Inc.

SECTION 2

Theory

Systems Theory Applied to Human Resource Development

Ronald L. Jacobs
Assistant Professor and Coordinator
Graduate Studies in Training and Development
The Ohio State University

The human resource development (HRD) profession has no unified or generally accepted theoretical base. Even a cursory review of the HRD literature bears testimony to this observation and suggests instead a young, emerging profession, comprising many specialists who work on diverse and complex problems. It is no small wonder that interest in formal theory and theory development has increased substantially among many HRD practitioners and researchers.

The basic question for many of us is "How do we organize our various practical experiences into some formal, theoretical structure that will be useful in advancing our practice and that, in turn, will provide a basis for further theory building?" Unfortunately, we seem to be limited by our present thinking, which tends to be mostly a theoretical. In part, we lack an appreciation for what Kuhn (1962) termed an underlying structure, or metatheory, from which individual applied theories can be developed.

I contend that general systems theory forms the most useful underlying structure for the HRD profession. It is in this structural sense that systems theory should be applied to HRD. Recently, systems theory has been extended to guide our understanding of many different subjects in many different contexts, such as the study of social systems in general (von Bertalanffy, 1968) and organizations specifically (Berrien, 1968; Katz & Kahn, 1966). The use of general

systems theory to support specific goals of HRD practice constitutes a unique and emerging body of knowledge, which some have referred to as human performance technology (Smith, 1986).

Human performance technology provides the focus as well as the departure point for my basic thesis: *HRD professionals must not only possess an applied theoretical basis for their professional actions, but they must also have a structured means to assess the usefulness of their theory.* Thus, this chapter offers an opportunity to assess the value, and eventually the worth, of applying a specific theory to HRD. My purposes for the chapter are the following:

- to describe HRD professional practice and systems theory
- to discuss the concepts of theory and theory building
- to provide an overview and evaluation of the theory of human performance technology
- to reflect on the opportunities and problems for HRD practice

The rationale for this chapter derives from the emerging status of HRD. If HRD professionals are to be viewed as possessing a unique body of skills and knowledge, then that body of knowledge must be understood and tested, using criteria drawn from both theory and practice.

HRD Practice and Systems Theory

HRD is a relatively new career that embodies a variety of roles and responsibilities whose general purpose is to foster a desired change in the performance of a defined audience in an on-the-job environment (Goldstein, 1980). HRD practice involves taking actions that are intentional and skillful under conditions that are changing and problematic. The effectiveness of HRD practices usually depends on the involvement of others—whether that involvement is in the form of the commitment expressed by upper-level managers and executives or the cooperation provided by supervisors and other personnel. In this sense, HRD professionals face situations that are similar to those found in other forms of professional practice within organizations—situations that are complex, uncertain, unique, and given to potential value-conflict (Schon, 1983).

Professional practice can be defined by the common settings, the kinds of structured activities, and the classes of outcomes associated with a profession. In fact, settings, activities, and outcomes help define the conditions under which a profession is practiced. In general, professional practice, comprises several large chunks of activity, each of which may require varying levels of knowledge and skill, depending on the role expectations placed on the individual. Although practitioners may differ from one another in their specific styles, perspectives, and skills, they hold in common a body of professional knowledge that they use to interpret and make sense of

their environment (Schon, 1983). This body of knowledge helps to establish the boundaries of the profession and to distinguish certain individuals as deserving special recognition for their knowledge.

For example, organization decision makers see HRD professionals as having the knowledge and skills necessary to help individuals and groups perform their jobs more effectively and efficiently. HRD professionals may fulfill decision makers' expectations by functioning in a variety of HRD roles—manager, program developer, OD specialist, or trainer—all the while using a variety of methods—training programs, feedback systems, or job-performance aids—to accomplish their intended goals—increased productivity, lower turnover, or greater quality of work life. In spite of this diversity of job roles, methods, and goals, I maintain that all HRD professionals are unified by a common body of professional knowledge, which primarily focuses on the general activity of identifying and solving human performance problems. It is this belief that provides the basic metaphor for the HRD profession: HRD professional as organizational problem solver. This central emphasis on problem solving makes the HRD profession similar to the other applied professions that Herbert Simon (1969) described as being part of the design sciences.

Most HRD professionals would assert that their concerns with solving problems are based primarily on sensible grounds. If pressed for more information about their practices, they would probably indicate a preference for actions that are also based on theoretically respectable grounds. Several different foundational theories and disciplines support HRD practice, including communications, adult learning, management science, economics, and general systems theory. But the question is "Which theoretical base is the most sensible and useful for HRD?" I propose that, given an assumed problem-solving perspective, general systems theory provides the most logical and most comprehensive underlying structure for the HRD profession.

Systems theory

Because there is no single, all-inclusive body of knowledge that can be labeled as systems theory (Berrien, 1968), the theory cannot be defined as such in the conventional sense of the word, even though there are theoretical aspects of systems thinking. Rather, systems theory is mostly a way to think about asking and answering questions. It is this manner of thinking that makes the theory so useful to HRD.

Several influential specialists have contributed to what is now known as general systems theory. Ludwig von Bertalanffy (1950), a biologist, is generally credited with providing the outline of general

systems theory; Kenneth Boulding (1956) did much to apply systems theory to economics; and Anatol Rapoport (1956) applied the framework to mathematics. The basic tenet of systems theory is that systems consist of many interacting subsystems, which are distinguished by boundaries that, in turn, monitor and control the rate and flow of inputs from the environment to the system and the outputs from the system to the environment. Hitch (1960) stated that in practice, systems theory offers a unique perspective on reality and a means to work in complex and unfolding environments by viewing entities as systems.

The concept of a system is basic to systems theory. Hall and Fagen (1975) stated, "A system is a set of objects together with relationships between the objects and between their attributes" (p. 52). All systems, natural or manmade, consist of related and interconnected parts that possess common features that stem from their inclusion in the system. Systems function independently, carrying on interdependent exchanges of information with other systems across boundaries. Systems use information to reform themselves, to respond to change, and to maintain themselves under pressure. To understand and work with any system, managers must know the system's components and how those components are related to each other functionally. Manmade systems are distinguishable from natural systems in that they are goal-oriented and must be intentionally designed and managed to achieve those goals.

Systems thinking is both systematic and relational. Systematic thinking is methodical, coherent, and intentional. Relational thinking accounts for the connections, interactions, and influences that impinge upon all systems (Jacobs, 1988). Systems theory links fields and disciplines together through the use of common principles in solving problems. Systems theory suggests that although problems may differ in their specific content, they are essentially the same in their basic structure. Further, problems within systems have definable causes. The causes may have multiple sources, which in turn can be linked to the original indicators. Those indicators then can be linked to actions that could be taken to remove the indicators and thus solve the problems. Systems theorists assume, therefore, that problems are not isolated or random events, but are the result of a set of antecedent conditions that can be predicted and controlled.

Efforts to use systems theory in solving practical problems have resulted in a number of applied fields of study, one of which is the application of the theory to the practice of HRD. Some other fields that have been influenced by systems theory include engineering, architecture, and instructional technology. Even theorists on human emotional functioning have proposed that the dysfunctional behavior of mentally ill people is best treated as a symptom of problems in a larger family system. Each of these fields has been formulated to

meet the needs of its specific areas of interest, all the while maintaining the basic framework that systems theory provides. In general, the impetus for the development of a field comes from some societal need, on which emerging professionals are called to apply their specialized knowledge. Nevertheless, important societal and organizational needs cannot be addressed skillfully unless professionals first define the boundaries and the variables that are common to their professions. Thus, systems theory frequently is used to structure specific problem situations, which then results in the formation of new bodies of applied knowledge to support the activities of those involved in solving specific problems.

In summary, general systems theory is relevant to professional practice for at least two reasons. First, the theory serves as a general orientation for thinking about problems. Most relevant to any practitioner is simply an awareness of systems theory itself. Then, too, knowing about systems thinking and how to use it to solve problems is of value in any situation. Second, the theory provides the framework for developing specific practices found in most professions. Professional practices include the various principles, processes, and procedures required to accomplish expert work. Those principles, processes, and procedures have contributed in unique ways to making professional work very much like applying a technology. Simply stated, professional practice that is founded on systems theory tends to be more reliable and replicable.

Theory and Theory Building

In its simplest form, a theory is an attempt to explain why some event or phenomenon occurs in our real world. But a theory is greater than a collection of facts or a summary of what is known about the event. It also represents an attempt to organize and integrate that knowledge into something useful. Theory tries to make sense of facts and to connect them to a systematic set of generalizable relationships. Theory allows us to understand the event, to predict the conditions under which the event will occur again, and to test hypotheses about the event. Dubin (1969), a well-known writer on theory and theory building, stated that a theory is an attempt to model some aspect of the empirical world. The motivation for this attempt arises because

- the real world is so complex it requires further simplification to be understood, or
- observation alone does not reveal the relationships between empirically detected entities

Experience is essential to building theory. Experience provides the empirical knowledge on which our subsequent understandings are

based. Yet all experience does not produce theory. A distinction should be made between learning *by* experience and learning *from* experience. New theory often results when people learn from experience. However, experience provides only an initial referent for the theorist, who must proceed from the data at hand to propose new and distinct insights that are applicable beyond the immediate situation. It is this additional mental work that makes theory something that consists partly of known information and partly of implications and probable relationships beyond what is known. The capacity to reach beyond present knowledge makes theory all the more useful. Theory is the result of our attempt to derive meaning from a complex world. Some theory may employ highly abstract concepts; that is, it is not meant to represent anything concrete in the real world. Nevertheless, it is important to emphasize that all theory is intended to say something about real-world events and phenomena.

Theory building is the general process of gathering facts and then proposing new explanations for their relationships. Theory building is not the domain of the researcher only, to the exclusion of the practitioner, even though some authorities on theory building have tended to support such an assertion. For example, at least one author has maintained that there are distinct professional roles for practitioners, who use pre-existing theory when confronted with a problem, and for researchers, who construct new theory (Dubin, 1976). The two roles are said to converge only when the symptoms of the problem are originally noted by the practitioner, who then alerts the researcher of the problem. Indeed, some researchers suggest that the operations researcher is better off remaining ignorant of the practitioner's thoughts about a problem because the researcher can then proceed unimpeded to discover new and distinctive perspectives.

I suggest that all practitioners undertake theory building, even though their processes might sometimes be quite informal. I also suggest that practitioners and researchers should certainly know what each other is thinking.

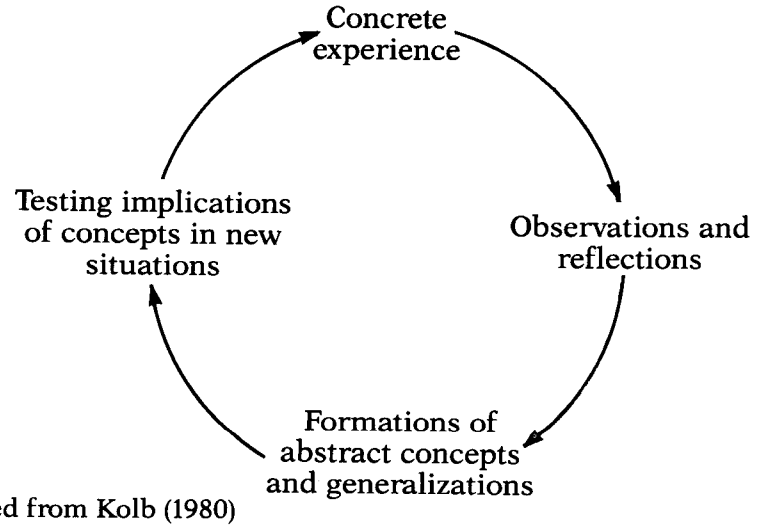
For example, I recently observed a line supervisor in an automotive-parts plant conducting a brief meeting on the previous day's production output. The supervisor explained to me that the daily meetings seemed to help his workers achieve their demanding weekly and monthly production goals. His theory, which he derived by reflecting on his experience, can be stated as an action principle: "If you want people to increase and maintain their work pace, then you must conduct daily production meetings." I shared with the supervisor my idea that his theory was an example of a more general principle regarding the effects of knowledge of results: "If individuals are provided with knowledge of results on a regular basis, then their performance likely will increase and be less erratic." The

supervisor did not seem to be at all concerned about the generalizability of his theory. He was only concerned about the effectiveness of his principle in that particular situation. It is possible, however, that the supervisor might use his principle in another situation. Upon reflection, I can say that both of us, practitioner and researcher, relied upon theory to interpret the events and that both of us were enriched by the discussion resulting from our respective interpretations.

Underlying the notion of informal theory building is the view that skillful professional practice requires the integration of both thought and action. Skillful practice is based on the professional's previous knowledge of what works and how to respond in similar situations. Chris Argyris (1982) has called this special kind of knowledge "theories of action."

In actuality, theories of action are sets of principles that may become explicit or may remain tacit elements of practice. Professionals, like the supervisor in the parts plant, generate many theories of action, depending on the intent of their actions, the timing of their actions within the context of practice, the specific features of a situation, and the consequences of their actions in practice. Kolb (1980) described a means to understand the process of theory building as a part of a model of experiential learning. In Kolb's model (see Figure 1), a person encounters a new idea, reflects upon it, compares it to what else he or she knows, tests it in a real setting, reflects on the meaning of the consequences, and then formulates a new theory of action or revises an existing one.

Figure 1—Experiential learning model



Adapted from Kolb (1980)

Formal theory building

The process of formal theory building differs from the process of informal theory building in its greater need to make the theory explicit and in its initial acceptance of an underlying structure, or metatheory. A metatheory provides the foundational structure from which individual theories can be built. As Snow (1971) stated, "a metatheory provides a kind of syntax or grammatical structure within which the particular theory can be developed and stated. It offers a distinctive medium of communication that often defines a distinctive community of researchers" (p. 80). Examples of metatheories include the stimulus-response theory of behavioral psychology, psychoanalytic theory, and naturalistic inquiry. Earlier, I proposed that general systems theory would be the most logical metatheory for HRD because it brings together many of the related disciplines into a single, organized entity.

Formal theory requires a greater degree of explicitness of form, level of analysis, and basic features, all of which permit the theory to be studied and tested in a more systematic and objective manner. I will describe each term here and then apply the terms in the next section. *Form* refers to the basic structure of the theory. Most forms of theories have been divided into two basic classifications:

- The theory may be built initially on a simple intellectual scheme and then proceed to a more complex scheme that is tested empirically; or
- The theory may be built on an existing empirical base and then proceed to the development of a set of unique principles that increase our understanding of the meaning of the data (Kaplan, 1964).

Formal theories can belong to either approach, but most applied theories take the second form—that of a principle-type theory. Principles are statements that show a relationship between two conditions and can be presented in an "If . . ., then . . ." structural form. Applied theories are based primarily on a network of statements describing the theoretical principles and their relationships.

The term *level of analysis* has several different meanings (Kaplan, 1964). First, level of analysis refers to the range of the theory or the degree to which it applies to individuals and their behavior. In this respect, range has been used to describe whether the theory focuses on explaining the behavior of an individual, the behavior of individuals in groups, or the behavior of large groups and institutions. Most applied theories tend to focus on the behavior of individuals in groups or the behavior of large groups. Few theories focus on the behavior of one individual alone. Second, level of analysis refers to the scope of the theory or the different types of and the number of behaviors it attempts to explain.

Formal theories have several *basic features* (Dubin, 1969). First, formal theory makes explicit a set of assumptions, or premises, of the theory. These assumptions are givens, which are accepted as true and do not require proof. Second is a set of operationally defined concepts, or variables, that comprise the basic units of the theory.

Third, the interactions between the variables bear certain logical relationships to each other, which are stated in the form of principles. Two major kinds of theoretical principles can be identified in formal theories: *correlational* and *causal.* Correlational principles show the relationship between two or more variables but do not indicate how one variable influences another in any one instance. Causal principles show a directional relationship between two variables. The relationship may be *deterministic* in nature—that is, the cause always produces the effect. Or, the relationship may be *probabilistic*— that is, the cause has a certain probability of producing the effect.

Fourth, from the above assumptions, concepts, and principles, theoretical hypotheses can be constructed over time. Hypotheses are predictions as to whether the established assumptions, concepts, and principles are valid. Because prediction is a major goal of science, the hypotheses are stated in a form amenable for testing through research. Testing hypotheses leads to new knowledge, which may confirm existing theory, call for its revision, or require the development of a totally new theory. In other words, research functions as the means by which theory is tested, and theory provides the basis for further research.

The question of what constitutes a "good" theory is a problem of *validation.* Whether or not a theory can be declared valid depends on whether the theoretical statements are consistent and logical and whether the predictions agree with what is known objectively and what is believed will result from future research (Frank, 1957). Some theorists refer to beliefs and opinions about the results of future research as the "zeitgeist," or the current set of beliefs of the times. A theory can never be proved in the true sense of the word because proof would require observation of all possible instances. Instead, a theory is proved by the accumulation of research results, which are presented in a body of research literature. On the other hand, a theory can certainly be disproved. One unquestioned instance where research results do not fit a theory may lead to a comprehensive reexamination of that theory. However, rarely in the social sciences is a theory totally rejected. For example, even though most modern management theorists have discarded many of Frederick Taylor's theoretical assumptions about workers, many other aspects of his work have influenced their current theories about analyzing jobs and tasks.

Patterson (1983) synthesized the works of several authors and proposed a set of eight specific criteria to be used in assessing theories in counseling and psychotherapy (see Figure 2). The criteria are

- importance
- preciseness and clarity
- parsimony and simplicity
- comprehensiveness
- operationality
- empirical validity or verifiability
- fruitfulness
- practicality

Patterson's criteria can be used to evaluate the theory of human performance technology that results from applying systems theory to HRD. Before proceeding, at least two cautions should be noted: First, very few theories exist that satisfy all eight criteria. Most existing theories about human behavior are considered still in a state of development, thus necessitating that the criteria be viewed as goals for future theory building. Second, the criteria are described in terms of characteristics only, thus making the process of judging whether a particular theory actually meets the stated criteria somewhat subjective in nature.

Overview and Evaluation of the Theory

The following section has two parts: The first part provides descriptive information in terms of an overview of the theory, the form, the level of analysis, and the features. The second part provides evaluative information about the results after applying each of Patterson's criteria to the theory. The goal of this section is to provide a comprehensive means to assess the theoretical value of applying systems theory to HRD.

Overview of the theory

The application of systems theory to HRD practice can be linked to the efforts of several behavioral and organizational theorists during the past 25 years or so. Among them are Thomas Gilbert, George Odiorne, Robert Gagne, Geary Rummler, and Robert Mager. Although all of these people deserve mention for their influences on the theory of human performance technology, any overview must recognize the singularly competent work of Thomas Gilbert. Despite the fact that much of Gilbert's work is unknown to most HRD practitioners, many of their current views and practices can be linked either directly or indirectly to the ideas in his book *Human Competence* (1978) and to several important preceding papers (Gilbert, 1967, 1974). Gilbert has synthesized the various foundational bodies

Figure 2—Criteria for assessing a theory

- *Importance.* A theory should not be limited to a few situations, rather it should have relevance to real-world situations. Importance may be difficult to evaluate, as acceptance by professionals or recognition and persistence in the literature may be the only real indication of importance. Also, if it meets the other following criteria, then it is probably important as well.

- *Preciseness and clarity.* A theory should be understandable, internally consistent, and free of ambiguities. Clarity may be tested by the ease of relating the theory to data or to practice, or the ease of developing hypotheses or making predictions from it and specifying methods of testing them.

- *Parsimony and simplicity.* Parsimony has long been considered an important criterion for theory. This means that the theory has a minimum of complexity and few assumptions. Parsimony carried to an extreme, however, may lead to oversimplification of the theory. Parsimony is important only after the criteria of comprehensiveness and verifiability have been determined.

- *Comprehensiveness.* A theory should be complete, covering the area of interest and including all known data in the field. The area of interest, however, can be restricted to one general area.

- *Operationality.* A theory should be capable of being reduced to procedures for testing its propositions or predictions. Its concepts must be precise enough to be measurable. Theoretical concepts should first be identified and defined and then a method of measurement chosen or developed. Not all the concepts in a theory must be operational. Some concepts may be used to indicate relationships and organization among other concepts.

- *Empirical validity or verifiability.* The preceding criteria are rational in nature and do not directly relate to the correctness or validity of a theory. Eventually, however, a theory must be supported by experience and experiments that confirm it. That is, in addition to its consistency with or ability to account for what is already known, a theory must generate new knowledge. However, a theory that is disconfirmed by experiment may lead indirectly to new knowledge by stimulating the development of a better theory.

- *Fruitfulness.* The capacity of a theory to lead to predictions that can be tested, leading to the development of new knowledge, has often been referred to as its fruitfulness. A theory can be fruitful even if it is not capable of leading to specific predictions. It may provoke thinking and the development of new ideas or theories, sometimes because it leads to disbelief or resistance in others.

- *Practicality.* The final criterion for a good theory, which is seldom mentioned, is whether the theory is useful to practitioners in organizing their thinking and practice by providing an organizing framework for practice. A theory allows the practitioner to move beyond the empirical level of trial-and-error application of techniques to the rational application of principles. Practitioners too often think of theory as something that is irrelevant to what they do, unrelated to practice or to real life.

Adapted from Patterson (1983, pp. xx-xxi)

of knowledge into an integrated statement relevant to the HRD profession. His publications, however, are based primarily on his extensive experiences as a consultant, with limited reliance on empirical research studies. Researchers at the Training Systems Institute at the Bureau of Industrial Relations, University of Michigan, conducted additional theoretical work during the mid-1960s. From these developments, a unique, applied body of knowledge began to emerge, which many have called human performance technology (Smith, 1986; Stolovitch, 1982).

Much of the early activity related to human performance technology was directed toward developing industrial training programs, particularly those that used an emerging training method called *programmed instruction.* Theorists subsequently realized that organizations may experience many different kinds of problems that are not suitably addressed by training, such as performance problems that are not caused by a lack of skill or knowledge. Many HRD professionals have moved forward to address different kinds of performance problems theoretically, using several different classes of solutions, only one of which is training.

Gilbert (1978) proposed that the costs of improving human performance be viewed as investments in human capital, which yield returns valued by both organizations and individuals in terms of their performance potential. He presented a conceptual model for achieving worthy human performance, which is the ratio of the value of the performance to the cost of the behavior required to achieve that performance. That ratio can be expressed as follows:

$$\text{Worthy Performance} = \frac{\text{Value of Performance}}{\text{Costs to Achieve Performance}}$$

Worthy performance exists whenever individuals produce accomplishments that exceed the costs of achieving those accomplishments. Thus, competent people are those who can contribute valuable accomplishments without generating excessive costs.

The theory of human performance technology is a body of knowledge that concurrently constitutes an emerging theory, a collection of specific activities and their outcomes, and a general orientation for HRD practice. Thus, views about the theory tend to vary widely. Some HRD professionals equate the theory with the activities of their practice: needs assessment, instructional design, organization development, evaluation. Other HRD professionals equate the theory with the outcomes that result from those activities: training programs, job-performance aids, feedback systems. I believe both views are too limiting. Given a performance problem, all the various aspects of systems theory should be considered (Rummler & Brache, 1988).

Recently, I undertook the task of synthesizing information about the theory, with the intent of making more explicit its theoretical roots and boundaries (Jacobs, 1987, 1988). In that process, I proposed a domain of human performance technology, which comprises three major aspects:

- performance management functions
- performance systems design functions
- components of human performance systems

Consistent with the proposed domain, I defined the theory as follows: *"Human performance technology is the development of human performance systems, and the management of the resulting systems, using a systems approach to achieve organizational and individual goals"* (Jacobs, 1988). I should note that the motivation behind the work was not to provide a definitive interpretation of the field. Rather, it was to make the various theoretical aspects more cohesive and complete. Both conditions are necessary for describing and assessing the body of knowledge.

Form, level of analysis, and features

In this section, I discuss how each of these areas is represented in human performance technology.

Form. To a large degree, the form of human performance technology is that of a principles-type theory. The principles of the theory were formulated from empirical research conducted in a number of areas, primarily the behavioral sciences and systems engineering. The principles are largely deterministic in nature, with given degrees of probability that results can be expected to occur under specific conditions.

Level of analysis. Human performance technology is best suited for explaining and predicting the work behaviors and related performance outcomes of individuals and groups within organizational settings. I propose that human performance technology has two levels of analysis. For convenience only, they are called *the systems level* and *the component level.* Of greater importance is the distinction made between the two levels. The systems level views the organization as a system in its own right, which is composed of many subsystems, each of which must work together in contributing to the goals of the larger system. The component level views the human performance system as a subsystem of the larger organizational system and identifies the components of all human performance systems.

The focus of the systems level of analysis is how to manage and develop human performance systems in ways that are consistent with organizational and individual goals. Organizations consist of many human performance systems. Each performance system must function in such a manner that it can be expected to achieve its own

goals reliably as well as contribute to the accomplishment of organizational goals. The focus of the component level of analysis is how to achieve exemplary performance within a particular human performance system. Performance systems consist of certain structural components. All of those components must be present and adequate in all systems—a condition that increases the probability that individuals and groups will perform to their potential.

Features. The following assumptions about the theory derive from systems theory:

- All organizations are themselves a system, and all comprise differentiated subsystems.
- All systems in organizations have goals, and their contributions to the goals of the larger system determine their value.
- Systems must be managed intentionally and designed to meet the goals set for that system reliably.
- Individuals and groups will respond to the conditions in a system with some degree of reliability.
- Using both a systems approach and a systematic approach is necessary to design systems.

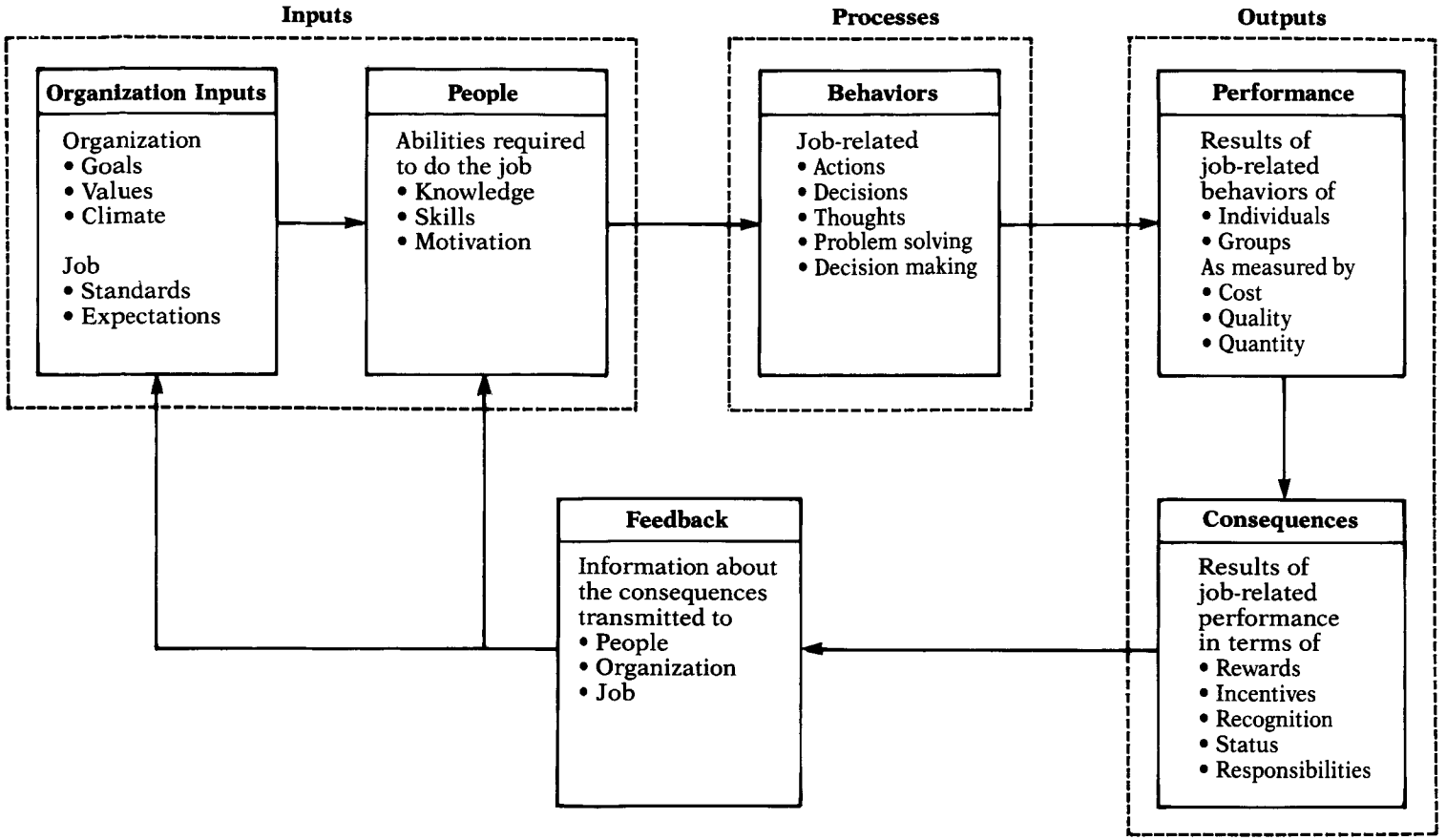
A number of key concepts from human performance technology must be operationally defined. Three superordinate concepts (see Figure 3) are taken from the proposed domain of the theory. First, a performance management function is required for developing human performance systems and for managing their required support functions. Inclusion of this concept is based on the need to regulate and control all systems of interest. Second, performance systems development describes the use of various forms of the systems approach, preferably in a systematic manner, to develop new performance systems or to maintain existing ones. A systems approach is a goal-oriented management tool that forces differentiation between problems, causes, and solutions, and then tests the desirability of the solutions. Systematic approaches are the structured, orderly ways by which a systems approach is carried out. Systems approaches may be represented in a number of different forms, including needs assessment, needs analysis, job/task analysis, instructional design, organization development, evaluation, and research. Third, the human performance systems concept is used to model all work settings in which people use resources and tools to do their work.

As Figure 4 shows, human performance systems have six major components: 1) organizational inputs in the form of goals, values, climate, standards, and expectations; 2) individual inputs in the form of knowledge, skills, and motivation required to do the job; 3) behaviors that are required for performance; 4) indicators of performance that results from the behaviors; 5) consequences that result from the performance; and 6) feedback about the performance delivered to the organization and to the individuals.

Figure 3—Domain of human performance technology

	Management Functions	Performance Systems Development Functions	Human Performance Systems Moves and Components
Purpose	To guide, control, and facilitate the development of human performance systems and to ensure their continued operation.	To examine all aspects of a problem, to relate results from a set of decisions to other decisions, and to use resources optimally to develop new or maintain existing human performance systems.	To provide a conceptual means to view the people, materials, events, resources, and tools that are required to achieve individual and organizational goals in work settings.
Components	**Administrative** • HRD department mission • Department goals • Coordination of tasks • HRD philosophy • Budgeting • Policies • Coordination of programs **Personnel** • HRD staff selection • Task assignments • Project management • Staff feedback/appraisal • Professional development	• Determine problems, needs, goals • Analyze performance • Analyze supporting systems • Develop tentative solutions • Revise and improve solutions • Implement and disseminate final solution • Conduct research and develop new knowledge about the technology	• Organizational inputs • Knowledge, skills, motivation of the people • Behaviors required for performance • Performance results • Consequences of the performance • Feedback to the people and organization

Figure 4—Human performance system



In addition, human performance systems have permeable boundaries that delineate them from other systems in an organization. Human performance systems are best represented in the form of an *input-process-output model* because the theory emphasizes the outcomes (*performance*) as the result of system inputs (*organizational inputs and people*) and system processes (*behavior*). Feedback is the monitoring process through which the system modifies and improves the outputs.

Among the additional concepts related to the theory are performance problems, symptoms, goals, needs, causes, and solutions. Performance problems are a special type of organizational problem. They occur when some aspect of an existing human performance system or some anticipated aspect of a planned human performance system does not function as desired. Symptoms are the outward signs that a problem exists in a performance system. Goals are general statements about how some condition within the performance system should be functioning. To derive a goal, one must first analyze the present condition and then compare it to some more desirable condition. The deviation between the two conditions, present and desired, defines what is meant by a need. A need is a gap between two levels of performance, in other words, the difference between "what is and what should be" (Kaufman & Stone, 1983).

Goals are statements that describe the level at which the performance problem can be said to be solved. Performance problems can have a number of root causes, and these may generally be classified as originating within a person, in a person's environment, or both. As Figure 5 summarizes, Gilbert (1978) proposed his Behavioral Engineering Model as an analytic tool for identifying performance problems and their causes. The model discriminates between the external environment and the person as two interacting cause categories. Simply stated, causes of performance problems can be linked to some lack within a performance system.

Solutions are considered the means to achieve the goals or to remove the performance problem. In Figure 6 are five general classes of solutions relevant to the theory: training, job-performance aids, feedback systems, employee selection, and organization redesign (Jacobs, 1987). Given the complexity of most performance problems, these solutions are seldom used in isolation. More often, solutions are used in some creative combination to address the different causes of a complex performance problem.

Finally, the concept of *exemplary performance* must be defined. Gilbert (1978) defined exemplary performance as "the worth of the historically best instance of the performance" (p. 30). Exemplary performance plays a central role in the theory as a guide for thinking about how to determine performance standards. It is assumed that

Figure 5—Behavioral engineering model

	Information	Instrumentation	Motivation
Environmental supports	**Data** • Relevant and frequent feedback about the adequacy of performance • Descriptions of what is expected of performance • Clear and relevant guides to adequate performance	**Instruments** • tools and materials of work designed scientifically to match human factors	**Incentives** • Adequate financial incentives made contingent upon performance • Nonmonetary incentives made available • Career development
Person's repertory of behavior	**Knowledge** • Scientifically designed training that matches the requirements of exemplary performance	**Capacity** • Flexible scheduling of performance to match peak capacity • Physical shaping • Adaptation • Selection	**Motives** • Assessment of people's motives to work • Recruitment of people to match the realities of the situation

Adapted from Gilbert (1978)

exemplary performers will always exist in a given performance system. Their performances can be represented in terms of the procedures, processes, troubleshooting skills, attitudes, and subject-matter areas known and used by expert performers (Swanson & Gradous, 1986). Exemplary performance serves as a benchmark or a goal for people who are performing the work at relatively lower levels—the typical performers. Human performance technology makes the optimistic assumption that given an ideal human performance system, everyone can achieve or approach the level of exemplary performance. Thus, the general pattern of any performance improvement effort is to consider the best possible performance that is occurring in the system, to analyze the reasons why some people do not reach that level of performance, and then to provide the necessary means to lessen the gap between exemplary and typical performances.

Figure 6—Solutions relevant to human performance technology

Descriptions Solutions	Definition	Goal	Type(s) of Problems Addressed	Products/ Activities
Training	A structured set of learning experiences and methods to present the knowledge, skills, and attitudes required for use on the job.	To increase the probability that the person can recall from memory the knowledge, skills, and attitudes critical to effective job performance.	• Lack of skill, knowledge, or attitude	• Self-instructional modules • Group discussions • Role-playing sessions • Lectures
Job Performance Aids	A structured set of materials, resources, and equipment that stores information external to the user and guides the performance of work (Harless, 1986).	To guide all types of human performance on the job.	• Lack of skills, knowledge, or attitude • Lack of tools in the environment	• Checklists • Decision aids • Samples
Feedback Systems	Information provided to the performer either as a summative evaluation of performance or as a formative evaluation to improve performance (Tosti, 1986).	To affect the quality and quantity of performance.	• Lack of data in the environment	• Coaching sessions • Production of wall charts • Memoranda • Team meetings • Quality circles • Performance appraisals • Customer surveys

(continued on next page)

(continued) **Figure 6—Solutions relevant to human performance technology**

Descriptions Solutions	Definition	Goal	Type(s) of Problems Addressed	Products/ Activities
Employee Selection	The process of selecting the most appropriate people for jobs based on a description of the specific functions that must be performed; an analysis of the performance requirements to do the job; and a determination of the selection criteria that must be used at the the time of hiring (Leibler & Parkman, 1986).	To prevent performance problems and to reduce their associated costs.	• Lack of personal capacity to perform some aspect of a job	• Job descriptions based on performance models • Selection criteria required for job performance
Organization Redesign	The process of changing the assigned goals, responsibilities, and reporting relationships within a given organization (Rummler, 1988).	To improve the organization's ability to provide a better product or service and to use resources with greater efficiency.	• Lack of data, instruments, and incentives within systems of the organization	• Change reporting relationships • Improve data sharing • Define or change job responsibilities • Change goals and standards for functions • Understand systems flow of work

As Figure 7 shows, the principles from the theory can be represented for each of the two levels of analysis. At the systems level, the general principle involved can be stated as follows:

- *If human performance systems are expected to contribute to the accomplishment of organizational goals, then the development and management of those systems must use a systems approach.*

A negative corollary to that principle is this:

- *If human performance systems do not contribute to the accomplishment of organizational goals, then the developers and managers of those systems probably did not use a systems approach.*

At the component level, the principle can be stated as follows:

- *If all components of a human performance system are present and adequate, then exemplary performance can be expected.*

A negative corollary to that principle is:

- *If one or more components of the performance system are missing or inadequate, then exemplary performance cannot be expected.*

Figure 7—Levels of analysis and principles

Level of Analysis	Principle
Systems	If human performance systems are expected to contribute to the accomplishment of organizational goals, then the development and management of those systems must use a systems approach.
Component	If all components of a human performance system are present and adequate, then exemplary performance can be expected.

Within each of the two levels of analysis, more specific networks of principles can be developed. In general, those principles relate to the work of predicting what might happen when there is a dysfunctional relationship between performance systems or when some aspect of a performance system is missing or inadequate. It is at such points that a performance problem is said to occur.

Performance problems have symptoms, causes, and solutions, which form the basis for statements of principles. Rummler (1972), for example, provided a resource for developing principles, apparently at the component level. Figure 8 presents a list of symptoms and classes of solutions to address those symptoms. Consider the following principle, which was constructed from information presented in the figure: *If tasks are not being done to the desired standard and all other causes have been precluded, then the cause is a lack of feedback, and the solution should be one that improves or*

provides feedback. That principle infers that symptoms are linked to a set of causes only because the solution has been shown to remove those symptoms. From a practical sense, therefore, problems and symptoms are considered one and the same, because when the symptoms are removed, we infer that the problem has been solved. Many performance principles have been derived from related research in the behavioral sciences, most notably in the areas of the effects of feedback and the knowledge of results (see Jacobs, Shibano, & Emerson, 1988).

Figure 8—Symptoms and classes of HRD solutions

Symptoms	Class of Solutions
1. Tasks are not being done to the desired standard. 2. Desired performance gradually deteriorates over time. 3. Employees don't believe it is necessary to perform as desired.	Improve or provide feedback
4. Work is seldom done on time. 5. There is a backlog of work. 6. Work is done, but seldom well.	Redesign the job
7. Tasks are not being done at all. 8. Employees do the task when first on the job, but their performance deteriorates after a short time. 9. Employees do the job correctly only when a supervisor or other authority figure is present. 10. Employees appear to be lazy or not motivated.	Change the consequences

Adapted from Rummler (1972)

Evaluation of the theory

The theoretical criteria, as presented in Figure 2, were used to evaluate the theory known as human performance technology. The criteria do not represent mutually exclusive categories. Rather, they are dependent upon each other, thus serving as a guide to the evaluation. I address only seven of the eight criteria in this evaluation. I encourage others to address the eighth criterion, "practicality," from their own perspectives.

Importance. Judgment about the importance of applying systems theory to HRD can be based on two conditions: First, if the importance of systems theory is based on evaluation of its usefulness in solving problems in real-world situations, then the theory must certainly be judged important. There is little doubt that the theory addresses issues that are important to organizations and to society at large. However, if the importance of the theory is based on its persistence over time in the research literature, then the question of its importance can be answered with less certainty. Only recently have HRD professionals viewed human performance technology as a single theoretical entity. Therefore, to this point in time, discussions in the literature about the theory and research studies to test it are limited. The renewed interest in theory and theory building among many HRD researchers and practitioners suggests that this situation may change.

Preciseness and clarity. As stated, human performance technology draws its basic principles and structure from general systems theory. With few exceptions, general systems theory is noted for its precision and clarity. Explanations of systems theory have a certain degree of logic and elegance to them, which has helped many researchers and practitioners reduce complex phenomena to easily understood models. In spite of the attractiveness of systems theory, however, some ambiguities are especially apparent in the application of the theory to HRD. One source of ambiguity concerns how to reconcile goals across performance systems and how to select goals within a human performance system. The theory provides no specific guidance on how to achieve these ends, although some of Gilbert's work has been helpful in reconciling accomplishments and standards across various levels of an organization. Resolving these conflicts requires additional information from the theory.

One challenge for HRD practice is helping others select system goals that consider all the groups involved. For example, although a given performance system may contain both salaried and hourly employees, members of each of these groups may identify with the goals of systems external to the one in which they work. Salaried employees may also identify with the work group and with the goals of the organization at large. Hourly workers may also identify with the goals of their union. Obviously, in an ideal scenario, all of these goals would be considered when selecting performance system goals.

Yet conflicts frequently arise, especially in organizations that seek to achieve the goals of high productivity and high quality of work life. Both goals are highly desirable but difficult to achieve, especially during periods of rapid change. In practice, Stolovitch (1982) claimed that organizations that enjoy high productivity and high quality are often the same organizations in which employees enjoy high morale, self-esteem, and satisfaction. He further stated, "It is

not axiomatic that what is good for the company is necessarily evil for the employees. Excellent performance often translates into greater security, improved salaries, and an overall high level of interest and satisfaction in one's employment" (p. 18).

Much remains to be understood about reconciling and selecting goals within systems. Concepts such as employee involvement and organizational culture require future integration with present knowledge. Though those aspects of human performance technology are relatively ambiguous at present, any description of the theory must recognize that multiple sources of goals exist in all systems.

Another source of ambiguity is related to the first one. It concerns the theoretical limitations that must be placed on understanding the events and processes that occur within human performance systems. In general, the theory proposes that if we can successfully transform the present system state to that of a desired system state, then we have no reason to further understand the processes we used to accomplish that change. It is only when the system does not achieve the desired state that further analysis is in order. For example, the theory proposes that we can control the performance outcomes (such as productivity) of workers by manipulating the inputs (such as job knowledge, job standards, work environment, and feedback from previous work efforts) without having any detailed knowledge of the behavioral processes that occur within the group of workers. The theory explains human performance systems primarily in terms of the relationship between the measures that enter the performance system and the measures that exit the system.

To some HRD researchers, that limitation does not present a problem, as reliable behavioral principles about performance systems can nevertheless be generated. To other HRD researchers, however, the limitation is disconcerting, as it theoretically overlooks the processes that occur within all groups and organizations. Those processes include patterns of social interaction, the establishment of group norms, and the influence of organizational culture. Explanation of system processes draws much from the organization development literature, a field of study that has had a different, but sometimes parallel, history of development from that of human performance technology. Organization development processes should be viewed as important for the study of performance systems. From that perspective, I make the case for greater integration between the two fields of study. In general, human performance technology is much better at explaining what makes a performance system fail than it is at explaining what makes a performance system succeed. This is not surprising, given the problem-solving perspective of the theory. Additional knowledge about the processes that occur within a functioning performance system could help us prevent performance problems in the first place. Thus, learning how behavioral

processes mediate the effectiveness of human performance systems requires further attention from researchers.

Judgment about the clarity of the theory rests, in part, on whether hypotheses can be operationalized to test systems in the real world. In general, present research efforts in HRD seem to be driven more by organizational needs than by the need to confirm or to expand a theory of human performance. HRD researchers do most of their work in response to needs identified in specific practice settings. Whenever HRD research does test a theory, more often than not the theory of interest is drawn from other related disciplines. For example, management science theories, such as situational leadership, have received considerable attention from many HRD researchers who are interested in how organizations function. This is not to deny the importance of using HRD research to serve practical needs or to address issues derived from other theories. The lack of research devoted to testing a theory specifically related to HRD practice is a concern.

Parsimony and simplicity. According to Patterson's criteria, human performance technology has a minimum of complexity and relatively few assumptions. Two general principles were presented, one at the systems level and one at the component level. Those principles were derived from the proposed relationships between the three major aspects of the theory. Five theoretical assumptions were also presented. With the claim of parsimony, however, comes the inherent risk of oversimplification.

Systems theory uses several models and analogies to describe very complex organizational phenomena. Models and analogies, which have long been a part of the theory-building process, also play an important role in describing aspects of human performance technology. Models are used to represent actual entities or activities, not to duplicate them exactly. Within the theory, the performance systems development aspect uses both descriptive and prescriptive models. Descriptive models are conceptual in nature. They describe all the activities in a process and their relationships. Prescriptive models are applied in nature. They show how activities should be ordered when used in a specific setting. Examples of prescriptive models include the instructional development models that have been constructed by several major organizations, such as the various military branches, AT&T, and Arthur Andersen & Company.

Analogies are theorists' attempts to find additional meaning in phenomena by looking for what Jacob Bronowski (1956) has called the "hidden likenesses" between things in our world. Theorists in many different disciplines have used analogies in their work. At various times, program evaluators have used journalism, photography, and art criticism as analogies to help them further understand their work. In the natural sciences, researchers frequently

describe abstract events by employing concrete analogies, such as using the flow of liquids as an aid to understanding heat conduction. Similarly, human performance technology proposes that an actual work setting, which involves people, activities, and things, is analogous to an input-process-output system. Thus the analogy of the work setting as a human performance system is used as an aid to understanding this very complex phenomenon.

Comprehensiveness. Claims about the comprehensiveness of human performance technology can be made in at least two ways. On the one hand, the theory can be seen as comprehensive in the sense that the assumptions, the concepts, and the principles are representative of the body of knowledge. In this sense, it can be said to have internal validity. On the other hand, the claim of comprehensiveness, as it relates externally to the HRD profession, is another matter. Most HRD professionals encounter problems of a broad nature on a daily basis. Thus, they are generally concerned more with how to manage the details of their work than with how to think about their work. Satisfying clients, negotiating understandings, and coordinating the details of HRD programs require skills that are beyond the central focus of the theory.

Does that observation about external validity serve to reduce the comprehensiveness of human performance technology? I believe not. The theory makes no claim about its relationship to a particular professional group. It functions as a comprehensive body of knowledge in its own right. Many different professional groups may use the theory to guide their research and practice. However, I believe that for a number of reasons, including historical precedence, the theory is more relevant to the HRD profession than to any other. This seems to be true regardless of the relative fit of the theory with any particular HRD job role or activity.

Operationality. Several basic concepts have been operationally defined and their relationships identified through the use of principles. Two of the superordinate concepts—performance system management functions and performance systems development functions—describe activities that are used to support a third superordinate concept—the human performance system—which is undeniably the primary focus of the theory. A human performance system, however, does not represent an actual physical entity. Instead, it represents an abstract idea about how to think about a collection of people, events, and activities in a work setting.

Operationalizing an abstract concept, such as a human performance system, is accomplished through some degree of inference. That is, we infer the existence and condition of a particular abstract concept by obtaining some related measure. For example, if our interest is to measure leadership potential among a group of workers, then we might observe their interactions, administer a personality

test, or interview their cohorts, all the while looking for indicators to define what are, in our view, the predictors of the abstract concept. Leadership potential is never something we can physically touch, although with experience we can identify it through indirect means. We may have noticed that certain observed behaviors correlate with the leadership skills that some of the people display later on the job. Thus, over time, we can say with some degree of confidence that certain behaviors are predictors of leadership potential.

In the same way, operationalizing a human performance system can only be done by indirect means, that is, by measuring the objective indicators of those individuals and groups we believe to be part of the system. For example, if measurements taken from a performance system meet the specified goals, then we must conclude that the human performance system is complete and adequate. But if measurements of performance vary from the stated goals, then we must assume that the human performance system is inadequate or incomplete in some way, and we must further diagnose why that condition exists. Our knowledge of the system state is only as good as the measurement data we have gathered from the system. Only through such indirect means can we operationalize and thus understand the condition of a particular human performance system.

Empirical validity or verifiability. Only recently has human performance technology been viewed as a single entity. For this reason, empirical validation and verification of the major principles are lacking. The situation is not surprising, given the applied orientation of HRD. The theory is designed to be readily accessible for practical use, thus relegating most theoretical questions about the theory itself to a lower priority. In addition, some aspects of the theory have not been tested because they are generally parts of our current set of beliefs. For instance, the value of using a systems approach for solving problems, as opposed to using other approaches (for example, the experiential approach) is a well-accepted belief, in spite of criticisms about the perceived rigidity of systems thinking.

Consideration of the validity and verifiability of the theory has led to a contradictory situation. On the one hand, aspects of the theory have been used successfully in HRD practice for more than 25 years, to the extent that most experts have expressed a degree of confidence in its value for practice. On the other hand, few studies are available that have tested it in controlled settings, thus leading to questions as to whether it is, in truth, a valid and verifiable body of knowledge unto itself. Some HRD professionals have asserted that no theory exists at all. Instead, they recognize only a useful set of systematic techniques and activities. Though I disagree with that assertion, certainty about the practical value of the theory has not reduced the relative uncertainty about its theoretical validity and verifiability. Uncertainty about the theory can only be addressed through further research.

The need for further verification is particularly true when considering the principles of the theory. To a great extent, the existing principles have been derived from research conducted in related areas of the behavioral sciences. In general, this research has done more to validate principles at the component level than at the systems level. Principles at the systems level seem to involve many complex variables, allowing for less control of the research. New research is required to generate and test principles at both the systems and components levels of analysis. That is, research must begin to focus on how best to manage and develop performance systems and how best to achieve exemplary performance. Some researchers have suggested that progress in our understanding requires the development of a mathematical language with which to model parts of the theory and then to test the models against observations made in actual settings.

Fruitfulness. Judgment about the fruitfulness of the theory is predicated on its capacity to lead to areas of new knowledge. In this sense, the fruitfulness of human performance technology rests on our belief that the theory will lead us to develop better human performance systems. The paucity of studies that have attempted to predict rather than describe research results leads to hesitation. New knowledge can be generated only by directly testing the theoretical principles, with prediction as the main goal of the research. At this point, application of this criterion to human performance technology from a theoretical perspective is speculative at best.

Today, most HRD research is conducted in actual organizational settings. The preference for using actual settings is part of a wider effort to achieve more research relevance in the behavioral sciences. There are limitations to this position, especially from the perspective of researchers who are interested in theory building and prediction. Consider two research scenarios: HRD research in actual organizational settings is limited by the researcher's ability to control no more than a few variables. Research results, then, tend to be descriptive and correlational in nature and to have relevance to managers and other organization decision makers. In this real-world research scenario, research rigor is sacrificed to gain relevance. On the other hand, HRD research conducted in a contrived work setting allows the researcher to control many more variables. Research results tend to be more predictive in nature, but they are perceived to be less relevant among decision makers. In a contrived research scenario, research relevance is sacrificed to gain research rigor. (Also note that research conducted from the naturalistic inquiry paradigm (Guba & Lincoln, 1981) was a special case in which no control attempts were made.)

Both the real-world and contrived scenarios are equally valid. Most HRD researchers seem to prefer the first scenario, but the decision about which approach to select ultimately should rest on the goals selected by the researcher. Research goals should be clearly stated beforehand. If the research goal is to test a specific principle, then it seems necessary that some HRD research be conducted in controlled settings, possibly using experimental designs and formally stated hypotheses. Only through more controlled, predictive studies can a better balance of research results be achieved overall, thus permitting some determination of the fruitfulness of the theory.

Consider the following line of research to test the effects of a human performance system: The research would attempt to predict the effects when various components of a performance system are intentionally withdrawn or replaced. It can be hypothesized that if one or more components of a functioning performance system are withdrawn, then it is possible to predict that performance will be negatively affected. And if the component is replaced, then performance will be positively affected. Thus, for the sake of simplicity, the system can be said to have three system states: present state, reduced state, and enhanced state. In this simple example, there is a 50 percent chance of predicting correctly the movement of the present state to one of the two remaining states. Yet, from the standpoint of theory testing, knowledge about the theory is increased through the goal of prediction, even when the hypotheses predicting how the system will vary are limited.

In a contrived setting, for example, if feedback were withdrawn from people working in an adequate and complete performance system, then we could study the effect of that disruption on a number of distinct variables in the system. We could predict the direction of change in the system state and the length of time the new state would endure. Conversely, replacing the feedback should also have a discernible effect. This general line of study seems important for beginning to test the basic principles of human performance technology. Both quantitative and qualitative measures could be employed.

Conclusions. Applying Patterson's criteria to the theory leads to the following conclusions:

- The theory addresses important issues to organizations and to society at large.
- The theory is relatively precise and clear, although some critical ambiguities were noted. It does not address how to reconcile and select system goals, and it is limited in explaining the behavioral processes that occur within systems.
- The theory has a relatively low degree of complexity. Models and analogies are used extensively, with some risk of oversimplifying complex organizational phenomena.

- The principles are comprehensive. They appear to describe all aspects of the theory.
- Several concepts are used in the theory, each of which has been defined operationally. The primary focus of the human performance systems theory is an abstract concept that can be operationalized only by measuring system inputs and outputs. Problems are inherent in the approach because it indirectly measures the state of the system.
- The empirical validity and verifiability of the theory is relatively weak. This is arguably the weakest aspect of the theory. Much of the research base of the theory is dated and has been adapted from other lines of behavioral research. Much more research is required to begin to validate and verify that the theory represents a distinct and unique body of knowledge.
- Research on the theory has the potential to lead to new areas of knowledge about the performance of individuals and groups in the workplace. Again, judgments in this regard are limited by the amount of research that has already tested the theory. A more balanced research agenda—one that includes prediction as well as description as a goal was suggested.

In sum, my evaluation of the theory of human performance technology using Patterson's criteria has yielded mixed results. The theory seems to be relatively strong in meeting the criteria of importance, preciseness and clarity, parsimony and simplicity, and comprehensiveness. The theory seems to be relatively weak in meeting the criteria of operationality, empirical validity and verifiability, and fruitfulness. Most of the identified weaknesses are inherent to systems theory or representative of specific knowledge gaps found within human performance technology. Knowledge gaps in the theory are the result of a lack of systematic research. If the theory is to move beyond its current image as a mere collection of methods and techniques, then more research is required to address the knowledge gaps.

Opportunities and Problems for HRD Practice

All in all, applying systems theory to HRD practice presents both opportunities and problems. Use of human performance technology provides no cure-all or panacea. Besides being subject to numerous theoretical problems, the theory brings with it some imposing drawbacks when considered for practice, including the need for continuous measurement in an organizational setting. To a large extent, opportunities and problems for HRD practice are two sides of the same coin. Overcoming problems in using the theory can also be viewed as leading to opportunities for improving HRD practice. The following discussion presents some of the opportunities and problems of the theory for HRD practice.

Possibly the most promising opportunity in using the theory is the unique vantage point it provides for viewing HRD practices. With experience, HRD practitioners naturally should begin to frame all organizational problem settings as human performance systems, to know that performance systems can best be understood through the use of a systems approach, and to appreciate the importance of managing systems and their various components as part of the performance improvement effort. Practitioners should also know that it is their responsibility to help monitor and diagnose ineffective performance systems to determine if any components are missing or inadequate. Without such involvement, performance outcomes of individuals and the organization cannot be reliably predicted.

HRD practitioners who use the theory will find themselves involved in many complex and time-consuming processes, such as needs assessment, needs analysis, instructional development, and organization development. It should be noted that these processes are no better than the people working with them. Processes will not, in themselves, solve problems. Further, use of these processes demands time and effort by everyone involved. To the degree that HRD departments are already overburdened with too few staff and insufficient resources, use of the theory will only add to their concerns. The benefits of using the theory will not be fully realized until the changes in system outcomes that result from deliberate changes in system components are noted by HRD professionals and organization managers.

The theory requires explicit operational performance goals. This condition has been difficult to achieve in many organizations, where uncertainty and change are the norm rather than the exception. Performance goals are not themselves immutable. They must be flexible enough to withstand changes that might occur within the organization. Nevertheless, specifying performance goals serves an important function: Goals encourage attention to standards, against which present efforts can be compared. To achieve understandable performance standards, large amounts of information must be gathered and used, often through the use of elaborate and sophisticated communication networks. In the past, HRD practitioners have not been expected by their organizations to use such organizational information as production rates, turnover, and absenteeism. Obviously, use of the theory requires skills in data gathering; but if the data are poor or inadequate, then little can be expected from their use. It is imperative that HRD practitioners obtain sufficient data to help them understand the performance system at hand.

Use of human performance technology requires skilled management and administrative review techniques when making decisions about implementing HRD programs. In the best of circumstances, HRD programs are targeted to address specific performance needs.

Implementing programs to respond to unknown problems is inconsistent with the theory and thus should not be encouraged in HRD practice. Further, use of the theory suggests that alternative solutions for a known performance problem require intense scrutiny before selecting one solution. For example, techniques such as cost-benefit analysis are essential in addressing the following issues: Is this problem really important to the organization, and which solution among several possible ones should be selected to solve the problem (Swanson & Gradous, 1988). Consistent with the inclinations of most organizational managers, use of the theory provides a logical and pragmatic political strategy. That is, costs of performance are measured against their contribution to the organization's goals. However, organizations frequently have irrational and conflicting elements that may hamper use of the theory. Perceived role expectations may play a large part in contributing to decision making in HRD. Unfortunately some managers believe that the primary role and mission of HRD is to provide training programs upon request. Obviously, most HRD professionals today no longer embrace this narrow view. Use of the theory defines a specific alternative mission to focus on what is occurring in the organization. Thus, the conceptual focus of HRD practice is or should be that of developing human performance systems. Training is only one means to achieve that end.

To use the theory, HRD practitioners must have specific competencies in various areas of knowledge. These competencies may be developed in a number of different ways. Of critical importance here is the in-depth education that can be provided through graduate degree programs in HRD. Graduate programs can provide and develop new information about advances in practice, research, and theory building that HRD practitioners can then take back to their respective practice settings.

Finally, it should be noted that the theory is in its infancy relative to its application to performance problems in organizations. Time and experience will reveal the true potential of systems theory for HRD practice and should help advance our knowledge about the theory itself.

References

Argyris, C. (1982). *Reasoning, learning and action: Individual and organizational.* San Francisco: Jossey-Bass.

Berrien, F. K. (1968). *General and social systems.* New Brunswick, NJ: Rutgers University Press.

Boulding, K. E. (1956). General systems theory: The skeleton of science. In *General Systems Yearbook.* Ann Arbor, MI: University of Michigan.

Bronowski, J. (1956). *Science and human values.* New York: Harper and Row.
Dubin, R. (1969). *Theory building.* New York: The Free Press.
Dubin, R. (1976). Theory building in applied areas. In M. Dunnette, *Handbook of Industrial and Organizational Psychology.* Chicago: Rand McNally.
Frank, P. (1957). *The philosophy of science.* Englewood Cliffs, NJ: Prentice-Hall.
Gilbert, T. F. (1967). Praxeonomy: A systematic approach to identifying training needs. *Management of Personnel Quarterly, 6,* 20–33.
Gilbert, T. F. (1974). *Levels and structure of performance analysis.* Morristown, NJ: Praxis Corp.
Gilbert, T. F. (1978). *Human competence: Engineering worthy performance.* New York: McGraw-Hill.
Goldstein, I. (1980). Training in work organizations. *Annual Review of Psychology, 31,* 229–272.
Guba, E. G., & Lincoln, Y. S. (1981). *Effective evaluation.* San Francisco: Jossey-Bass.
Hall, A. D., & Fagen, R. E. (1975). Definition of a system. In B. Ruben and Y. Kim (Eds.), *General systems theory and human communication.* Rochelle Park, NJ: Hayden Book Co.
Hitch, C. (1960). Uncertainties in operations research. *Operations Research, 8*(4), 437–445.
Harless, J. H. (1986). Guiding performance with job aids. In M. E. Smith (Ed.), *Introduction to performance technology.* Washington, DC: National Society for Performance and Instruction.
Jacobs, R. L. (1987). *Human performance technology: A system-based field for the training and development profession.* Columbus, OH: ERIC Clearinghouse on Adult, Career, and Vocational Education, The National Center for Research in Vocational Education, The Ohio State University.
Jacobs, R. L. (1988). A proposed domain of human performance technology: Implications for theory and practice. *Performance Improvement Quarterly, 1*(2), 2–12.
Jacobs, R. L., Shibano, G. A., & Emerson, T. M. (1988). *The effects of feedback for training and development.* Training and Development Research Report Series. Columbus, OH: Graduate Program in Training and Development, College of Education, The Ohio State University.
Kaplan. A. (1964). *The conduct of inquiry: Methodology for behavior science.* San Francisco: Chandler.
Katz, D., & Kahn, R. L. (1966). *The social psychology of organizations.* New York: John Wiley & Sons.
Kaufman, R., & Stone, B. (1983). *Planning for organizational success: A practical guide.* New York: John Wiley & Sons.
Kolb, D. A. (1980). Learning styles and disciplinary differences. In A. Chickering (Ed.), *The modern American college.* San Francisco: Jossey-Bass.

Kuhn, T. S. (1962). *The structure of scientific revolutions.* Chicago: University of Chicago Free Press.
Patterson, C. H. (1983). *Theories of counseling and psychotherapy.* Philadelphia: Harper and Row.
Leibler, S., & Parkman, A. (1986). Selection of personnel. In M. E. Smith (Ed.), *Introduction to performance technology.* Washington, DC: National Society for Performance Instruction.
Rapoport, A. (1956). The diffusion problem in mass behavior. In *General Systems Yearbook.* Ann Arbor, MI: University of Michigan.
Rummler, G. A. (1972). Human performance problems and their solutions. *Human Resource Management, 11,* 2–10.
Rummler, G. A., & Brache, A. (September 1988). The systems view of human performance. *Training,* 45–53.
Schon, D. A. (1983). *The reflective practitioner: How professionals think in action.* New York: Basic Books.
Simon, H. A. (1969). *Sciences of the artificial.* Cambridge, MA: MIT Press.
Smith, M. E. (Ed.). (1986). *Introduction to performance technology.* Washington, DC: National Society for Performance and Instruction.
Snow, R. A. (1971). Theory construction for research on teaching. In R. Travers (Ed.), *Second handbook of research on teaching.* Chicago: Rand McNally.
Stolovitch, H. (1982). Performance technology: An introduction. *NSPI Journal, 21*(3), 16–19.
Swanson, R. A., & Gradous, D. B. (1986). *Performance at work.* New York: John Wiley & Sons.
Swanson, R. A., & Gradous, D. (1988). *Forecasting financial benefits of human resource development.* San Francisco: Jossey-Bass.
Tosti, D. (1986). Feedback systems. In M. E. Smith (Ed.), *Introduction to performance technology.* Washington, DC: National Society for Performance and Instruction.
von Bertalanffy, L. (1950). An outline of general systems theory. *British Journal of Philosophical Science, 1,* 134–165.
von Bertalanffy, L. (1968). *General systems theory: Foundations, development, applications.* New York: Braziller.

Systems Model 2000: Matching Systems Theory to Future HRD Issues

Patricia A. McLagan
Chief Executive
McLagan International, Inc.

Organizations face major changes and challenges as they move toward the 21st century. The environment is more complex, the workforce is changing, the work itself is changing, and success requires that decisions reflect a big-picture view of consequences and relationships. Organization development and human resource development promise to become more critical success factors as those forces intensify. Success will also require advances in the theories, tools, and technologies of HRD.

This chapter proposes that general systems theory provides a useful and appropriate theoretical framework for planning and doing HRD work in the future. It describes what systems are and how they operate. It then focuses on the unique opportunities and challenges available to organizations because they are self-aware and self-creating systems. Finally, this chapter suggests four major values of systems thinking for HRD professionals and others who will plan and implement deliberate change in today's and tomorrow's organizations.

Profound changes are occurring in how organizations must function in order to survive and thrive. For one thing, information is available virtually everywhere, almost as soon as it is generated. As a consequence, the pace of change is dramatically accelerating, competition is moving to a global scale, and customers are becoming more educated and discriminating. They want quality, value, and innovation in meeting their needs.

In the meantime, the workforce is changing worldwide. Although first- and third-world countries are in different stages of evolution, workers everywhere are demanding more participation and responsibility. That trend will undoubtedly increase in response to the failure of socialism in the Soviet Union and China.

Also, the nature of work is changing. The ratio of knowledge and service work to production work has been increasing dramatically since the 1950s. This process will continue in first-world countries, and will probably occur in less-developed countries due to new biological, chemical, and production technologies.

Finally, a growing number of people are beginning to see themselves, their organizations, and the world in terms of interdependencies. This is partly because of the information explosion. We are more likely today to get feedback on the side effects and the long-term effects of our actions on others, the industry, the nation, the globe, and the future. Organizations and individuals are beginning to get and to notice positive feedback when they focus on interdependencies. For example, organizations that emphasize customer relationships are winning more market share. Organizations that establish sound, respectful relationships with suppliers are producing better-quality products at lower costs. And organizations that cooperate with competitors to raise industry images and standards are reaping the rewards of a larger total market. In addition, diverse individuals and groups who must work together in organizations are beginning to function more creatively and effectively than when they guarded their turf. Even political leaders who were adversaries in the past are beginning to see prospects for their self-interest through cooperation and peace.

All of this is causing us to rethink our organizations. Specifically, as the environment becomes more complex, organizations and the individuals in them must become better able to deal with the complexity. They must prepare themselves to manage faster rates of change, higher levels of thinking on the job, more diverse relationships, and the long-term as well as the short-term effects of decisions. This is a major need today and will be a profound requirement, with implications for global survival, by the turn of the century.

Some organizations facing this dramatic increase in environmental complexity are changing how they operate and how they define themselves and their goals. Others are struggling to improve and refine their old structures and processes. Still other organizations are refusing to admit that anything is changing. But fundamental organization change is inevitable; current and future problems cannot be resolved without acquiring radically different mindsets and change strategies. Likewise, some organization processes that have been allowed to occur haphazardly, but are key to future success, must become more deliberate and prominent.

The Challenge for Human Resource Development

The development of organizations and their people is one such process. It must keep pace with and even help shape the pace of change and challenge in the environment. But where do we go for enlightenment about human resource and organization development? Is it enough to do what organizations have always done, only do it

faster and better? Are past models and ways of thinking about development and change adequate to the task?

For years, theories and empirical studies about organization change and human resource development have reflected the perspective of discipline-grounded researchers (sociologists, psychologists, economists, financial analysts, educators, management theorists, information scientists, etc). Thus, we have theories and tools for understanding some aspects of organization and human behavior and performance. However, we are beginning to realize that much is lost when we dissect organization and human behavior and focus only on one dimension from one point of view.

Successful organizations are more than the sum of their parts. Their synergy will probably provide the "winning edge" in the future. Also, if we don't focus on the total organization, we risk fixing one part in a way that may improve how that part functions (such as the sales organization) but reduce the effectiveness of other parts and the whole (the sales organization may sell too much in the short term, which inadvertently may lower product quality in the short term and cause reduced sales in the long term).

Where, then, do we turn for a paradigm that is rich enough to guide human resource and organization development for the future? General systems theory is a promising answer to that question. Granted, the theory is still evolving, but it provides a useful framework now for understanding organization and individual behavior and for guiding organization development and change. The following discussion attempts to show why this is true. I will first present the main elements of systems theory that managers and human resource professionals should understand. I will then describe the unique opportunities and challenges available to organizations as systems. Finally, this discussion will focus on general systems theory and HRD. The main point throughout is that HRD practitioners and managers *think* and *act* differently and more effectively when they adopt a systems point of view.

Understanding General Systems Theory

General systems theory has developed out of a recognition that discipline-based theories (such as in physics or psychology) are not a rich enough basis for understanding and influencing complex events and phenomena. Physics, for example, can help explain events in the physical world, but it neglects to take into account the biasing effects of observers on events and their interpretations. These biasing effects are the subject matter of psychology. General systems theory is also a response to our world's increasing complexity. The critical problems we face in society, science, politics, and business

require us to understand and influence a broad array of issues and their interrelationships.

With that in mind, researchers from a variety of disciplines began in the 1950s and 1960s to identify "a body of systematic theoretical constructs which [discusses] the general relationships of the empirical world" (Boulding, 1956, p. 197). They went on to investigate the rules and conditions that affect how systems (collections of individual parts that work together in an environment to achieve the purpose of the whole) function and sustain themselves. The research, theory building, and hypothesis generation that has followed provides human resource professionals and organization leaders with a rich and potent framework for understanding and influencing organization behavior and success. Specifically, general systems theory and the subset of general systems theory that applies to systems that consciously choose their purposes (teleosystems theory) has begun to provide the following thinking and decision-making tools:

1. *Hierarchies of systems.* These identify various classes of systems, from the simplest to the most complex. The hierarchies help assure that our analyses and interventions will be appropriate for the system we want to understand or influence.
2. *Descriptions of systems components.* These provide a common language and a general model to use in describing any system at any level in the hierarchy of systems.
3. *Descriptions of systems processes.* These help us understand what to look at and what to look for when systems behave. Systems processes are key leverage points for system change.

The Hierarchy of Systems

In the 1950s, Kenneth Boulding (1956) defined eight classes of systems. He arranged them in a hierarchy that reflects their complexity:

Level 1: *Frameworks.* This is the level of "static structures," like atoms in a crystal.

Level 2: *Clockworks.* This is the level of "simple machines," which move in a predetermined way without feedback from the external environment.

Level 3: *Thermostat.* This is the level of a cybernetic system that receives and interprets information and adjusts its behavior in predetermined ways based on environmental input.

Level 4: *Cells.* This is the first "open system" level. That is, the cell absorbs, transforms, uses material from the environment to reproduce itself.

Level 5: *Plants.* This is the first level where "division of labor" occurs. Parts of plants have specialized functions. Individual plants, while being part of their overall class or species, are unique.

Level 6: *Animal.* This is the first level of self-awareness and purposeful behavior. A central brain organizes information, but the way it is organized is unique across individuals because it is filtered by the individual's own internal image of reality.

Level 7: *Human.* Humans "know that we know." We produce and use symbols and therefore are capable of complex thought. Humans are also aware of space and time beyond the present and immediate experience.

Level 8: *Social organization.* These are voluntary systems, although they may have goals that developed over time, they are "systems by mutual choice." Their building block is the role, and their glue is communication. Roles and communication are affected by the organization's policies, structures, and functions and by the individuals in the roles. The latter is true because an individual's actions and information processing inevitably are affected by his or her own internal image of reality (see Level 6).

Russell Ackoff (1986) and others describe three categories of systems that encompass Boulding's eight levels. First is the *mechanistic* system (Boulding's levels 1, 2, and 3). Systems at this level react and maintain themselves, but they are not flexible. They are relatively closed systems that assume a static environment. We can often describe events in these systems in terms of high-probability causes and effects.

A second category of systems is *organismic* (Boulding's levels 4, 5, and 6). Systems at this level exchange material with their environment and grow by depleting or transforming something in the environment. Organismic systems are goal seeking, but the goals they seek relate to growth and survival through incremental adaptation to the environment. Relationships with the environment may be predictable but are more complex to control.

The third category of systems is *self-aware and self-creating* (Boulding's levels 7 and 8). In systems at this level, choice and purposeful behavior dominate. Individuals and groups voluntarily "act" and "create goals." At this level, individuals and groups can also create resources, substitute resources, or adopt new ways of using resources; that is, they can develop as well as grow. Because of the complex relationship with the environment (where the system both is influenced by and creates the environment and where individuals both are influenced by and create the organization), it is more difficult to analyze or predict system behavior. The situation is made even more complex because individuals and organizations, by exercising their power to create, may act in ways that are dysfunctional

in the short term but functional in the long term (or vice versa). That is, the social system's ability to short-circuit evolution and adaptation can be positive or negative for the system and for its environment. This capability raises issues of responsibility, ethics, and values that lower-order systems do not face.

In summary, systems exist at varying levels of complexity. And human and social systems are at the top of the hierarchy as we know it today—bad news for those people who want simplicity and a mechanistic picture of cause and effect. For the rest of us, that circumstance poses a challenge to understand and influence human social systems (including business organizations) on their own terms. We may even be required to reject the models and change methods that apply to systems below the level of the systems we are trying to understand or influence (for example, a simple stimulus-response model that helps change animal behavior probably will not be powerful enough to change how people communicate with each other in an organization).

Understanding and influencing organizations, which are social systems, is not an easy task. Theoretical models beyond Boulding's Level 3 are weak, and descriptive or empirical knowledge is inadequate at all levels. But at least when we deal with human and social systems, "we have, as it were, an inside track. . .we ourselves are the systems which we are studying. [That] enables us to utilize systems which we do not really understand" (Boulding, 1956).

Systems Components

A system is a collection of interdependent, organized parts that work together in an environment to achieve the purpose of the whole. The key system concepts are "parts," "whole," "environment," "purpose," "interdependent," and "organized." The *parts* may be subatomic particles, cells, or people in their roles. In higher-level systems, parts are systems themselves: mechanistic, organismic, or self-aware. Systems composed of self-aware parts are much more difficult to understand and influence than lower-level systems because their reality is partly shaped by their personal experiences, internal images, and (for humans) values. Thus, structure, information, and external control only partially affect their behavior. Personal motives, perceptions, expectations, and visions also affect what individuals and groups do and accomplish in social systems.

The *whole* may be atoms, cells, people, teams, an organization, an industry, a country—any collection of parts that is organized to accomplish a purpose. The appropriate definition of "whole" depends on what we are trying to understand or influence. What we define as the whole also depends on the probability that understanding or

influencing the "whole" will accomplish our goals with a reasonable expenditure, or exchange, of resources. For example, if we want to influence product sales, we can focus on the salespeople themselves (here, the person is the system), on how the organization supports sales (here, the total organization is the system), or on making their products succeed (here, the system may include the customer and suppliers). At a still higher level of analysis, we can focus on the industry as a system and explore the probabilities of success from using alternative distribution or marketing channels.

Purpose is the answer to why the parts must work together. What will they be or accomplish together that they will not be or accomplish as independent units? Purpose may be imposed from outside the system (as in mechanistic systems); it may evolve in reaction to the environment (as in organismic systems); or it may be voluntarily and freely chosen (as in social systems). Because purpose is chosen and agreed to by individuals in social systems, the selection of purpose is a key process in organizations. I will say more about this later.

Interdependence is the fourth key system concept. Interdependence assumes that the behavior of parts of the system affects other parts and the system as a whole. It is through successful interdependence that parts working together bond and become greater than their sum. At the social systems level, bonding occurs in the form of information and feedback. It is sustained and organized through the use of structures, policies, processes, and resources that help the organization thrive as a whole.

A key question for social systems is how to support optimal interdependence—that is, how to balance the freedom and creativity of each person with the goal efficiency of the whole. Some organizations behave as though individual freedom and organizational efficiency are inversely related. They develop rigid procedures, controls, and role boundaries to limit and prescribe the behavior of the parts. That rigidity can reduce the whole's ability to flex and act in a complex environment. It can also keep individuals from adopting a systems view of their own behavior and the effects of their behavior on the whole. In today's rapidly changing times, the challenge is to create new awareness of both independence and interdependence so that all parts fully use their capabilities and knowingly act in support of the larger purposes.

Organized implies that the parts of a system are not randomly chosen or placed. Rather, the parts have a role to perform and certain boundaries for their role. In lower-level systems, parts are totally dedicated to their role in the system (for example, a neutron in an oxygen atom has no other identity while it serves its purpose in the atom). In social systems, however, people are only partially their role and may perform roles in several systems at once. Also, many

roles in social systems are goal directed rather than reactive or responsive. Such roles need consciously designed structures, policies, and processes to organize them and to define their parameters. It is not enough, as it would be in a reactive system, just to organize roles to solve today's problems.

In social systems, there are many ways that roles and resources can be organized to accomplish the same goals. Also, many goals can be achieved through the same organization of roles and resources. But some configurations of goals, resources, and roles are likely to make better use of resources than others. Such configurations reflect a better fit between the parts and the whole and the whole and its environment.

The system's *environment* is everything outside the system that affects or is affected by the system's behavior. At the low end of the systems hierarchy, the system's normal functioning is independent of the environment. There is no, or very little, exchange of information and resources between the system and its environment (think here of an atom, a barometer, a scissors). Another system or force may move or use it, but the low-end system neither learns nor changes the composition of its parts.

At the high end of the systems hierarchy, the environment and the system engage in frequent and complex exchanges of information and resources. In fact, human and social systems both influence and are influenced by the environment. This influence may either be deliberate or unplanned. The process of influence is deliberate when individuals and the organization consciously create an image of the future and then channel resources and creativity toward making the image a reality. Often, however, influence is not a deliberate process, but a by-product of short-term actions that have unplanned and sometimes cataclysmic environmental consequences for the future.

Human and social systems have the creative ability to change the course of their own and lower-level systems' evolution. Because this is true, responsible planning and change at the human and social systems levels must consider the long- and short-term environmental effects of any choice that will change the course of events. In effect, this means major plans and actions for an organization must be developed from the perspective of the larger systems (such as social or ecological) of which the organization is a part.

In summary, all systems, whatever their level, are collections of interdependent, organized parts that work together in an environment to achieve the purpose of the whole. Furthermore, the central hypothesis of general systems theory is that all systems can be studied, understood, and influenced by focusing on

- the whole as purposeful and as more than the sum of its parts
- the parts
- interdependencies among parts

- the organization and structuring of parts into the whole
- the system's processes for working together
- how and to what extent the system interacts with the environment

Anyone who wants to use systems thinking to help an organization change will assess and try to influence all of those components.

System Processes

To understand and influence systems in general, and social systems in particular, we must begin to understand system processes. The eight processes that appear to be most critical are

- equilibrium maintenance
- feedback/feedforward
- growth
- conversion/production
- knowledge exchange
- executive decisions
- development
- interventions

Equilibrium maintenance

This process is relevant to all systems. Equilibrium maintenance reflects a system's tendency to move toward balance with its environment. It also describes the tendency of the parts of the system to work together in predictable relationships. Equilibrium maintenance applies to atoms as well as to complex human organizations. Sometimes the drive toward inner equilibrium prevents systems from moving from a dysfunctional toward a more functional equilibrium with the environment. For example, systems develop "set points," which cause some parts to "compensate" for deviant behavior by other parts. Compensation may occur even when the "deviant" behavior supports a better overall equilibrium with the environment. The body system, for example, will slow its use of fat in order to maintain its weight "set point," even when the loss of weight and fat is in the best interest of overall health. Or, to preserve the "set point" in a family system, a "good" person in the family may misbehave when a "bad" person improves his or her behavior.

In social systems, both individuals and the whole organization may create pseudo-equilibriums by denying or ignoring data from the environment that says, "It's time to change." On the positive side, the drive toward equilibrium maintenance helps keep the system's parts together and helps systems remain stable through temporary and insignificant change.

Feedback/Feedforward

Feedback is reactive. It is information that tells a system how the environment is responding to it. Feedforward is anticipatory. It is information that is useful for creating goals. Feedback provides insight into a system's current or past relationships with the environment or the past relationships of subsystems to each other. It tells us whether or not our behavior is on track. Sometimes it is delayed, so the cause-effect relationship between feedback and its stimulus is obscured. Sometimes initial feedback and later feedback are discrepant. Peter Senge (1987) stated that a system's actions may produce "better before worse" or "worse before better consequences." In complex systems, feedback may be directed by the environment to the system, by the system to the environment, or from some parts to other parts of the system.

Feedforward is information relevant to creating goals. Because it is anticipatory, feedforward is relevant only to self-creating systems. It may be hidden or may appear to be neutral unless it is noticed or sought out by systems which are moving toward or creating new goals. For example, one organization may ignore information about demographic changes, but another might use it as feedforward to help identify new markets.

The universe is full of information. A system will need or process only a small portion of it. The successful system will notice and respond to the environment's reactions to its behavior (feedback). The successful system will also capture information that may signal the need for a change in direction (feedforward). The former supports continuous improvement and adaptation; the latter supports breakthrough change.

Growth

Growth, a feature of systems beginning at Boulding's Level 4, is the process of increasing the size and substance of a system by co-opting resources from the environment. In physical growth, something is lost from the environment and gained by the system, which may then be returned to the environment in the form of a more valuable product. Growth that does not return a net value to the environment, including to the larger systems of which the system may be a part, tends to encounter limits (for example, excessive political power leads to coups). Such growth is also counterbalanced by resource shortages (the growth of wood-based construction industry leads to a reduced supply of trees), equilibrium reactions by other systems (increased numbers of mosquitos support growth in numbers of their predators), and even death (cancer). Growth that does not return a net value to the environment may continue unchecked for a time

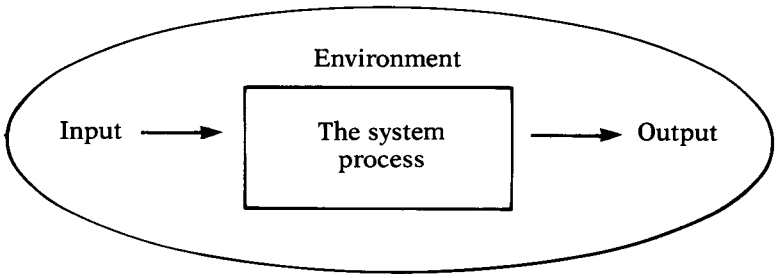
because of the lag that often occurs between behavior and its real impact on the environment.

Conversion/Production

All systems engage in some conversion process. This is true even of systems that are primarily "closed." In a rock, for example, there is a conversion of matter to energy at the atomic and subatomic level, and there is energy exchange with the environment through weathering or volcanic activity. At the highest system levels, a variety of complex physical and informational inputs are converted to complex products, messages, and conditions.

Figure 1 shows the basic general model for the systems-conversion process. The process part of the system may include many subsystems, each with its own input-process-output cycles. Also, many inputs may be required to produce many or few outputs.

Figure 1—The basic general model



Outputs are what the system or subsystem/part delivers, produces, or provides as it works to accomplish its purpose. For example, a plant produces seeds as it works to ensure the survival of its species, and it produces oxygen as it performs its subsystem role in the ecological system. A business team may produce products that ensure the survival of the larger organization. The team may also provide feedback that enables another team to improve its performance. And that same team may develop a new technology that benefits the whole industry.

Inputs are materials, energy, and information that will be in the output or will be used to produce the output. *Processes* include the direct responses and actions that transform or reorganize inputs into outputs (these are primary processes, such as product assembly). Processes also include the responses and actions that support the system's ability to produce outputs and achieve its purpose (these are secondary, or support, processes, such as staff training). In the digestive system, processes include the action of juices to break down food and distribute nutrients and waste to appropriate organs. In a

work organization, processes include planning, organizing, communicating, and work that changes the state of information and materials.

Processes change inputs into outputs. When that change is dramatic and when it results in a net increase in value for the system and its environment, we can describe the system as "high value added." When it results in little or even negative contribution, we can describe the system as "low or negative value added." For example, a polluting industrial plant uses more resources than the value it adds. For now, the plant may be able to pollute without apparent consequence to itself, but based on what we know about systems operations, the fact that its pollution is reducing rather than adding value will ultimately lead to its extinction.

There is also a competitive factor in the conversion/production process. The environment usually favors systems that produce value greater than their cost. Relative to their competitors, such systems need fewer or more broadly available inputs to produce their products, which makes them more resilient under conditions of scarcity. Because of their more valuable product, such systems may become the preferred suppliers to the larger systems of which they may be a part (for example, the stronger hand tends to get used more; the person who provides more positive support tends to get included more; the organization that produces the better-quality cars for a value price tends to sell more).

Because of the nested nature of high-level systems (systems contain subsystems, which, in turn, contain subsystems), the conversion/production process probably needs to result in some optimal balance of value across subsystems for there to be an overall net value. For example, the person who provides high levels of positive support for others but doesn't take care of his or her own health may, in the end, become a net drain on system resources.

On a final note, when the output is primarily information (research, news stories, products whose cost is mostly intellectual labor), there is a high possibility of net value added because the prime input material (information) is not depleted with use. But this net added value probably can occur only if the product helps conserve energy and materials and enhances the well-being of the systems it affects. For example, an electronic refrigerator requires more intellectual output from microchips but ultimately uses less energy and delivers a broader array of services than a conventional refrigeration.

Knowledge exchange

The parts of a system are interdependent. Therefore, the effectiveness and the efficiency of the total system depend on how well the parts work together. A complicating factor in higher-level systems is

the fact that neither the system nor the environment is static. Also, in systems where subsystems are human (individuals and groups), new ideas come from within. The point is that high-level systems must regularly contend with large amounts of information. Thus, another major system process is the ability of a system to find and recognize appropriate information, to move it from part to part through the system, and to convert it into knowledge that can be used as needed.

Executive decisions

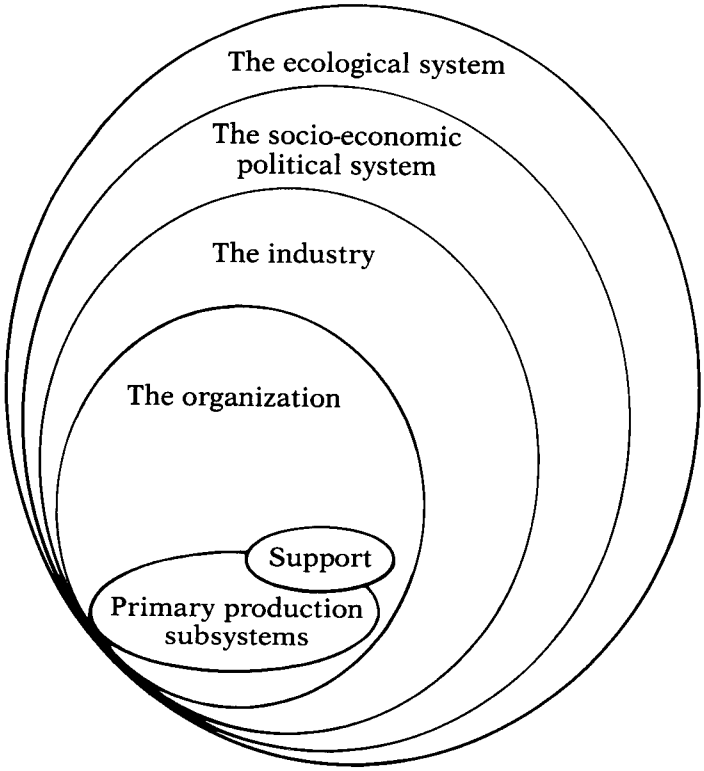
In lower-level systems, the system's purposes and the rules governing subsystem behavior evolve with the system. As far as we know, atoms, clouds, furnaces, cells, and plants do not consciously choose what they will become, not in the same way humans do. Nor do they decide what goals they will pursue, how they will organize their parts, how they will process information, or how they will interact with the environment. People and organizations do choose, within parameters, what they will become and how. They make executive decisions to change their purposes, goals, structures, and processes.

- The first executive decision function of social systems is to create *purpose* and *goals*. Because we humans can think beyond ourselves in scope and time, we can imagine the future. We can create and test scenarios. We can also think about how we think, which involves examining and testing values, assumptions, biases, and beliefs, and creating missions and purposes that break with the past. The moon mission was one such goal; it was a discontinuity, a breakthrough. We humans made it to the moon in 1969 because the goal pulled us there. Without the goal, the flight to the moon might have happened, but not so soon and not in the same way.
- The second executive decision function of social systems is to create and define the *systems structure*. The general rule that some systems scientists suggest is to "design so the organization can be flexible and experimental" unless there is an objective basis for design (Gharajedaghi, 1985, p. 58). Following this rule usually involves designing for high levels of information exchange, creating broad rather than narrow roles, localizing the management functions, and creating bonds that focus on front-end processes (values, visions, and goals), rather than back-end processes (day-to-day inspection) and external control.

To define the system's structure for an organization, it is important to ask, "What is environment and what is system?" In some organizations, individuals define the system as the "line organization" or the "manufacturing organization." They then behave as though other parts of the organization are environment. In other organizations, individuals treat the company or the institution itself as the system. Customers, suppliers, and other organizations in the industry or

community are the environment. In still other organizations, executives consider the system an even larger entity that includes suppliers, customers, regulators, competitors, and the labor market. Viewing the system in this way leads to a more complex picture of interdependencies and an expanded, or at least tiered, view of purposes and potential goals (see Figure 2). Whatever the choice of system size and complexity, executive decisions about organization structure usually focus on roles and information and feedback channels.

Figure 2—A tiered view of systems



■ The third executive decision area concerns core *system processes*, which include

- the major technologies for conversion/production
- the processes to assure that people are aligned with larger goals and have opportunities to meet some of their personal needs through their system roles
- the processes for seeking and recognizing feedback and feedforward
- the processes for evaluating system effectiveness
- the processes for learning and development
- the processes to assure quality in executive decision making

The executive function is to decide what these core processes will be, based on feedback and feedforward data. One or many people may perform the function, but it is qualitatively different from the decisions involved in implementing the core processes on a day-to-day basis.

All three executive decision functions require thinking from above and from outside the system. Decisions are choices about goals, structure, and processes that require intelligent foresight, the ability to think about the future in a tangible way, and the testing of choices against future scenarios. Only intelligent systems (humans and social organizations) are capable of engaging in teleological processes.

Development

Development is the creation of new capacity in a system. As a result of development, individuals and organizations are able to increase the cost/benefit ratio of their outputs. That is, as a result of development they are capable of more effectively using resources to create a higher-quality or better output.

Deliberate development is unique to intelligent systems. Gharajedaghi (1985) presents a four-phase definition of development in social systems. He says that development occurs through the active and sometimes painful process of creating and spreading knowledge, learning and adapting, discovering new dimensions and new implications, and creating and adopting new paradigms.

Development is also a personal process that has value and importance beyond enhancing individuals' roles in a social system. Development helps individuals expand their purposes and goals, better manage time as a scarce resource, and deal more effectively with change and complexity. Development also appears to satisfy a basic human need. In systems, it is important to pay attention to development because there are virtually no limits to its impact and because development's basic resource (knowledge) is not depleted with use.

Interventions

Interventions are deliberate, but temporary, actions whose intent is to help a system make major changes in goals, structure, or

processes. Interventions help assure that various parts of the system work together to make desired change happen quickly and successfully. Interventions are transition events, which are necessary to counteract the system's use of "equilibrium maintenance" as a mechanism for maintaining the status quo. Interventions are also necessary to help the system compensate for the time lag that often occurs between causes and their effects. The fact that causes and effects are often not closely connected tends to encourage the implementation of short-term or faddish solutions rather than more effective actions with longer-term payoffs.

Senge (1987) describes the following four major dysfunctional behaviors that systems may employ in order to maintain status quo and to resist change:

- *Policy resistance.* This is the often illogical "delay, dilution, or defeat of well-intentioned policy changes."
- *Compensating feedback.* This is the "tendency of a system's negative feedback loops to intensify when faced with changes in the environment."
- *Eroding goals.* This is the "tendency to lower goals in response to the gap" between the ideal and actual, rather than to persist in goal-oriented behavior.
- *Shifting the burden to the intervener.* When this happens, the system accepts change, but only while the change agent is physically present to sustain it. In its more dramatic expression, shifting the burden takes the form of a chronic dependency, where the system becomes addicted to the change agent and requires perpetual intervention, rather than internalizing the capacity to make its own change.

Other coping and resisting behaviors, similar to those people adopt when they experience a major personal loss, occur when self-aware systems face major changes in goals, structure, and processes. Interventions are attempts to help a system develop protective devices. Interventions help separate functional from dysfunctional equilibrium-seeking behavior, and they accelerate the development processes associated with successful change.

Unique Opportunities and Challenges Available to Self-Creating Systems

Self-creating systems can think about and design themselves—within limits. Although people and organizations can't turn themselves into rocks or plants, they truly have not yet reached the limits of what human systems can create.

As systems and our awareness of them evolve, several systems principles are becoming clearer:

1. *Everything is connected to everything else.* Whatever we do, whatever we change, the effects will show up in other places and at other times. If we realize this and ask what systems and subsystems are likely to be affected by our actions, we can better plan for and assess the costs and benefits of change. We can even find better places to intervene, to start the change process, and to maintain it. We will also be more aware of the potential effects on ourselves and our systems of changes in the environment or in other systems with which we relate.
2. *Some processes are unique to self-creating systems.* These unique processes are often the most highly leveraged vehicles for assuring quality performance and efficient and enduring change. Well-designed interventions, for example, can accelerate change and can both harness and help reduce dysfunctional change energy. Interventions also can help clarify the real cause-effect relationships, or at least help anticipate the time lag between decisions and the payoff for change.

   Development processes can help increase the added value of outputs from the system and can provide powerful points of synergy for meeting individual and organizational goals. Executive decision processes establish the goals, structure, and operating processes that help keep the system on a powerful trajectory of choice. Executive decisions help focus attention on subsystems and the environment as well as on the system itself or specific events in it. Executive decisions also help focus the creative and anticipatory capacity of the system. They help the system make conscious tradeoffs between long- and short-term costs and benefits for parts of the organization, the organization itself, and the larger system that the organization influences.

   The knowledge exchange and feedback/feedforward processes, while not totally unique to self-creating systems (plants and animals both receive and transmit information), occur at a much more complex level in self-creating systems because of human ability to make and use symbols. Humans can also interpret, deliberately filter, and create information. This capacity, which may be enhanced by information/communication technology, will undoubtedly provide future social systems with unique opportunities for advanced functioning.
3. *Many potentially "right" goals, structures, and processes are possible.* This is true because organizations help create their own future. There are an infinite variety of potential interactions among a system's parts or between the system and its environment. Many goals can satisfy the system's purpose. Also, many structures and processes can work to create the desired future. There are no best decisions or choices, only some that will be

more effective and more enduring than others. The search for one cause or one solution is appropriate only at a much lower level in the system hierarchy (and there is some doubt that simple cause-and-effect relationships apply there either).

4. *The potential for chaos and creativity is inherent in all systems and should be expected and nurtured.* As far as we know, it is impossible to predict or control anything completely. Furthermore, attempts to overcontrol can hurt the system and its chances for survival. Systems at all levels appear to combine chaos and order. "In the development of one person's mind from childhood, information is clearly not just accumulated but also generated—created from connections that were not there before" (Gleick, 1987, pp. 261–262). This supports #3 above. Some potentially "right" goals, structures, and processes may be created only in the future, which is an argument for remaining continuously open to better solutions and goals.

In attempting to understand and influence self-creating systems, we must take those and other relevant hypotheses into account. Certainly anyone whose job it is to help develop individuals or organizations has a lot to gain by adopting the systems perspective.

General Systems Theory and HRD

General systems theory provides a powerful framework for the HRD practitioner and for anyone whose role is to develop an organization and/or its people.

■ First, it provides a perspective, a vantage point, for thinking about the organization. That perspective derives from the nature of the organization itself rather than from a discipline (such as economics, engineering, administration, adult education, psychology, communication) or a subsystem theory (such as stimulus-response theory from behavioral psychology). Organizations are complex, self-aware, and purposeful systems that comprise complex, self-aware, and purposeful subsystems (individuals and groups). Organizations are also subsystems of larger economic, political, social, and ecological systems. No other theory provides a rich enough perspective for facilitating the development of organizations and their people. General systems theory suggests that we treat organizations as members of the class called "systems"—defined as "a collection of interdependent, organized parts that work together in an environment to achieve the purpose of the whole."

The systems perspective also suggests that we can knowingly choose the system processes we will investigate and influence (including equilibrium maintenance, feedback/feedforward, growth, conversion/production, knowledge exchange, executive decisions,

development, and interventions). Even when we choose to deal with only a part of the system, we will be aware that that part is interdependent with the rest of the system. If we choose to deal only with the behavior or processes associated with that part, we will be aware of the risk of creating potentially dysfunctional impacts on other parts of the system and the risk that the one part's behavior change may stimulate compensating feedback elsewhere in the system or may trigger policy resistance by the part itself.

Perspective also allows us to initiate change at a variety of points in the system. We can do so knowing that all issues in a system are system issues that can be resolved in diverse ways. We might start a change with a training course, for example, even though we know that the issues are broader than training needs. We might follow with a more central or more powerful intervention, such as a change in structure. The systems perspective helps us decide how broadly we want to think. We can ask how big the system is that we will influence: is it an individual, a group, the organization, the industry? Given the responses to our questions, we can balance the benefits of thinking bigger or smaller against the costs of being too simple or being overwhelmed.

■ Second, systems theory directs us to consider and influence the processes that are unique to self-aware systems (including interventions, development, executive decisions, and knowledge exchange). HRD professionals have paid little attention to these processes in the past, or they have treated them in isolation, driven by a particular technique or expertise with which they are comfortable.

Many HRD professionals persist in using techniques and perspectives that are more appropriate for understanding and influencing lower-level systems. Examples of this reductionistic thinking include

- short-term cost-benefit analyses
- stimulus-response theory, which focuses exclusively on individual behavior as the focal point for change
- organization models that consider only material flows or financial analyses.

Organizations are self-creating social systems whose actions have long-term and short-term effects. Models that fail to acknowledge the purposeful, anticipatory, creative, chaotic, nature of individuals and organizations cannot support and sustain system success for both the short and the long term.

■ Third, systems theory helps us adopt a big-picture view of development. Most important, it suggests the major roles that people play in system success. People and the technologies they create perform these important system functions:

- to monitor the environment for feedback and feedforward information
- to make executive decisions about goals, structure, and processes

- to find ways to compensate for the lag between actions and feedback
- to design and implement interventions for the purpose of bringing breakthrough change into the organization
- to carry out or guide the conversion/production processes
- to bring information from related systems or larger systems to the table for consideration in executive decisions
- to exchange and create knowledge
- to examine and improve the fit between their system and the environment and among the subsystems in the organization
- to understand, counteract, overrule, and absorb dysfunctions in the system
- to create new technologies and resources that will increase "added value"
- to develop themselves and support the development of others
- to examine, challenge, and create their own values and assumptions and support others in similar efforts

Development from an organization-systems perspective must focus on building individual and organizational capacity in the above areas. Without a systems perspective, development may be restricted to the knowledge and skills needed in the conversion/production process, which is too limited a scope, given the broad array of challenges facing organizations in a rapidly changing, clearly interdependent world where individuals, groups, and organizations with abilities to choose, learn, create, and communicate hold the keys to survival (Toffler, 1970).

From a systems perspective, development must also relate to individual goals, values, and self-perceptions. People are self-aware systems who can choose the level of energy they will commit to their organizational roles. They also help create their roles by the simple act of being there. It is foolish and reductionistic to view people as machines. The systems perspective prevents us from doing so, even when we choose to direct development resources only to improve performances in current roles.

■ Fourth, systems theory tells us to expect resistance when we initiate major changes. "Policy resistance," "compensating feedback," "eroding goals," and "shifting the burden to the intervener," are four methods that systems use to maintain old equilibriums. These resistant reactions are constructive when executive decisions are bad for the system's long-range success. Resistance can also cause the system to improve its goals, structures, and processes. Dysfunctional resistance arises more from the system's desire to stay the same than from real interest in the system's future viability in a changing environment. Whenever dysfunctional resistance occurs, the HRD professional and system executives must recognize it for what it is, help individuals and groups move through it, and remain firmly

committed to the visions and goals that launched the change in the first place.

Successful intervenors anticipate and address resistance as well as initiate targeted changes. People who are driving the changes must begin to get support and ownership of the change early in the process (participative management) or to be firm, supportive, and nondefensive when resistances occur.

Conclusion

Human resource development, including individual, group, and organizational development, is becoming an acknowledged and central process in organizations today. In the future, HRD will undoubtedly be recognized as the competitive advantage of organizations that create high added value and thus succeed in the global environment. Development will be key because it accelerates an organization's ability to anticipate, create, and adopt change. Few organizations have even begun to realize their potential and how to make development happen on a systems scale. Many forces are drawing attention to development. The key forces include one, an accelerated pace of change and competition because of increased availability of information and two, an increased awareness of interdependencies and the long-term effects of system actions.

Compared with the past, today's organizations and their people must be able to develop at extraordinary rates. Those who cannot, will not have a place in the future.

In this future scenario, development is a key process, but it requires a paradigm that is rich enough to assure its relevance to future challenges. General systems theory—the evolving theory that focuses on social and self-creating systems—provides an appropriate framework for thinking about and planning development. The theory directs us to consider processes that are unique to self-creating systems. It helps us move beyond narrow, discipline-based models to a view of development that will lead to more powerful interventions. And it helps us know what to expect when we introduce change and development into a complex organization.

Finally, systems theory enables us to draw on methods and theories from a broad array of disciplines without being unduly restricted by those points of view. Thus we can use information and methods from many disciplines, all the while knowing that we are working with a system. We will therefore not "accept as final a level of theoretical analysis which is below the empirical world we are investigating. . .[even though] valuable information and insights can be obtained by applying low-level systems to high-level subject matter" (Boulding, 1956).

Development from a systems perspective will be very different from what it is today. It will be more future-oriented, interdependent, and focused on a broad array of processes (including how individuals, groups, organizations, and industries think, learn, choose, and exchange knowledge). Development is the key to success as we enter the 21st century. It will be more visible, the subject of more discussion, the object of more support. Wait and see!

References

Ackoff, R. L. (1986). *Management in small doses.* New York: Wiley & Sons.

Boulding, K. E. (1956). General systems theory: The skeleton of a science. *Management Science, 2*(3), 197–207.

Gharajedaghi, J. (1985). *Toward a systems theory of organization.* Seaside, CA: Intersystems Publications.

Gleick, J. (1987). *Chaos: Making a new science.* New York: Viking Press.

Senge, P. M. (1987). Catalyzing systems thinking within organizations. In F. Mazarick (Ed.), *Advances in organization development.* Norwood, NJ: Ablex.

Toffler, A. (1970). *Future shock.* New York: Bantam Books.

Pushing the Frontiers of Systems Thinking: Implications for Human Resource Development

G. Richard Hartshorn
Program Manager
Ford Executive Development Center

> Seek greater understanding, but do not expect greater detail. There are many who, by virtue of their passivity, dependency, fear, and laziness, seek to be shown every inch of the way and have it demonstrated to them that each step will be safe and worth their while. This cannot be done. For the journey of spiritual growth requires courage and initiative and independence of thought and action. While the words of the prophets and the assistance of grace are available, the journey must still be traveled alone. No teacher can carry you there. There are no preset formulas. Rituals are only learning aids, they are not the learning (Peck, 1985, pp. 310–311).

This chapter is not about the reductionist theories of traditional problem solving, nor does it provide the definitive formula for radically changing the human resource development organization. It is an appeal to have those of us who have been associated with training and development to become more concerned and involved with shaping our destiny—indeed, to change the way we do business. The mere suggestion that there are alternative ways of looking at our function and the possibility of including nontraditional ideas in the process is, in my mind, this chapter's fundamental value. In this context, systems thinking is the process of generating insight into the important organizational phenomena that help us understand our assumptions, examine our perceptions, and learn from the process. It is about developing a new discipline for achieving organizational learning and establishing new models of systemic thinking.

Ideas from Leading Systems Thinkers

Ian Mitroff, in his book *Break-Away Thinking* (1988), suggests that American business needs more than new strategies or theories. He believes that we need entirely new ways of thinking. No longer is it appropriate to modify our "tried and true" models of problem solving to fit tomorrow's dilemmas. We must begin to challenge corporate leaders to accept radically different techniques for operating and managing into the 21st century. In a sense, we must redesign the

basic building blocks of the organization to be responsive to an entirely different set of altered functions.

The net effect of the global economy is that everything is not only interconnected, but everything is also affecting everything else. The world is a dynamic ectoplasm that constantly shifts and changes but is never separated, one part from another, in ways that allow us to apply old solutions. We must invent and establish new management concepts because the world of today affects us all, whether we like it or not. Ours is a global economy, a universal set of interactions. Its complexities will not disappear by our treating vital issues with traditional approaches.

Mitroff argues, and rightly so, that Japanese and American leaders organize their approaches to business and industrial systems differently, precisely because they are different people. They have fundamentally different mental images, which govern the way each thinks about the world. Behaving like the Japanese will not make Americans think like the Japanese, but it could help our leaders understand why the world today, and tomorrow, will require major shifts in thinking.

Further, Mitroff offers valuable lessons for those of us in the business of HRD, principally the notion of using new assumptions as critical components of new thinking. He suggests that accurate assessments of all problems will follow from the vital role that these new assumptions play in treating problems. It is clear that the growing integration of the "world's systems"—economic, sociological, cultural, governmental (for example, a combined European Community)—demands unique features of the organization struggling to survive and be successful in the 1990s.

Russell Ackoff (1986) also offers some interesting ideas on how we should be managing our organizations. His perspective on planning is uniquely different from the traditional "forward" planning processes used by most businesses. His understanding of human effectiveness, oddly enough for a systems thinker, focuses on values. He stresses the need to assure that the organization's and the employees' values are congruent—and not just on paper! The key is to express employee values in terms of what the organization is attempting to accomplish, to enable each and every employee to value what the organization values—quality, productivity, etc.—in a way that permits the true expression of dedicated performance.

In what way, then, is this a valuable lesson for the HRD programs of the enterprise? In part, Ackoff proposes that we develop a future scenario, a kind of image of what the enterprise should look like, perform like, and be like and that we inculcate this image in the minds and the spirits of those who must perform. Communication of the image is essential, but more important, the task before us as

HRD experts is to engender a spirit of commitment that operates in both directions—employee to the organization—and the reverse.

Other features of Ackoff's thinking that should be used as the cornerstone of the "new" thinking for training and development include the concepts of comprehensive, coordinated, and participative planning. An unusual form of planning, which has all the intrigue of reading the last page of a novel first, is called "planning backward." Planning backward includes the notions of being introspective, designing an ideal future, and then working backward to the present situation. To HRD practitioners, the approach provides a superb opportunity for innovation. Ackoff's method begins by assuming that the organization for which plans are being created has just disappeared and that an idealized design must replace it. The value in this method is that issues of practicality become irrelevant. Although the product of such a planning effort may seem somewhat unrealistic, the process serves to expand planners' concepts of what is feasible. Therein lies its value. As Ackoff suggests in *Management in Small Doses* (1986), "we can get much closer to our ideals by working backward from where we are [in this scenario]" (p. 190).

Even broader HRD issues related to systems thinking have been raised by Peter Senge (1987), who believes that the managerial learning process should be the principle focus of efforts to improve organizational effectiveness and strategic management. He encourages managers to establish new missions, visions, and values that conflict with the core operating policies currently controlling organizational behavior. Senge believes that without such planning, the managerial thinking behind current organizational policies remains unchanged. The requirement that the organization adopt new learning processes and that managers develop more systemic and dynamic perspectives is a key factor in establishing the change process. One objective of introducing systems thinking logic into the managerial learning process is to generate insight into the organization and to examine the unique cues that managers use to understand the underlying causes of organizational phenomena. Another objective is to establish the kind of disciplined thinking that avoids using traditional approaches to problem solving and solution selection.

The major learning that we HRD specialists can take from Senge's work is to change the methods by which we establish systems thinking in our organizations. To accomplish the shift to systems thinking, we must begin to help managers examine the long-range implications of their actions. Doing so will require that they conduct a fairly sophisticated analysis of the interactive processes in organizations and the consequent effects of managerial actions on all parts of the system. In short, a look at the dynamics of organizational activities is crucial. The clear mandate is to begin to train managers in systems thinking as soon as possible.

The HRD practitioner must find a means to reduce the threatening aspects of system thinking. Political threats may arise because systems often cut across traditional boundaries of managerial accountability. Intellectual threats may stem from the demand for considerable investments of time and energy in rethinking accepted notions of operating. Threats to the strategic and philosophical foundations of the enterprise may arouse defensive reactions to the point where line managers avoid the learning process itself.

By implication, the HRD practitioner ought to be capable of designing and facilitating learning processes that develop the managerial skills associated with model building and strategic planning. It may be critically important to establish the development process by using the existing elements of the training function and to begin the training task immediately. Because HRD practitioners will never have the perfect training and development system in place, nor will we know all the models for helping managers learn, it is essential that we JUST GET STARTED.

Integrating Systems Thinking into the Operating Practices of the Organization

The use of systems thinking is one of the more valuable development concepts to emerge for HRD in the last 10 years. Traditionally, the role prescribed for the training and development function in many organizations has been that of responding to organization problems. The consultant role that prevails in many HRD organizations today appears to be directed toward the evaluation, analysis, and establishment of programs for a wide variety of organization needs. Careful examination of the output of such HRD activities shows that in many cases those programs are merely reactions to symptomatic evidence of the real concerns in the enterprise. This, however, is not the sort of approach advocated by systems thinkers, no matter how complicated the solution.

What, then, are the lessons to be learned from these emerging systems ideas for HRD? For the entrepreneurial HRD practitioner, the major lesson is the need to become a part of the strategic planning process, to develop the capability to guide the integration of "chimney" components (such as engineering, finance, quality control) into a truly effective team. This team-building work requires a tremendous commitment to maintaining integrity within the HRD function while offering perspective and insight to management. And how does the HRD practitioner accomplish such intervention into the strategic issues facing the organization? HRD involvement at every level in the organization will yield opportunities to help consolidate the thinking of the top people in the organization.

The key to applying some of the principles of systems thinking effectively is to search for ways to examine the organization as a total organism. No method can be as effective as having teams of managers—cross-functional and worldwide, if appropriate—struggle with the current frustrations of the organization. But facilitating such activity requires bold, imaginative HRD practitioners with dedicated, empowered subordinates to create planning/learning ventures and carry them to their logical conclusions.

The difficulty with applying linear thinking to complex systems are that "obvious" solutions frequently fail to produce the intended results, not because people lack good intentions, abilities, or resources, but because cause and effect in complicated systems are not closely related in time and space. That is, it is not readily apparent to people how instituting one venture may materially affect many parts and conditions in a system. Applying a linear problem-solving format may even exacerbate the very problems management is trying to solve.

A major role for HRD in any organization is the development of a cadre of leaders who are capable of integrating and synthesizing diverse points of view in order to understand the organization as a whole. The organizational need is to develop a network of structured, disciplined thinkers who can simultaneously recognize and accommodate the dynamic qualities of the organization's processes. The trick for HRD practitioners is to design effective methods for qualifying individual managers in the discipline of systemic thinking. Traditional development methods (task analysis and other linear formats for getting from one place to another) will not work; we HRD practitioners do not have the model to make them work. On the other hand, the new management development process must be evolutionary and must be produced within the context of systemic learning processes. Unfortunately, our long history of training in nonsystemic thinking is not easily reversed. Because most of us learned to isolate symptoms and to derive solutions for problems by looking at processes that we viewed as separate from the system, it is often difficult for us to integrate the various parts of our organizations into the whole.

Our development task is two-fold: First, we must help management begin the effort to create a vision of what it would like the organization to become. Second, we must establish a systemic learning approach for management development. To accomplish this goal, an open-ended learning process must be designed to examine continually what the organization learns and to change the context of the development effort to be consistent with organization and learner achievements.

In particular, it will be important for the HRD practitioner to develop fluency in basic systems principles and to provide ongoing

exposure to generic systems structures as the foundation for management education in systems thinking. Because HRD practitioners have much to explore and to learn in pursuit of these efforts, it is vitally important that we begin our own learning processes with experts like Peter Senge and Russell Ackoff. The key is to learn how very different systems-thinking concepts are from traditional systems, such as those encountered in engineering, computer operations, or manufacturing. To be sure, Senge offers a series of sophisticated principles and intricate systems models in his papers. The value of training managers in systems principles and systems models transcends that of the usual training designs by encouraging managers to take a holistic view of the organization and its environment. For managers to truly benefit from training in systemic thinking will require that we fabricate a unique set of training and development tools.

As mentioned earlier in this chapter, traditional training and development approaches provide neither the learning environment nor the conceptual models that help managers think and act differently and begin using systemic thinking on the job. New and innovative simulation techniques, risk-free opportunities for experimentation, and whole-hearted support from senior management are critical to establishing such a learning environment.

The basic ingredient for developing systemic thinking is the design of effective management development activities that concentrate on continuing the process of learning from prior learning. The development process must help managers clarify and test a mental model of strategy and then increase their understanding of the dynamics that occur within the structure of the organization. Along the way, the HRD practitioner must help managers develop language for cataloging the analytic process. The major objective is an HRD model that integrates management development processes with the underlying strategy of the organization.

Practical Issues for the Organization

As a practical matter, the organization that discovers it needs or wants to begin examining systems thinking as an avenue for organization change must develop a realistic set of missions, values, and guiding principles. It follows, then, that programs designed to train managers in systems thinking must consider the larger context in which managers accomplish their goals. For example, if we are to be concerned with a joint venture strategy (two organizations associating with each other to accomplish a common goal) as a fundamental dilemma for the organization, there must be a close link between the training and development process (what people are doing in the classroom) and the strategy set forth at the corporate level.

Strategy, however, cannot provide the recipe for managing a successful relationship with a partner in a joint venture. Strategy merely provides the architectural framework that guides the implementers, who must then be given the opportunity and the freedom to engage in a variety of actions leading to a successful relationship. The nurturing of the relationship and the subsequent involvement of those whose responsibility it is to make the relationship work is best handled at the operations level. What is required of the organization is to establish an atmosphere in which individual managers can be free to work effectively on interactions with the venture partner.

Systems thinking would suggest that operations managers need to examine the broad aspects of entering into an association. The implications of joint venturing go far beyond the narrow expectations of being involved together in a single product, service, or technology. In fact, the main difficulty with joint venturing is in the need to be fairly clear about how far one is willing to go in the partnership. And yet, not one of the partners can totally predict the long-range effect of the association. The lesson for all involved is one of institutional learning—how the operations managers take the experiences of the day and offer them to their colleagues so all may gain enough new learning from the interaction to act measurably different in the next iteration of the process.

Systems dynamics invariably creates an incredibly messy situation because of an infinite variety of complex variables. Establishing a working arrangement to examine, define, and deal with the issues of a system is not a finite task. There is no inherent end to a system or to understanding it. The lesson for the organization's members is to rethink how they deal with any problem involving a comprehensive set of complex tasks. My advice is short: start simple; do not tackle the biggest issues first; learn on the small ones; always slow down the tempo of the learning process until you grasp the importance of each issue.

The most practical matter for those who must train people in systems thinking may be to help them learn via a developmental process. The limitations of training people by designing a formula for attacking complex problems are imposed by the very nature of the training process. That is, the mere act of arranging or projecting a sequence in which people are expected to learn to deal with a given set of circumstances constrains the solutions and thereby limits the learning. Thus, the process of linear learning, in effect, becomes self-defeating. Frustration for managers/trainees occurs because of the perceived lack of control that accompanies their attempts to find remedies to complex problems. Again, as Senge has pointed out, only through integrating the intuitive domain with the rational awareness domain can a true education process occur. When "everything is

connected to everything else," the organization can never be completely defined in terms of the interconnections. When all managers finally realize they can never figure out the organization and neither can anyone else, they will have moved to the point where they accept uncertainty and begin to reward experimentation and the potential for failure as important ingredients in the ultimate success of the enterprise.

In summary, the lessons learned from systems thinking involve managers' acceptance of ambiguity and the development of relevant models to help them examine the irrational, complex behavior of the systems of which they are a part. Another exciting discovery is the effect that the acceptance of systems thinking can have on the creativity of the individual manager. Developing managerial skills for coping with the fundamental uncertainty that is present in organizational life thus becomes the HRD practitioner's main challenge. The ultimate goal of every manager is to facilitate individual development, to unlock the power and potential of every person in the organization. The outcome of the systemic approach is the creation of a driving force for accomplishing the goals of the organization.

References

Ackoff, R. L. (1986). *Management in small doses.* New York: Wiley & Sons.

Kiefer, D. F., & Senge, P. M. (1984). Metanoic organizations. In J. D. Adams (Ed.), *Transforming work.* Alexandria, VA: Miles River Press.

Mitroff, I. I. (1988). *Break-away thinking.* New York: Wiley & Sons.

Peck, M. S. (1985). *The road less traveled.* New York: Simon & Schuster.

Senge, P. M. (Summer 1986). The new management: Moving from invention to innovation. *New Management, 4*(1), 6–13.

Senge, P. M. (1987). Catalyzing systems thinking within organizations. In F. Masarik (Ed.), *Advances in organization development.* Norwood, NJ: Ablex.

SECTION 3

Applications

Making Work Productive

Frederick W. Nickols
Senior Vice President, Systems and Operations
Monarch Financial Services, Inc.

Elsewhere in this monograph, Ronald Jacobs contends that "systems theory forms the most useful theoretical paradigm" for the human resources development profession. As an old saying has it, "the proof of the puddin' is in the eatin.' " Translation: the utility of systems theory to the HRD profession can be argued at the theoretical level, but it can be proved only at the level of practice.

Practitioners and theorists alike share an interest in the productivity of work. This chapter presents and discusses a systems-based model that has proved useful in efforts aimed at making work more productive. It is not a model of human behavior or human performance; its focus is work, not the people who do it. The aim in presenting this model is to demonstrate the value of systems theory as it relates to the practical problem of making work more productive. This chapter, therefore, supports Jacobs's contention.

Owing to the lack of a generally agreed-upon definition of the disciplines and professions included in (or excluded from) human resources development, defining the audience in terms such as "trainer," "OD consultant," or "human performance technologist" is problematic to say the least. Suffice it to say that the following comments are directed primarily to those who are concerned with analyzing, understanding, and ultimately intervening in the work-related affairs of people and organizations.

Work and Systems Theory

"Work," wrote Peter Drucker (1973), "is both noun and verb." As a verb, it tends to be associated with human activity in the workplace, with workers, and with working. However, work is also accomplished by machines and by human beings in interaction with machines. It is important to distinguish among work, workers, and working (no matter who or what does it), because it is *work*—not working or workers—that must be made productive.

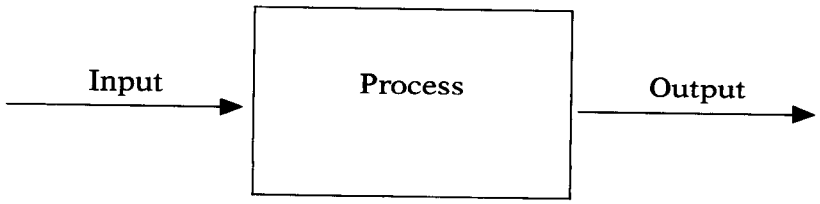
Drucker noted that as a noun, work is a process, and it has a result. Moreover, the result of work exists apart from the worker and from working. A cabinet exists apart from the cabinetmaker and cabinet making. A sale exists apart from the seller and the buyer and from buying and selling. And a decision exists apart from the person who makes it and the process of making it.

In essence, the distinction between the result of work and the activity that produces it is the same distinction Gilbert (1974) made when he differentiated between an "accomplishment" and the behavior that produces it. It is the separation of the result of work from the activity of doing it that makes systems theory well-suited for analyzing work, because that separation makes possible the treatment of work in terms of *input-process-output.*

Work Systems: Input-Process-Output

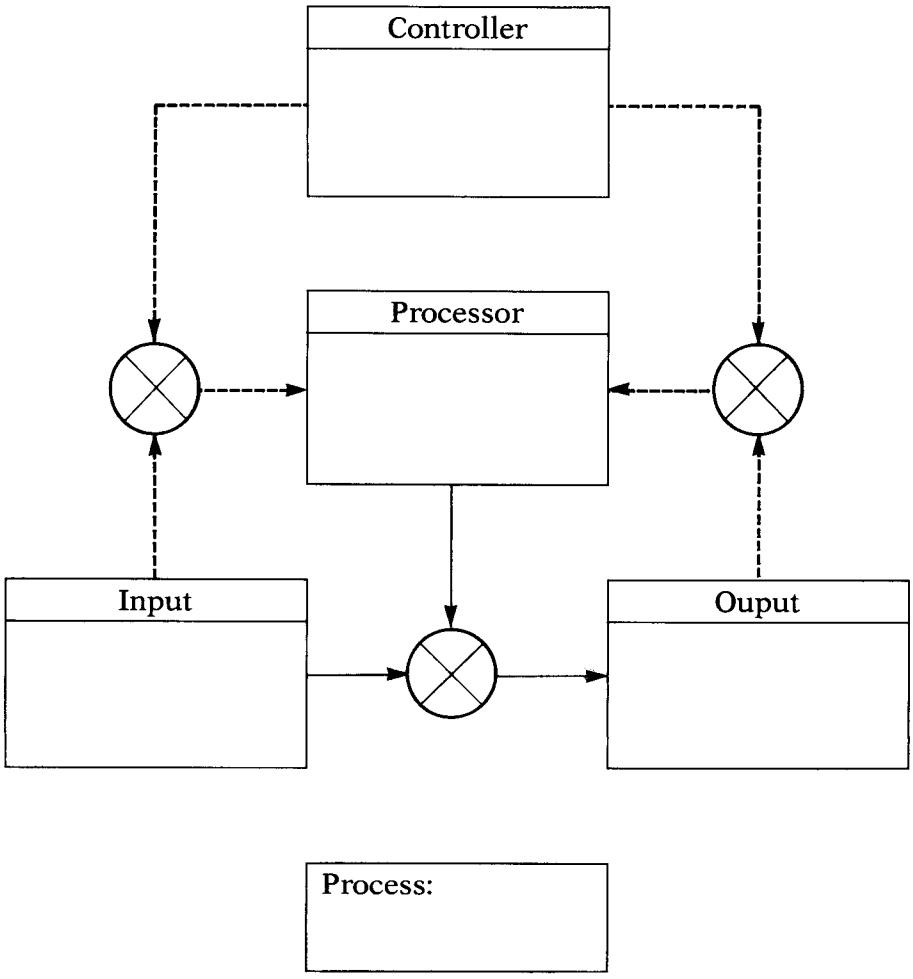
The input-process-output formulation is perhaps the best-known aspect of systems theory. Basically, it states that a system transforms inputs into outputs. For example, in a shop that makes custom cabinets, we can identify production *inputs*, such as wood, hardware, stain, and other items that are discernible in the end product. Working in such a shop includes such activities as planing, joining, squaring, gluing, staining, and sanding. The *outputs*, of course, are the finished cabinets. Figure 1 shows the conventional manner of displaying inputs, processes, and outputs. For reasons that will be made clear, it is useful to depict a *work and work-control system* in a somewhat different manner.

Figure 1—The "classic" systems model



The model in Figure 2 is recognizably an adaptation of the more conventional systems model in that it shows inputs and outputs. Yet it is different in that it depicts the processor and the process as well as a controller and two feedback loops. (Strictly speaking, one of the loops is a "feedforward" loop.) Although this model includes a work and work-control subsystem, from this point on, it will be referred to simply as a work system.

Figure 2—The work systems model



A Word About Processes and Processors

Process is a frequently used but rarely defined term that is really nothing more than a label for the interactions between a system input and a system processor. The conversion of inputs to outputs results from those interactions. In Figure 2, the interactions between input and processor are depicted using the electro-mechanical computing symbol for a differentiator-integrator (an 'X' within a circle). The same symbol is used in both feedback loops. Provision is also made for supplying a label for the interaction.

At the "macro," or most general level of analysis, an entire organization can be considered a single processor. At the "micro," or most specific, level of analysis, a human being or a machine can be viewed as the processor; the process itself can consist of one or more steps in a task or procedure. There are, of course, varying levels of analysis between these two extremes (for example, between unit and departmental analyses).

In the example of the cabinet-making shop, cabinets result from processes (planing, joining, etc.), which are labels for interactions between and among the inputs (the wood, hardware, etc.) and the cabinetmaker who uses tools such as saws, planers, joiners, clamps, and sandpaper. The term *processor*, then, refers not simply to the cabinetmaker but to the tools and equipment used as well. In Figure 2, the structure of the work subsystem consists of the input, the processor, the interactions between the two (the "process"), and the resultant output. The structure of the work-control subsystem consists of the controller, who provides reference conditions, or "referents," and the measurement, communication, and comparison mechanisms that provide feedback.

There are two reasons why the model in Figure 2 depicts the processor instead of the usual box labeled "process." One reason is to be clear about the true nature of the interactions labeled "process." The second reason is to more clearly illustrate the way that control is exercised in a work system.

Control: Definition, Purpose, and Function

"Control," as Drucker (1973) so sagely observed, "is always against some standard." William Powers (1973), in his eloquent and erudite examination of human behavior from a systems perspective, referred to the standards used for control purposes as "referents." The terms "standards" and "referents" are used interchangeably in this chapter to denote requirements or criteria that must be met.

Control, like work, is both noun and verb. Control as a verb refers to actions aimed at ensuring inputs and outputs of a certain quantity

and quality, not just to actions aimed at directing or manipulating activity. The cabinetmaker, for instance, regularly measures the cabinet as it is being built, comparing its actual dimensions against those specified in a plan or drawing and adjusting work activities to ensure that the end product conforms to specifications.

Control as a noun refers to the means used to measure actual conditions (what is), to compare them with reference conditions (what should be), and to take appropriate action (how to close the gap). The purpose of control in a work system is to reduce the difference between the input at two points in time. The first point is as the input exists at the beginning of the work process; the second point is as the input exists at the end of the work process when that same input, suitably altered, will be called the output. This output then becomes an input to some other system.

The point at which an output becomes an input is critically important to the issue of control. Generally speaking, the referents, or criteria, for producing a system's output should be derived from a study of the input referents, or requirements, of the consuming, or receiving, system.

Controlling work requires controls for its initiation, its execution, and its termination. For workers, those three control points can be expressed as questions:

- How do I know to begin?
- How do I know I'm making progress?
- How do I know I've completed the task?

The fewer and the simpler the nature of the controls, the better. If those who build controls and control systems make the control system too complex, it will be susceptible to manipulation and countercontrol in ways that are difficult to detect.

The work of a work system is completed when the output meets certain criteria, not when specified activities have been carried out. Progress is signaled by gradual or incremental changes to the input on its way to becoming the output, not by the completion of this or that activity. Work begins when there is a requirement to produce the output, when the processor is in a state of readiness, and when the input required to produce it is present in sufficient quantity and acceptable quality.

In controlling a work system, the actual condition of an input or output is compared with the referents for the input or output. Any difference between the two constitutes an error signal, which is sent to the processor. In turn, the interactions between the processor and the input are adjusted so that changes in the output reduce the error signal to zero (plus or minus some tolerance). The controller supplies the referents, measurement provides information about actual conditions, and communication provides for comparison of the two.

Troubleshooting Work Systems

One important use of this model is as a guide to diagnosis—a framework from which to troubleshoot poorly performing work systems. Faulty output signals the requirement for diagnosis. The structure of a work system, as in Figure 2, suggests that a faulty output, or result, is attributable to a limited number of factors.

The inputs or resources might be faulty, in which case the control referents should forestall task commencement. The reference conditions or referents might be absent or inadequate, in which case the outputs or results will vary. An all-too-common situation is to find the presence of standards for output volume but none for output quality, even though the quality standard is generally the more important of the two. Measurement of the actual conditions might not be performed, or its results not fed back for comparison with the reference conditions. In other words, the feedback loop might be open. Again, output will vary. Finally, the tools used or the routines carried out by the processor might be insufficient or faulty.

Control as Problem Finding and Problem Solving

One can hardly overlook the similarities between the earlier description of control as an error-reduction process and needs assessment or problem finding as described by Kaufman (1970) or problem solving as defined by Kepner and Tregoe (1965). Indeed, one way of viewing control and controls is as a *preprogrammed* set of problem-finding and problem-solving routines. There is a connection here to Jacobs's view of the HRD professional as organizational problem solver.

Jacobs, citing Goldstein (1980), asserts that the general purpose of HRD "is to foster a desired change in the performance of a defined audience in an on-the-job environment." Intervention is implied. If "performance" refers to the results associated with work and working, then it follows that the interventions of HRD professionals must address the issue of how the performance in question is controlled. In turn, if control is essentially a set of problem-finding and problem-solving routines, then the work of HRD professionals must not only center on the problem-finding and problem-solving activities of others, but must itself consist of those same two activities. To deny this would be to exempt the work of HRD professionals from the same basic principles of control as apply to other forms of work.

More important, the work of most people consists of problem-finding and problem-solving processes. Recurring, repetitive routines of a simple manual nature have all but disappeared from work in the United States; but recurring, repetitive routines of a mental nature have not. One such routine is the work of problem finding and

problem solving, which can be studied and analyzed apart from the specific inputs and outputs associated with this or that occupation.

Consider, for example, the physician, the manager, and the technician. The same basic process underlies the work of all three. The physician calls it "diagnosis," the manager refers to it as "problem-solving," and the technician knows it as "troubleshooting." Yet fundamentally, it is the same work, and the same principles of work control apply to all three.

Control and Countercontrol

Employees, as workers, often function as processors in work systems. Employees also can be viewed as autonomous, open systems, not merely as automatons in someone else's scheme of things. Their role as processor, then, is in no small way colored by the fact that they fulfill it as independent entities, carrying out their own transactions and operating in accordance with their own referents. Those referents can and do come into conflict with the referents that management attempts to impose. As Skinner (1974) pointed out, "Those who are so controlled then take action." He added, "In other words, they oppose control with countercontrol."

Two of the most basic control mechanisms in organizations are budgets and the payroll system. "Padding" of budgets is too well-known a practice to warrant review here. Cheating on time cards is another. However, countercontrol can take much more subtle forms. For example, one sales manager who was puzzled by a seemingly senseless pattern of his sales representatives taking sick and vacation days, asked a consultant who was studying the work of the sales crew to investigate. The consultant found that the sales reps were simply "managing" the payroll system so as to better balance their personal cash flow situations. Here's how it worked:

The sales reps were paid based on their commissions from sales. To allow for clearing and verification of the sale, commissions were paid four weeks later. Payments for sick days and vacation time, however, were made the week following the time off. More important, those payments were based on a rep's average level of sales. Three weeks after a week in which a rep's sales were below his or her average (the results of which would show up in the next week's paycheck), he or she would take sick days or vacation time and thus boost the amount of the following week's paycheck.

New analysts who are interested in studying work performance would do well to remember that they are dealing with intelligent, reasoning, analytical human beings, not with objects bearing the label "employees" or "processors" or even "open systems."

The Control of Work and the Shift to Knowledge Work

There is ample reason to emphasize the issue of control. Between 1920 and 1980, a fundamental shift occurred in the nature of work itself. For workers, work ceased to be primarily a materials-based process and became one that is primarily information and knowledge based.

Knowledge work requires using one's mind, not one's muscles. Its primary tools are language and logic, not lathes. As work has become more and more mental instead of manual, the activity of working literally has slipped out of sight, making work difficult to study and working impossible to supervise—leaving the worker firmly in control of the work itself. For now, at least, the locus of control over work and working has shifted from management to the worker. The referents that control work and working are part of the individual worker's frame of reference. Often, only the worker knows the referents. This is especially true in the case of highly skilled, highly specialized professionals. Further, the referents often vary from worker to worker. The situation today with respect to knowledge work is much the same as it was with respect to manual work when Frederick W. Taylor (1911) first began studying it more than one hundred years ago; namely, management has little first-hand knowledge of the work being accomplished by employees or what is involved in accomplishing it.

The reason the model in Figure 2 includes a controller is to emphasize the critical role that referents play in governing the work. I make no claim that we can peer inside the mind of the worker and see what goes on there; nor do I claim that the mind is anything other than a construct. However, because the results of work exist apart from the worker, I do claim that knowledge work can be studied in a systematic, scientific way, just as Taylor, Gantt, and the Gilbreths studied manual work. I also claim that much of the work that is currently escaping serious analysis because it bears the label "judgment" or "knowledge work" is really nothing more than an undocumented algorithm—complex, perhaps, but an algorithm nonetheless.

The key to studying knowledge work and making it productive lies in focusing on the work, not the worker. Much of Taylor's success stemmed from improvements to the work itself and to the tools and equipment used to do it. Much of the success of the area of HRD practice known as "human performance technology" stems from precisely the same kinds of improvements.

An Example of the Proper Focus

An analysis of the work of financial-aid assistants undertaken at the Educational Testing Service in Princeton, NJ, illustrates the value of focusing on the work itself.

For three months of intensive effort, mostly by experts in the work being studied, all the tasks associated with deciding what to do with the documents that had been suspended from a system of automated processing were documented in the form of algorithms. The 108 algorithms, which detailed the work involved in resolving 60 error messages, contained 769 discrete, unambiguous, binary decisions and 607 detailed action steps. The algorithms were supplemented by narrative descriptions and then packaged as a tabbed and indexed set of job aids to be used at the financial-aid assistants' work stations. The job aids also constituted the primary tool used in training new employees and in communicating new error-resolution routines to existing employees. For the first time, the referents that governed the work were captured, standardized, encoded in the algorithms and narratives, and then communicated to the financial-aid assistants.

By studying the work of the financial-aid assistants, the experts developed new tools (the algorithms and the job aids) and modified another tool—a computer program. The results were a sizable improvement in productivity, reductions in training time and costs, and improved hiring practices. Worth mentioning is that not once during the course of the project was the focus placed on the worker.

An Example of the Wrong Focus

By contrast is a classic example of focusing on working and the worker that occurred several years ago in predivestiture AT&T. This example clearly illustrates the failure to study systematically the work itself for the purpose of identifying, communicating, and encouraging the adoption of the referents that should have governed the work.

AT&T's HRD department conducted a study of the jobs of first- and second-level managers. The results of the study, which was based primarily on data collected from interviewing and surveying third- and fourth-level managers, indicated that the first- and second-level managers did not have good writing skills. In this study, the focus was clearly on working and on the worker.

Subsequently, AT&T spent several million dollars purchasing and delivering training in an effort to improve the writing skills of its first- and second-level managers. About a year later, a follow-up study was conducted. The results of that study were puzzling and problematic for the HRD department: the third- and fourth-level managers asserted that matters had gotten worse, not better.

Had the original study identified and traced the flow of the outputs of the first- and second-level managers' writing activities, the

department would have established that, for the most part, those outputs consisted of correspondence and memoranda prepared for the signatures of the third- and fourth-level managers.

The referents governing the acceptability of the outputs (the correspondence) were in the minds of the bosses for whom the documents were prepared; that is, the referents varied from boss to boss. The documents that had been prepared by managers who had not determined the preferences of their bosses regarding correspondence and memoranda were apt to require revisions or to be rejected out of hand. Understandably, the bosses had concluded that the first- and second-level managers did not know how to write.

The money spent training the first- and second-level managers how to write probably would have been better spent developing ways for them to identify the referents their bosses used to evaluate correspondence and memoranda (for example, by going to the files to study documents previously signed or by interviewing each boss's secretary regarding stylistic and substantive preferences). Some of the money may even have been better spent teaching the analysts how to study work.

Instead, the first- and second-level managers attended training where they were presented models and referents for writing that were totally unrelated to the models and referents their bosses used. When the first- and second-level managers began writing as they had been trained to do, their bosses rejected even more of the documents.

Analysis: Where to Begin and Why

The primary use for the model in Figure 2 is as a guide to diagnosis or analysis. Whether a prelude to intervention or simply a means of gaining understanding, the analysis of a work system should begin with its outputs, not its inputs. One risk in beginning analysis with the inputs is that because there are usually many of them, the analysis will branch out in a number of directions, making the analysis not only an unwieldy task, but one that offers little insight into when and where it will conclude. In some cases, beginning analysis with inputs presents a great risk, as the following example illustrates.

In the course of carrying out a project for a client, a consultant was asked to take a brief look at the firm's complaint-handling function. Complaints came in by correspondence and by telephone. The costs of the correspondence-handling unit were three times those of the telephone-handling unit. The consultant was asked to see if he could spot any obvious and easily implemented ways of making the correspondence unit more productive. He could and he did.

The correspondence unit was shut down. Instead of attempting to respond to complaint letters with more letters, thus triggering an even greater and more costly correspondence workload, correspondence workers began answering complaints received by mail with a preprinted postcard, asking the person to call a toll-free number and speak with a customer-service representative. In effect, complaints sent in by mail were converted to complaints made by telephone.

This example prompts our consideration of two fundamental rules for improving the productivity of work:

- Rule 1: If you have to do work, do it once.
- Rule 2: Don't do work at all if you don't have to.

Had the above analysis begun with inputs, the firm might have found ways of making the correspondence unit's work more productive—that is, it might have found ways of increasing the efficiency of work that should not have been done at all. Instead, the analysis began with the outputs and with a few basic questions: What are the outputs of this unit? Where do they go? Why are they produced? How do they make their way back to the organization? What happens then? By beginning with the outputs, a great deal of work was eliminated.

Challenging the Work Itself

Another example from the Educational Testing Service project can be used to highlight the importance of challenging the work itself—that is, checking to see if the work really must be done.

The work of the financial-aid assistants consisted of determining why documents had been suspended from an automated processing system, deciding how to correct or modify the data, and submitting those corrections to data entry for reentry and additional automated processing. As it turned out, the task of determining why the document had been suspended was unnecessary.

The documents were being suspended from the automated processing stream because the data entered from them had failed certain edits in the computer program's logic. Upon suspension, the computer printed a correction document containing an error message. Many of the error messages were linked to more than one edit. Thus, a given error message might occur for more than one reason, some for as many as five. The first task facing a financial-aid assistant was to identify the specific edit that had caused the suspension. The computer program "knew" which edit the document had failed, yet the printed error message did not indicate the source of the problem. The solution proved to be a simple matter of modifying the error-message routine in the program to indicate the reason for the message on the printout, thus eliminating the first step of the financial-aid assistants' task.

Of course, eliminating the work itself is not always an option. In many cases, the analysis must proceed first.

Getting Quickly to the Heart of the Matter

To get quickly to the heart of the matter, analysts must begin with the outputs. Suppose, for example, we want to analyze the work of an insurance underwriter to determine how the underwriting class of an insurance applicant is assigned. If the analysis begins with inputs, we can readily establish that the inputs consist of information about the applicant's age, sex, health, citizenship, the amount of premium involved, and the face amount of the policy for which the application was submitted. Then, if we ask the underwriter to explain the process of assigning an underwriting class to an applicant, we encounter a maze of decision-making factors that seems capable of infinite expansion and that will take forever to unravel. But, if we begin with the possible outputs, with the range of underwriting classes that can be assigned, we quickly establish finite boundaries for the analysis. We learn that there are eight standard and 16 substandard underwriting classes. That count of 24 total underwriting classes is somewhat inflated because it includes classes based on simple, unambiguous differences between males and females and between smokers and nonsmokers. The count quickly reduces to three: "simplified" and "medical," both of which are considered standard, and "rated," which is considered substandard.

We also learn that in the absence of any negative health information, the simplified and medical classes are determined by the applicant's age and the dollar amount of the premium and that the rated cases are the result of a "debiting" or scoring system used by the underwriter. At this point we will identify yet another outcome: The application might be declined.

In summary, beginning the analysis of a work system by studying the outputs instead of the inputs helps us get more quickly to the heart of the matter. In the case above, the "heart of the matter" is the scoring system underwriters use to assign rated or substandard underwriting classes.

A Caution Against "Sloppy Systems Thinking"

We must exercise great care in identifying inputs and outputs and especially in tracing the relationships between the two. Of particular importance is knowing when to focus on physical or material flows, when to focus on information flows, and when to focus on the linkages between the two.

In my own company, for example, it is tempting and even technically correct to think of premiums and applications for insurance as inputs and insurance policies as outputs. However, it is not correct to think of applications or premiums as being converted into policies. Instead, information about the applicant and the premium serves as input to the processes by which decisions are made to accept an applicant and, subsequently, to issue a policy.

A claim form submitted to a health insurer can be readily traced from receipt to archive. Doing this tells us something about document flow and perhaps about document control. However, if we wish to analyze the decision to pay or deny the claim, studying the physical flow of claims forms will not reveal a great deal.

A claim could be submitted for any one or more of several thousand services that physicians provide. Factors affecting payment of the claim include subscriber eligibility, patient eligibility, provider eligibility, service coverages, maximums, coordination of benefits with other providers, and the diagnosis underlying the service provided, to name but a few. Yet regarding payment of a claim, there are only two possible payment outcomes: The claim is paid or it is not. If paid, it is paid in full or in part. If not paid, it is denied as an invalid claim; or, it is deemed valid but no payment is made (as when the maximum coverage for a particular service has been reached). Oh yes, there is one other possible outcome: The claim could be lost.

From that limited set of outcomes, we can work backward to identify the referents and the logical processes that comprise the work of "adjudicating" a claim. This work is indeed algorithmic in nature. It can be, and has been, subjected to the same kinds of analyses as were applied to the work of the financial-aid assistants at Educational Testing Service.

Redundant Work Systems

To this point, the discussion has centered on what might be considered a single work system at the individual, or micro, level of analysis. In most organizations, work is accomplished by many interrelated and interdependent work systems. Thus, there might be opportunity for improving the productivity of work owing to the potential for redundancy; that is, there might be situations wherein the same work is being accomplished in more than one system.

Three basic types of computer systems support the products my company markets. The actuarial department uses one called "the actuarial system" to develop and price products. The marketing department uses another called the "sales illustration system" to demonstrate various investment returns, policy values, and the like. And the service department uses one called the "policy administration

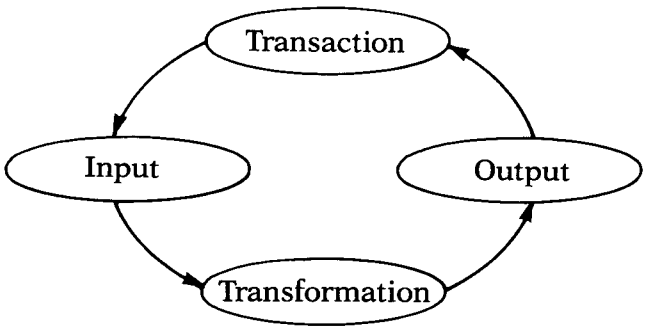
system" to support its new business and customer-service functions. All three computer systems rely on many of what are essentially the same calculation routines. Yet, until recently, those routines were developed independently of one another. Actuaries developed one set of calculation routines in FORTRAN for use in their mainframe actuarial system. The mainframe programming staff developed another set of calculation routines in COBOL for the policy administration system. And, yet a third set of calculation routines were developed in BASIC for use in the microcomputer illustration system.

Naturally, the same programming "nuts" were being "cracked" in three different places, generally in three different ways by three different sets of programmers. This costly duplication of effort is being eliminated as a result of efforts now underway to develop calculation routines usable by all three systems.

Transactions: System and Environment

Katz and Kahn (1966), defined a social system as "a cycle of events." Such systems are characterized not just by the input-process-output formulation, but also by transactions with their environment, by the exchange of outputs for new inputs in order to close and reinitiate the cycle of events that defines the system. The transactional aspect of open systems is shown in Figure 3.

Figure 3—Cycle of events model



Katz and Kahn's definition of a system is *event oriented*, in contrast to definitions that are *thing oriented* and that define a system as a "collection of components." Both perspectives are useful.

The production subsystem of the cabinet-making shop can be analyzed from a thing-oriented systems perspective. Its sales and decision-making subsystems, however, are event oriented. Most organizations have processes that are thing oriented and processes that are event oriented. By tracing physical flows in thing-oriented processes, we can learn a great deal about the outputs and how they are produced. Regarding event-oriented processes, however, we must trace the flows of information and the events they enable, trigger, and control.

Organizations, as open systems, must engage in transactions with other systems. The cabinet-making shop, for example, must have some means of exchanging its outputs for new inputs. Because bartering is rare, products are usually exchanged for money. Thus, a business organization must have marketing, sales, and distribution subsystems, no matter how simple or informal.

An organization must also have some means of exchanging its money for more materials, equipment, facilities, and labor with which to manufacture additional products; it must have purchasing, plant management, and personnel subsystems. Tracking the flow of money and the surpluses and shortages arising from that flow requires two other organizational subsystems—finance and accounting. It seems obvious, then, that the internal structure of an organization reflects its external environment. More to the point, understanding the internal structure of an organization necessitates studying its external environment. In my company, for example, looking for the sales force would be an exercise in futility because our products are sold through external distributors.

Studying the transactional aspects of organizations and individuals as open systems reveals that not all transactions are concerned with exchanging production outputs for money or with exchanging money for new production inputs. Some inputs serve only to maintain the system. It follows that there is work associated with the maintenance of the organization. One such maintenance input is the granting of legal status to the organization on an ongoing basis. Without it, the organization would have to cease operations. And, in my company, there is work associated with a function called "compliance." That work exists to ensure that the company's practices are consistent with various laws, rules, and regulations so that it may continue doing business.

For the purposes of analyzing work, however, the distinctions between production and maintenance inputs or between transformational and transactional processes are of no concern here. Work is work, whether you are dealing with a clerk, technician, manager, or

physician. The techniques of analyzing work are indifferent to class distinctions of a social nature.

Eliminating Non-Productive Time

Implicit in the view of a system as a "cycle of events" is the notion of time. Given that the fundamental task of managing work is one of concentrating and channeling energy along productive lines, one of the simplest and generally quickest ways of increasing the productivity of work is to identify and eliminate time not spent in that cycle of events known as work. An example from Citicorp's travelers-checks operation will illustrate.

In the course of documenting the work of travelers-checks claims examiners (the people who process claims for lost or stolen travelers checks), Citicorp decided to examine the time examiners spent at and away from the work station. Roughly 60 percent of their time was spent at the work station, and 40 percent was spent away from it. Of the 40 percent of the total time away from the work station, the examiners spent half that time standing in line at the copy machine. This had not always been the case. The copier was a large, new machine, capable of high-volume runs. It had been purchased because the cost per copy was lower than that of the previous arrangement of using many small machines scattered around the facility. However, when the cost of the "waiting time" of the examiners was factored in, it became clear that returning to the previous arrangement would be more cost effective. The small copy machines were put back in place and considerable attention was paid to their placement to reduce travel time and waiting time.

Another sizable portion of the examiners' time was spent traveling to and from the supervisor's desk and waiting there for approval of resolved claims. That travel time was eliminated by increasing the dollar limit of cases requiring supervisory review and approval.

Today and Tomorrow: Change, Adaptation, and Intervention

It is not enough for an organization to be able to exchange its outputs for new inputs today. It must also be able to do so tomorrow and into the future. Moreover, often what can be produced and exchanged today cannot be exchanged in the future, leading to changes in what is produced or how it is produced, or possibly leading to the demise of the organization. The requirement to "adapt or die" is as true for individuals as it is for corporations. Change and adaptation are the laws and lessons of survival, and they call for intervention.

The Context for Intervention: The Organization as a System

When intervening in work systems, we must consider the larger context—the organization itself—as a system. Kelly (1982), in his effort to link the analysis of work with the design of jobs and work performance, cited the sociotechnical view first set forth by Trist and Bamforth (1951) and subsequently elaborated upon by Emery (1959) and Rice (1958). The general gist of sociotechnical systems theory is that two primary dimensions of an organization must be integrated. One, the social dimension, has to do with the needs of people. The other, the technical dimension, has to do with the work itself. Similar constructs can be found in the writing of Blake and Mouton (1964), regarding managerial style, and Hersey and Blanchard (1977), regarding organizational behavior.

Curiously, the two dimensions of organizations receiving the least amount of attention in treating organizations as sociotechnical systems are two of the most important—politics and economics. This gap in subject matter might explain why so many interventions fail or fall short of expectations. Kelly has noted that Emery (1959) and Trist et al. (1963) argued against including a financial dimension, saying that was best treated as a measure of effectiveness. Few authors raise the issue of politics. Yet politics and economics are organizational realities, and both are extremely relevant to those who intervene in the work-related affairs of people and organizations.

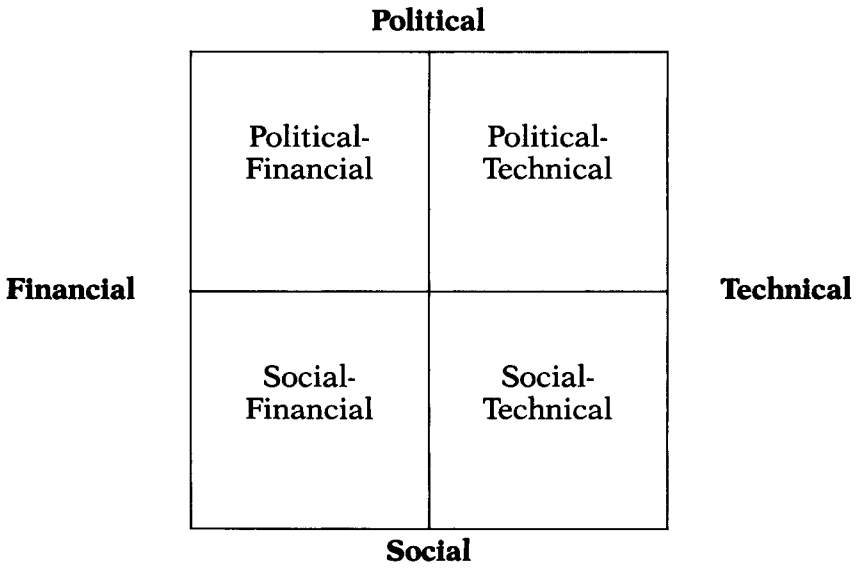
The Four Dimensions of Intervention

It is useful to adopt a view of *organizations as systems* that integrates not only their social and technical aspects but also their political and financial aspects. In Figure 4, the social and political aspects form one axis and the technical and financial aspects form the other. This yields a diagram showing four dimensions relevant to interventionists.

The *social-technical* dimension is the focal point for efforts relating to work analysis, job design, work organization, typical human relations efforts, and the day-to-day task of managing. By and large, this dimension of organizations focuses on the work itself, the primary subject of this chapter.

The *social-financial* dimension concerns what March and Simon (1958) termed the "contributions-inducements" relationship between an organization and its members and what Baldamus (1961) called the "wage-effort bargain." A key issue here is compensation, especially production incentives and performance bonuses. Another issue is benefits. Perhaps the paramount issue is attracting and retaining people. This dimension, then, includes issues related to personal and career development.

Figure 4—The four dimensions of intervention



On the opposite side of the diagram, the *political-technical* dimension relates to the requirement to divide and coordinate the work of the organization and to maintain a balance of power in so doing. The division and coordination of work and functions carry with them a corresponding distribution of technology, people, resources, "turf," and authority. These are all sources of power and influence, and the balance among them must be managed. The political reality here is that organizations must be governed as well as managed.

The fourth dimension, *political-financial,* is perhaps the most important. Three dominant issues here are the control of resources, the relationship between leadership and legal authority, and market pressures—in short, the issues of running the business. This dimension is of primary concern to chief executive officers and boards of directors. Chief among the tools for change in this dimension are leadership, authority, and its concomitant control of resources.

Whatever authority is exercised or delegated within organizations derives from the organization's status as a legal entity. That status is conferred by "the state," which derives its authority from the consent of the governed. In turn, the consent of the governed is predicated on a perception that those who govern are fit to do so. In a word, the ability to govern rests squarely on the ability to lead—on leadership. Organizations lacking in leadership don't change and adapt; they drift. And unless a firm hand takes the helm, they will founder on the rocks and shoals of happenstance.

Assuming adequate leadership, the primary tool for change is the authority to control resources. Nothing happens in an organization unless the effort is staffed and funded (officially or unofficially). However, the allocation of resources and restrictions on their use are not so much the prime determinants of what will get accomplished as they are of what won't get accomplished. The control of resources provides a form of veto power, and steering the organization in the right direction is often a matter of keeping it from going in the wrong direction.

All organizations, profit oriented or not, are economic entities. Inputs, in the form of money or as the result of an exchange for money, are essential to continued operation. All organizations, profit oriented or not, are subject to pressure from their "markets." Typically, markets are thought of as customers, as outlets for production outputs. There are also capital markets consisting of potential investors, labor markets consisting of potential employees, and commodity markets from which organizations obtain new production inputs. Pressures for change and adaptation can arise from any or all of those markets.

Given that organizations as systems have interrelated social, political, technical, and financial dimensions, or subsystems, intervening in organizational processes is a complex task—one that taxes the ablest manager, executive, or consultant. The complexity of this task led Bowers (1973) to say, "The most fundamental thing we know about change is that it is indirect; that is, you don't change it, you change something else, and it changes as a result." Senge (1987) echoes this view when he says, "Cause and effect in complex systems are often distant in time and space." The next few paragraphs partially illuminate this complexity.

Systems Players and Systems Thinkers

It has been said that organizations are playgrounds for adults. That is, people work on their "personal agendas" while at work. Some engage in power plays and are caught up in a never-ending struggle for dominance. Some revel in political maneuvering for the sheer sake of the game. Some strive for professional or personal recognition or both. Some seek meaning from their work. Some try to run a business. Some merely try to make ends meet; they do their work, take their pay, and go home. Some are pawns, some are players, and some are observers. All, in one way or another, are "systems players"; that is, they use and are used by the organizations in which they spend the majority of their waking lives. Although most people are "systems players," few are "systems thinkers." Not many people have the breadth of experience, the inclination, the insight, or the know-how to address, balance, and integrate the social, political,

technical, and financial dimensions of organizations. Yet, with few exceptions, successful intervention—especially on a company-wide basis—demands addressing all four dimensions.

The restructuring of work, for example, can disturb delicate balances of power and can trigger opposition that has nothing to do with potential gains in productivity. Improving the productivity of work lowers labor costs, thus increasing profitability and perhaps the demand for higher wages. Business decisions to enter new markets can create the requirement for new technology, and importing new technology can disrupt both the formal and the informal organization. By the same token, social change can "piggy-back" on technological change, or technological change can be used deliberately as a way of forcing social change.

Therefore, when making work productive, it is not enough to study the work (*social-technical* dimension) in a purely rational, analytical way to determine better methods or tools. We must also consider the financial incentives provided to the workers (*social-financial* dimension). We must consider issues related to the balance of power inherent in the division and coordination of work (*political-technical* dimension). We must consider the validity of the work itself in light of market pressures for change. Finally, we must consider the backing an intervention will receive in terms of leadership, authority, and the control of resources (*political-financial* dimension). We must play the system *and* its games.

Above all else, the HRD practitioner who is interested in making work productive must consider that the quality of management and the productivity of work might or might not be of pressing concern in a given firm. On this score, no better statement has been made than one by Frederick W. Taylor in *Shop Management* (1911b):

> The second fact that has struck the writer as most noteworthy is that there is no apparent relation in many, if not most, cases between good shop management and the success or failure of the company, many unsuccessful companies having good shop management, while the reverse is true of many which pay large dividends. We, however, who are primarily interested in the shop, are apt to forget that success, instead of hinging upon shop management, depends in many cases mainly upon other elements, namely—the location of the company, its financial strength and ability, the efficiency of its business and sales departments, its engineering ability, the superiority of its plant and equipment, or the protection afforded by patents, combination, location or other partial monopoly.
>
> And even in those cases in which the efficiency of shop management might play an important part, it must be remembered that for success no company need be better organized than its competitors (p. 19).

The context for HRD practitioners, then, regardless of their specialty, is an exceedingly complex one. Moreover, it is not one that is well mapped or well understood. But systems theory, as a framework on which to hang the results of experimentation and trial-and-error learning, seems to offer the most promise of someday enabling systematic, reliable approaches to understanding, changing, and developing organizations. In the meantime, practitioners must make do with the insights gleaned from practice.

Insight: Buying and Selling Transactions

The transactional aspects of open systems offer insights into long-standing practices. Using sales an example, consider Figure 5, where two systems are engaged in the age-old transaction of buying and selling.

If the practitioner accepts the premise that referents control outputs and processes, it follows that one task of the system engaged in selling is to "position" its products favorably in relation to the buying system's input requirements and in relation to the criteria or referents that govern the buying system's decision to buy. It also follows that a second task might be one of influencing the buying criteria themselves—that is, suggesting to the customer the basis on which to decide.

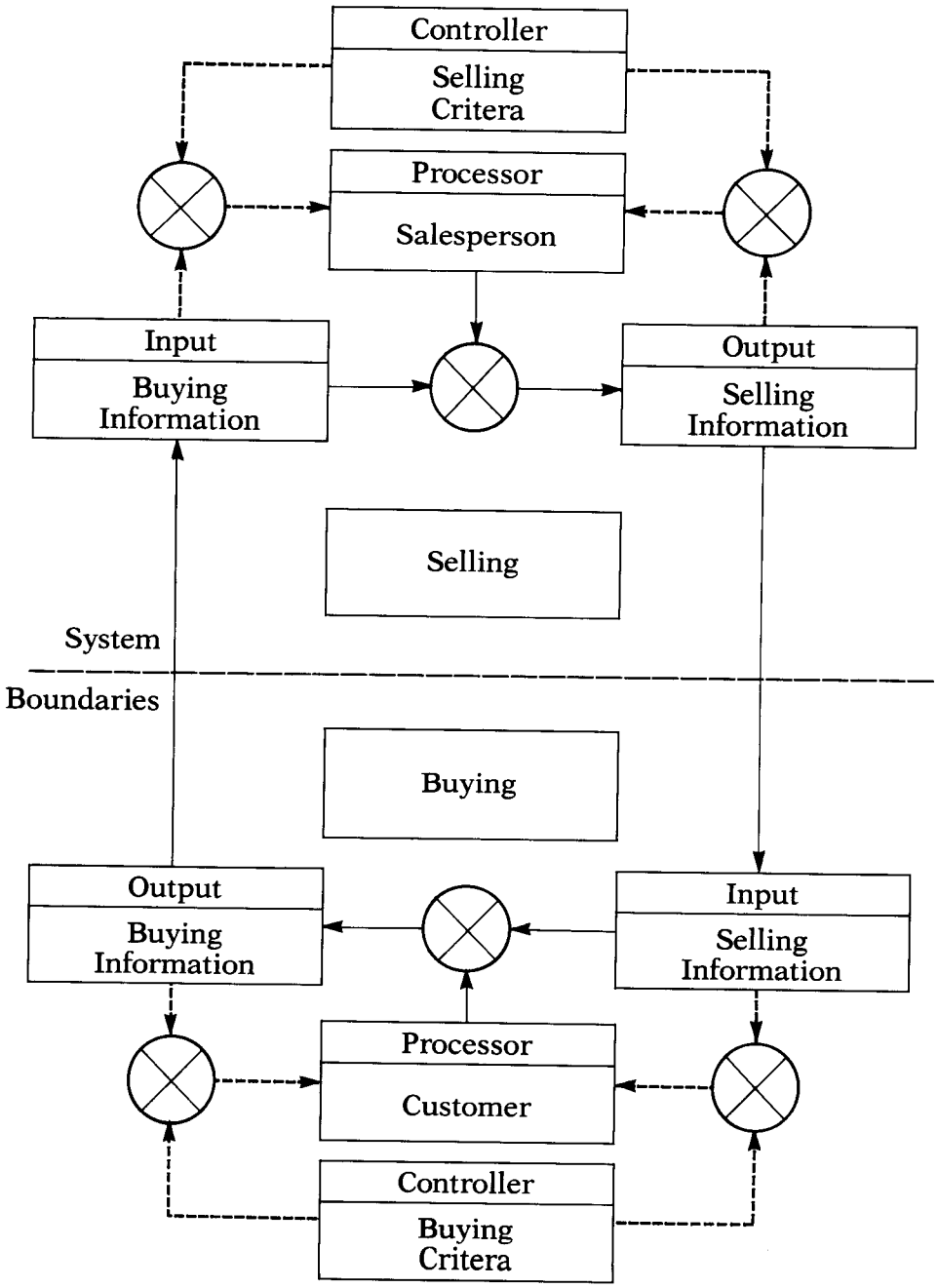
A well-known case in which the referents (and processors) that govern the buying decision were not dealt with adequately involves the Singer company, which is best known for its sewing machines. A number of years ago, Singer found itself with a large distribution network of small stores all around the country. A decision was made to use this network to sell a much broader range of products—namely, stereo equipment.

The strategy seemed sound. What Singer somehow failed to realize, however, was that although most of the customers frequenting its stores were women, at that time men were making most of the decisions to buy stereo equipment. A simple look at the anticipated transaction on which Singer predicated and implemented its costly strategy might have forestalled the effort. Or, it might have resulted in a massive advertising campaign aimed at attracting the real buyers to the stores. In either case, Singer should have identified its buyers.

Insight: Consequences and the Formation of Referents

One of the most significant insights to be gleaned from examining the transactional aspects of individuals as open systems concerns the relationship between the consequences of behavior and the formation of the individual's referents.

Figure 4—Buying and selling



In systems terms, the consequences of behavior are the perceived results of a transaction with the environment. Some of those consequences are contrived in an effort to "shape" behavior, for example, praise and rewards or criticism and punishment. Other consequences are inherent in the work itself, for example, when a programmer writes a program and it runs or it doesn't run. (The pleasure derived from its running can far outweigh the pleasure derived from any compliments for a job well done.)

The referents an organization attempts to impose can and do conflict with those held by the individual. Consider a common situation facing many salespeople. The sales manager is pressing the salespeople to sell Product A. However, the commission is higher on Product B, and the customer wants Product C. Consider next the range of referents that might be operating in this situation—to satisfy the boss, to maximize personal income, and to meet the customer's needs. An interesting problem, isn't it? Even more interesting is the fact that it falls to the salesperson to reconcile the conflict among referents. In this case the worker truly controls the work.

Insight: Referents, Attitudes, and Motivation

Unfortunately, all too often the referents that should govern work are not communicated to the worker. Even when the referents are communicated, not much is done to foster their adoption. As a result, many people learn "the right way" to do things only as a result of continuous criticism. Criticism is not feedback; rather, it is information about expected performance—after the fact. What is worse, owing to the punitive circumstances under which many people learn what is expected of them, such information forms other, less desirable and doubtless unintended referents.

For example, the following sentiments express a subset of referents to which we normally apply the label "attitudes": "This is a rotten place to work," "They don't know what they want," "I have no idea what's expected of me," "People are treated like dogs around here." Worst of all, "Who cares?" These referents manifest themselves in ways we generally attribute to motivation. They stem from management practices developed in a former time when work was mostly manual and control over the work was exercised by controlling the behavior of the worker. The focus of control was the worker and the aim was compliance. Such practices persist today. The old ways die hard, despite their painfully obvious inadequacy.

Insight: Future Directions

Now, owing to the shift to knowledge work, the focus of control must shift back to the work itself, and its aim must be contribution not compliance. Although the locus of control of work has shifted

from management to the worker, it can be and must be shifted back. As in Taylor's day, the task facing management is once again one of studying the work itself in order to control it and make it productive. As Drucker (1968) put it, "To make knowledge work productive will be the great management task of this century, just as to make manual work productive was the great management task of the last century." And, just as Taylor (1911a) set them forth, the four basic principles of scientific management still apply:

- a scientific study of the work itself
- the scientific selection, training, and development of the worker
- harmonious cooperation between management and the worker
- equal sharing of responsibility for the work between management and the worker

The major difference between Taylor's approach and the one we must take now is not one of general principles. It is one of method and technique. Because working has become an "invisible" activity, observation and time-and-motion studies do not serve us well. The focus of control can never again shift from the work to working and thence to the worker. In short, the target is no longer overt human behavior.

We must take aim at that marvelously complex construct of models, methods, logic, and language we call the mind. Training, development, and management must focus on identifying, communicating, and fostering the adoption of referents that make work more productive. (Incidentally, the issue of who else might be taking aim at this target and for what purposes is worth pondering.) Work, especially knowledge work, must be made productive. Fortunately, it is possible, as a result of studying the work itself, to make work more productive.

Systems theory offers a useful framework for making work productive. It does not, however, provide a detailed set of methods and techniques for making work productive; rather, it provides a systematic and structured way of thinking. In this sense, it is a compass, not a map. It is work that must be made productive, not working or the worker. Failure to keep this goal in mind will spawn productivity improvement efforts that are aimed at working and the worker. As has always been the case, these efforts will be met with resistance and contempt. And rightly so, for such efforts are themselves most unproductive. As two of the above examples showed, perhaps the worst outcome of all is that focusing on the worker or on working might succeed in reinforcing work that should not be done at all.

A Shortcoming in Systems Thinking

Make no mistake about it, the great value of systems theory and systems thinking lies in its utility at all levels of abstraction. To learn

to think of individuals, groups, organizations, and even nations in systems terms leads ultimately to truly global thinking. To use a trite phrase, systems theory and systems thinking enable us "to see the big picture"—to see events in context.

But perhaps more important than the application of systems theory and systems thinking is the recognition of those situations to which they do not apply. Consider, for example, the global economic system, especially that portion of it labeled "business and commerce." And, consider that we do not yet have interstellar trade. What emerges is the recognition that the global economic system is a closed system, not an open system.

The literature of systems theory is rich with concepts and constructs useful for studying and understanding open systems, but, by and large, it consigns the subject of closed systems to the irrelevant. As a result, the economic systems engineers who will be assigned the task of building our global economic system don't have much of a theory base on which to draw. For the foreseeable future, economics at the global level will find the subject of closed systems most relevant. And, unless or until we beef up our theory base regarding closed systems as well as open ones, we are likely to find ourselves with a severe shortcoming in the usefulness of systems theory and systems thinking.

If systems theory is to be advanced, progress must along occur closed- systems lines as well as those of open systems. The "suprasystem," in which all companies, industries, and nations find themselves is, a closed system, economically at least, and we have precious little theory to aid us in coming to grips with the problems that beset it.

References

Baldamus, W. (1961). *Efficiency and effort.* London: Tavistock.

Blake, R., & Mouton, J. (1964). *The managerial grid.* Houston: Gulf Publishing Co.

Bowers, D. (1973). *A taxonomy of intervention: The science of organizational development.* Technical Report AD 762 085. Office of Naval Research, Organizational Effectiveness Programs. Institute for Social Research, University of Michigan.

Drucker, P. (1968). *The age of discontinuity.* New York: Harper & Row.

Drucker, P. (1973). *Management: Tasks, responsibilities, practices.* New York: Harper & Row.

Emery, F. (1959). *Characteristics of socio-technical systems.* Doc. 527, London: Tavistock.

Gilbert, T. (1974). *Levels and structures of performance analysis.* Morristown, NJ: Praxis Corp.

Goldstein, I. (1980). Training in work organizations. *Annual Review of Psychology, 31,* 229–272.
Hersey, P., & Blanchard, K. (1977). *Management of organizational behavior.* Englewood Cliffs, NJ: Prentice-Hall.
Katz, D., & Kahn, R. (1966). *The social psychology of organizations.* New York: Wiley & Sons.
Kaufman, R. (1970). System approaches to education: Discussion and attempted integration. *Social and technological change: Implications for education.* Eugene, OR: ERIC/CEA, University of Oregon.
Kelly, J. (1982). *Scientific management, job redesign, and work performance.* London: Academic Press.
Kepner, B., & Tregoe, C. (1965). *The rational manager.* New York: McGraw-Hill. March, J., & Simon, H. (1958). *Organizations.* New York: Wiley & Sons.
March, J., & Simon H. (1958). *Organizations.* New York: Wiley & Sons.
Powers, W. (1973). *Behavior: The control of perception.* Chicago: Aldine Publishing Co.
Rice, A. (1958). *Productivity and social organisation.* London: Tavistock.
Senge, P. (1987). Catalyzing systems thinking within organizations. In F. Masarik (Ed.), *Advances in organization development.* Norwood, NJ: Ablex.
Skinner, B. (1974). *About behaviorism.* New York: Alfred Knopf.
Trist, E., & Bamforth, K. (1951). Some social and psychological consequences of the longwall method of coal getting. *Human Relations, 4,* 3–39.
Trist, E., Bamforth, K., Higgin, G., Murray, H., & Pollock, A. (1963). *Organisational choice.* London: Tavistock.
Taylor, F. (1911a). *The principles of scientific management.* New York: Harper & Brothers.
Taylor, F. (1911b). *Shop management.* New York: Harper & Brothers.

Systems Thinking and the HRD Role in Creating Entrepreneurial Business Cultures

Carolyn D. Holt
Senior Organization Development Consultant
The Chemicals and Plastics Group
Union Carbide Corporation

Developing new businesses is a difficult challenge for American industry. Recent research indicates that as few as 12 percent of all net new jobs between 1981 and 1985 were created by companies with more than 20 employees (Birch, 1987). Various routes to internal growth have been tried, and today, senior management teams in major American companies seem to be emphasizing the creation of more entrepreneurial business cultures. However, internal venturing (popularly called "intrapreneuring" since the word was coined in 1978 by Gifford Pinchot, author of *Intrapreneuring* and chair of the consulting firm Pinchot & Company) is difficult to catalyze and sustain. Systems thinking provides valuable insights as to why this is so.

The role of practitioners in both human resource development (HRD) and organization development (OD) is to bring information about systems thinking to senior management teams and to help them develop a systems perspective on what it takes to bring about successful organizational change. By working together, the management team and the training practitioner can develop and implement organizational interventions with a higher likelihood of success. Many of those successful interventions will include executive, management, or professional development components.

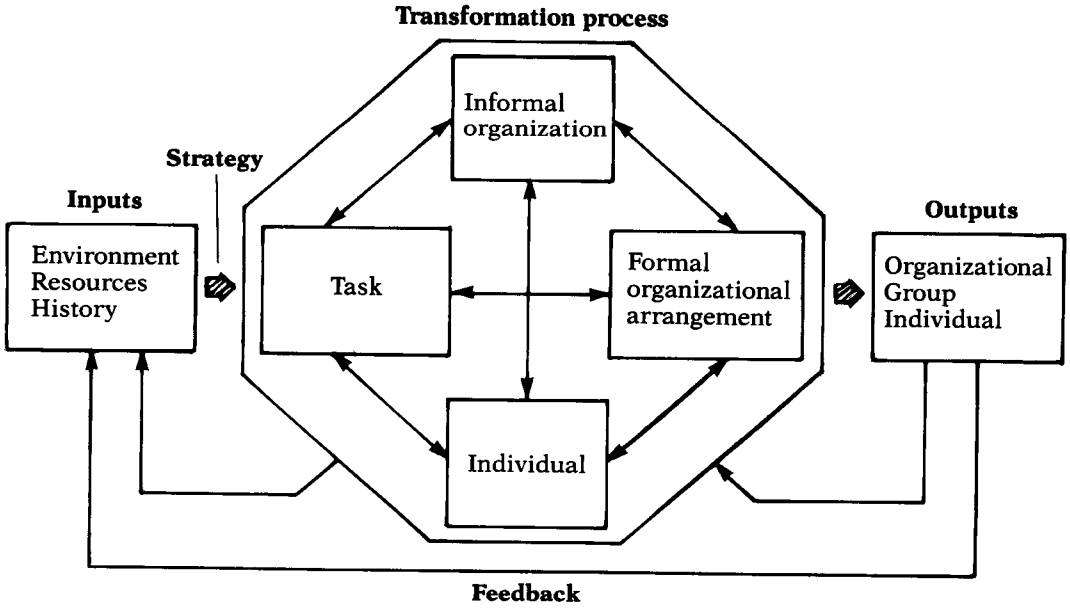
Making Intrapreneuring Happen: Clues from Systems Thinking

Organizations as systems

Today, most organization theorists view organizations as dynamic, open social systems, and most HRD and OD practitioners work from a systems-based model of how organizations function. They understand that all parts of the organization are interrelated and that the organization does not exist in a vacuum but interacts with its environment. Even though there may be as many systems-based models

as there are theorists and practitioners, many of the HRD and OD practitioners at the cutting edge of their professions use variations on the Nadler-Tushman Congruence Model of Organization Behavior (see Figure 1) largely because it is both comprehensive and elegantly simple. Other practitioners use models that take in only one part or one aspect of the organization, for example, formal organizational arrangements. Ronald Jacobs's human performance model (discussed elsewhere in this monograph) seems to fall among that group of organizational submodels that make up in detail what they lack in comprehensiveness. As its name indicates, the essential feature of the Nadler-Tushman model is congruence. The model is based on the diagnostically useful assumption that the effective organization will exhibit the greatest possible congruence, or "fit," between its various parts and with the larger environment (Nadler & Tushman, 1980). The model is usable at various stages in the development of an organization and during times of organization change. Jacobs's theory, in contrast, "requires explicit and operational performance goals," which admittedly are "difficult to achieve in many organizations, where uncertainty and change are more the norm than the exception."

Figure 1—The Nadler-Tushman congruence model for diagnosing organizational effectiveness



From Nadler & Tushman (1977)

Because the Nadler-Tushman model considers the big picture of the organization in its environment, I find it useful for thinking about issues of performance management and human resource development. Thinking in terms of the Jacobs model puts HRD practitioners at risk of not remembering that organizations are open systems and that organizational survival depends more on making an adaptive response to the environment than on internally focused tinkering with performance management systems. HRD is done within the context of a business that exists within the context of an industry that, in turn, exists within an even larger context. If a business is to survive in today's environment, it is likely to have a decentralized structure, an entrepreneurial flavor that implies growth and change, and a lot more chaos than bureaucracy. Its managers are likely to want the services of HRD practitioners who can not only help with solving the problems of the current organization, but also with creating the businesses that will ensure the organization's future.

Principles of systems thinking

Some of the most interesting work in articulating systems principles in terms and methods that are usable by managers and consultants is being done by Peter Senge of MIT through Innovation Associates, the consulting firm he co-founded with Charlie Kiefer. Senge (1987) argues that organizations exhibit certain fundamental characteristics that hold true for all complex systems. Those characteristics are policy resistance, compensating feedback, and short-term/long-term tradeoffs.

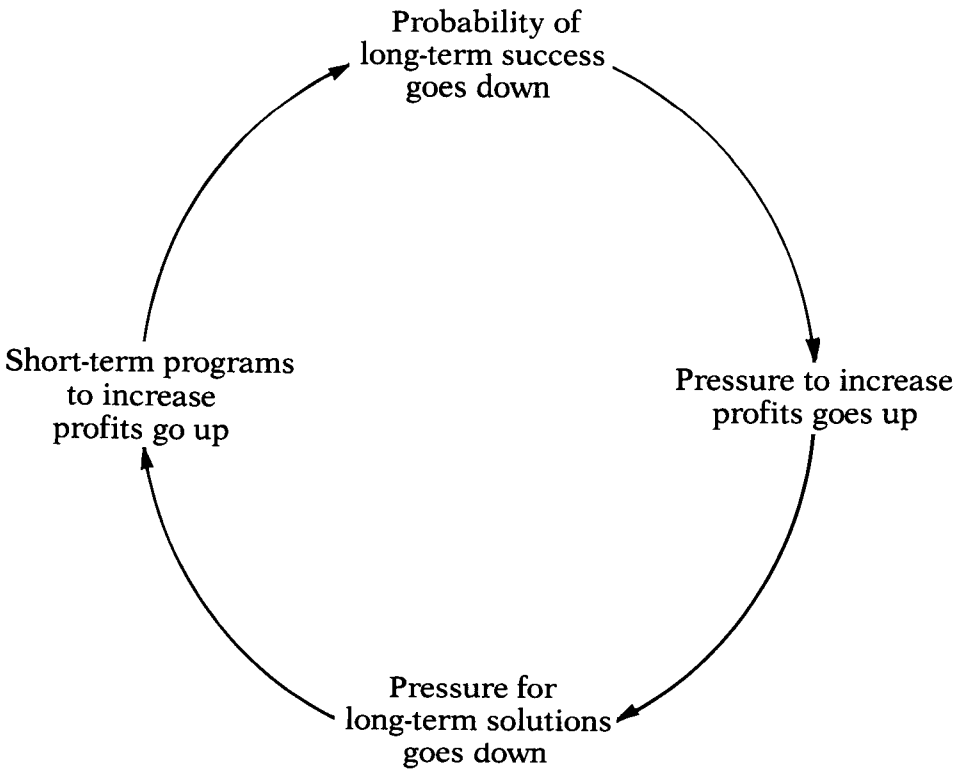
Policy resistance. Policy resistance, perhaps the most important characteristic of organization change, is "the tendency of complex systems to resist attempts to change their behavior" (Senge, 1986). Michael Goodman (1988), also of Innovation Associates, describes policy resistance as "the tendency of complex systems to delay, dilute, or defeat the effects of well-intended policy interventions. Policy resistance is also called the counterintuitive nature of social systems, or the law of unintended consequences" (p. 3).

Compensating feedback. "The most common cause of policy resistance is multiple 'compensating feedback' relationships that attempt to maintain internal balances despite external interventions" (Senge, 1986, p. 133). Compensating feedback is the drive toward equilibrium that all students of systems recognize: "Organizations develop energy to move towards states of balance. When an event occurs that puts the system out of balance, it reacts and moves towards a balanced state" (Nadler & Tushman, 1980, p. 3). The drive toward equilibrium happens no matter how well-intended the intervention; indeed, it will happen even when the intervention is a critical step toward the

organization's survival. Goodman (1988) states the idea graphically: "A policy that simply pushes on the system will cause the system to push back just as hard until you or the system quit or become exhausted" (p. 3).

Short-term/long-term tradeoffs. Goodman continues: "The short-term and long-term effects of policies are usually different. The tradeoff arises because things take time: there are delays in many feedback loops. Thus a policy that is beneficial in the short run is often harmful in the long run and vice versa" (p. 4). The cycle, at first positive and then negative, plays out over time, creating what systems theorists call the better-before-worse phenomenon (see Figure 2).

Figure 2—A systems loop



The principles of policy resistance, compensating feedback, and short-term/long-term tradeoffs have obvious and sobering implications for change management. HRD and OD practitioners who consult with senior management on culture change issues ignore those principles at their peril.

Leverage points

In spite of the principles of systems dynamics, there are a "relatively small number of policy changes that can radiate desirable influences throughout a system," Senge says in "Systems Principles for Leadership" (1986). He calls them "leverage points," and he indicates a major task of organizational leaders and HRD practitioners: shifting "management attention away from the large number of low-leverage policies to the relatively few high-leverage points. . . [through] an ongoing management education process" (p. 135). Different theorists and practitioners emphasize different levers. I prefer to begin with visioning work—a lever that initially serves to focus management attention and later to imbue the entire organization with the desire to move current reality closer to the vision of a desired future.

Innovation for Growth: A Case History of a Successful Culture Change

Following is the case history of a successful culture change in one division of a major American corporation. The case dramatizes the value of systems thinking in general and the value of using a systems-based model of organizations in particular. The HRD practitioner's interventions throughout this culture change were firmly grounded in both.

The organization

In 1985, the Union Carbide Corporation experienced several major shocks. First, a massive industrial gas leak at a Union Carbide plant in Bhopal, India, caused the deaths or injuries of thousands of people. The tragedy caused the corporation's stock to plummet and set the stage for a takeover attempt by New Jersey-based GAF Corporation. In successfully fending off GAF, the corporation incurred tremendous debt, emerging from the crisis carrying a debt load equal to 70 percent of capitalization. The corporation also emerged as an entity in search of a purpose. Under the leadership of President and CEO Bob Kennedy, work on the corporation's mission and its core values became the critical first step in restoring a sense of purpose.

The GAF takeover defense led to a major organizational restructuring. Two important and profitable divisions were sold, and subsequent

streamlining and downsizing removed whole levels of authority from the corporate hierarchy. Strategic planning and resource allocation were also simplified. Carbide's three main business groups—Chemicals and Plastics, Linde, and Carbon—were to be being treated more and more as though they were separate subsidiaries. Each business group would be in a position of virtual financial autonomy in terms of creating its own future. With that freedom, however, came the responsibility of making the tough investment decisions necessary for survival, renewal, and growth.

The challenge

After emerging from the GAF takeover attempt as a smaller, more highly leveraged company, the corporation pared down its debt load more quickly than had been anticipated and found itself in the difficult position of wanting to grow, but projecting insufficient growth from the businesses currently in its portfolio. Top management decided that both the size and quality of the Chemical & Plastics portfolio of businesses had to change. The goal was to add higher-value businesses and to evolve the mix of businesses in the portfolio away from a heavy dependence on commodities to about 50 percent specialties.

The Chemicals and Plastics Group (C&P), with $5 billion in sales, has four operating divisions, a trading arm, and a staff services unit. Three of C&P's operating divisions are largely commodities businesses. The fourth, Specialty Chemicals, with $1 billion in sales, has a significant role in changing and increasing the C&P portfolio of businesses because of its base in specialty businesses.

Specifically, the current plan is to create 30 new businesses, each with about $50 million in sales, by the year 2000. The Specialty Chemicals Division (SCD) is expected to deliver many of those new businesses. The SCD will use multiple delivery approaches: acquisitions, licensing, joint ventures, traditional approaches to internal development, and intrapreneurial initiatives. Intrapreneuring initiatives are now emerging from a divisional culture change that has been some 30 months in the making.

Culture-change timeline

July-September 1986. The change process began with meetings of the SCD senior management team in the summer of 1986. The off-site, teambuilding meetings, which I designed and facilitated, focused on developing the team members' vision of the division's future and on the values critical to achieving that vision.

[I never fail to be awed by the impact and the staying power of visioning work, which generally begins with one simple question: "What do you want your organization to be like 10 years out?"]

The management team did not leave the initial meetings with a pretty or complete vision or values statement. The members did, however, leave with a consensus on the critical need for what was later called Innovation for Growth. Ultimately, Innovation for Growth became the division's core value. It was first presented to the organization as four things the division must do:

- champion new products and services
- assume risks in the marketplace
- employ new ways to do the job
- leverage growth with external technology and business opportunities

Those words were not written for public relations purposes or even with much thought to sparking the imaginations of employees. They came straight from senior management's vision of the strategies that would be required to make change happen. The focus on a core value was at once an important systems-based leverage point for change and an act of leadership. In Senge's (1986) words, "The principle of leverage points illuminates one of the most elusive qualities of great leadership: namely, the capability of great leaders to focus attention on a small number of critical success factors. . . . While most managers are drawn into a reinforcing struggle to battle crises, effective leaders must understand the critical dynamics for long-term success and distill this understanding into operational guidelines" (p. 151).

As the division lived out its core value during those 30 months, a number of behavioral themes clustered about it. Although there had always been a strong emphasis in the organization on *individual responsibility*, during this time, that value was being reflected in a gradual move (a move not without concern and hesitation) toward acceptance of the venture capitalist's view: "I'd rather have a Class A entrepreneur with a Class B idea than a Class A idea with a Class B entrepreneur."

The division was betting on its people to make growth happen. From the decisive management style of its president, Joseph C. Soviero, flowed the continuing theme of *bias for action*. The organization runs at a fast pace, with a fair bit of hustle. Another obvious theme was *senior management involvement*, as the entire division management team became intimately involved in bringing the core value to life. *External orientation* was another pronounced theme. For better or for worse, the division exhibited a distaste for internal focus. Finally, the management team emphasized creating an *enabling environment* within the division. Through decision after decision—in the areas of resource allocation, organization structure, training, reward, and recognition—the team demonstrated that it intended to do everything possible to create the conditions necessary for innovation and new business development.

August 1986. Structure was the second leverage point for change. Developing the infrastructure to support Innovation for Growth began with the creation of two key positions: the director of new business development and the director of acquisitions. The action eliminated a familiar problem—when *everyone* is responsible for something, *no one* is responsible for it—by making someone responsible.

Next, the New Business Development Council (NBDC) was established. The NBDC comprises the vice-presidents/general managers of the division's businesses, the vice-president of research and development, and the director of new business development. During this stage my work as the HRD practitioner included assisting with the writing of a job description for the new director and a charter for the NBDC, as well as facilitating the NBDC's first meetings.

The mission of the NBDC is to hear proposals for funding new ventures and to decide on appropriate resource allocations. The council has played a significant advisory role throughout the development of the division's intrapreneuring program, which has become a major vehicle for actualizing the core value, Innovation for Growth. Intrapreneurship is widely viewed within the organization as the heart of the change process.

The division president and others from the division management team joined the council at certain strategic decision points, for example, while developing the criteria for funding new ventures and while hearing the first venture proposals to come out of the intrapreneuring program. Overall, there was very little feel of bureaucracy. The new business development thrust did not seem staff heavy, and formalized structure was kept to a minimum.

November 1986. Because the division was attempting to grow on a scale that its existing businesses could not support by extending their conventional products and markets, proceeding with a conventional strategic planning process seemed inappropriate. The planning goal was to generate a multitude of fertile *opportunity areas* to "plow" for new business concepts. The only requirement was to stay within the world of specialty chemicals. The bottom-up approach to strategy development, as it turned out, complemented and reinforced the volunteerism that has since become a key feature of the intrapreneuring program.

Initially, the opportunity areas were generated internally by divisional staff. Mark A. Spivack, the director of new business development, and I took three small groups of seven people off site for intensive business concept development laboratories. Using Synectics-style approaches (the creative problem-solving techniques promoted by that consulting firm), we seeded the process of Innovation for Growth by developing general areas of opportunity in which we felt SCD could spawn new businesses. As the "client" for this work,

Spivack gave direction to the groups, and I facilitated the creative process. Each of the three groups generated seven or more opportunity areas.

January 1987. Disconcertingly, the NBDC looked at the opportunity areas the groups had developed and saw little that was new. As Ron Pellman, president of Pinchot & Company, later advised us, this is a common phenomenon. Apparently, it is very difficult for management to look at an undeveloped idea, especially one without a champion, and assess its potential with any degree of confidence. At this point, the NBDC decided to implement an earlier plan. The council commissioned several external consulting groups to look at our existing businesses and what was happening in the external world and then to recommend opportunity areas in which the division might profitably search for new business concepts. Innotech, one of the external consulting groups, used expert think-tanks, which function a lot like consumer focus groups. The other consultants used other methods.

Of interest is the considerable overlap between the opportunity areas recommended by the external consultants and those generated by the division's staff. In fact, some of the ventures funded in 1988 had their conceptual roots in the business concept development laboratories. As it turned out, idea creation was not the problem. We had enough good ideas. The real benefit of the process was in pulling people closer to consensus on the division's business strategies. One important learning was that we had not known how good our people are. The innovation process is perhaps not so much a matter of generating creativity as it is a method for unleashing and harvesting it.

About this time, we realized that the management team needed criteria to use when communicating to the organization the kinds of new business ideas with which it hoped people would step forward. The same criteria would be used later in deciding which venture proposals to fund or not to fund. The work was done by NBDC and facilitated by Innotech. The result was a list of 19 criteria, for example:

- technology oriented, close to the knitting
- not at retail level
- competitive advantage
- emphasis on services and systems
- return exceeds cost of capital
- free-standing within a few years
- containable liability

Developing criteria is a lot like writing job descriptions—once you draft them, you seldom refer to them again. The process of writing them is valuable in that it surfaces differences in expectations and helps develop a common understanding of what is important.

March 1987. While the external consultants were helping the NBDC develop criteria and identify opportunity areas, the management team was deeply involved in communicating values to the organization, particularly the core value of Innovation for Growth. The whole team went to all 13 major domestic sites and spent a half-day in workshops with each large group of managerial and professional staff. Through this means, management communicated the divisional values, their importance, and their reason for being and listened to the questions and concerns of small breakout groups. Leading the workshops took an immense amount of patience on the part of the management team. Each new group was heard afresh, even though after the first few workshops, many themes could be anticipated. Further, each group was heard without defensiveness, even though people did not mince words as they seized a rare opportunity to vent their concerns and frustrations. The participative workshops played an important diagnostic role in the Innovation for Growth process. Through them, management identified the major enabling forces and the major blocking forces for the core value.

The workshops were a radical and important intervention in support of Innovation for Growth. They sent a strong message that employee ideas were wanted and valued and that senior management was committed to the core value. They provided unmistakable evidence of management attention, which is, of course, the single most important factor in culture change.

May 1987. I consulted with Gifford Pinchot and Ron Pellman and then recommended to the president of the division that he commission an *innovation audit.* An off-site management team meeting was called to review the results of the audit and the themes that had emerged during the 13 Innovation for Growth workshops. The purpose of the meeting was to achieve consensus on a plan for taking the next steps in the Innovation for Growth process. Managers came to the meeting with a few reservations, because C&P's past experience with climate surveys had not been positive. Such instruments usually had conveyed negative feedback and had failed to provide direction on how to improve the situation.

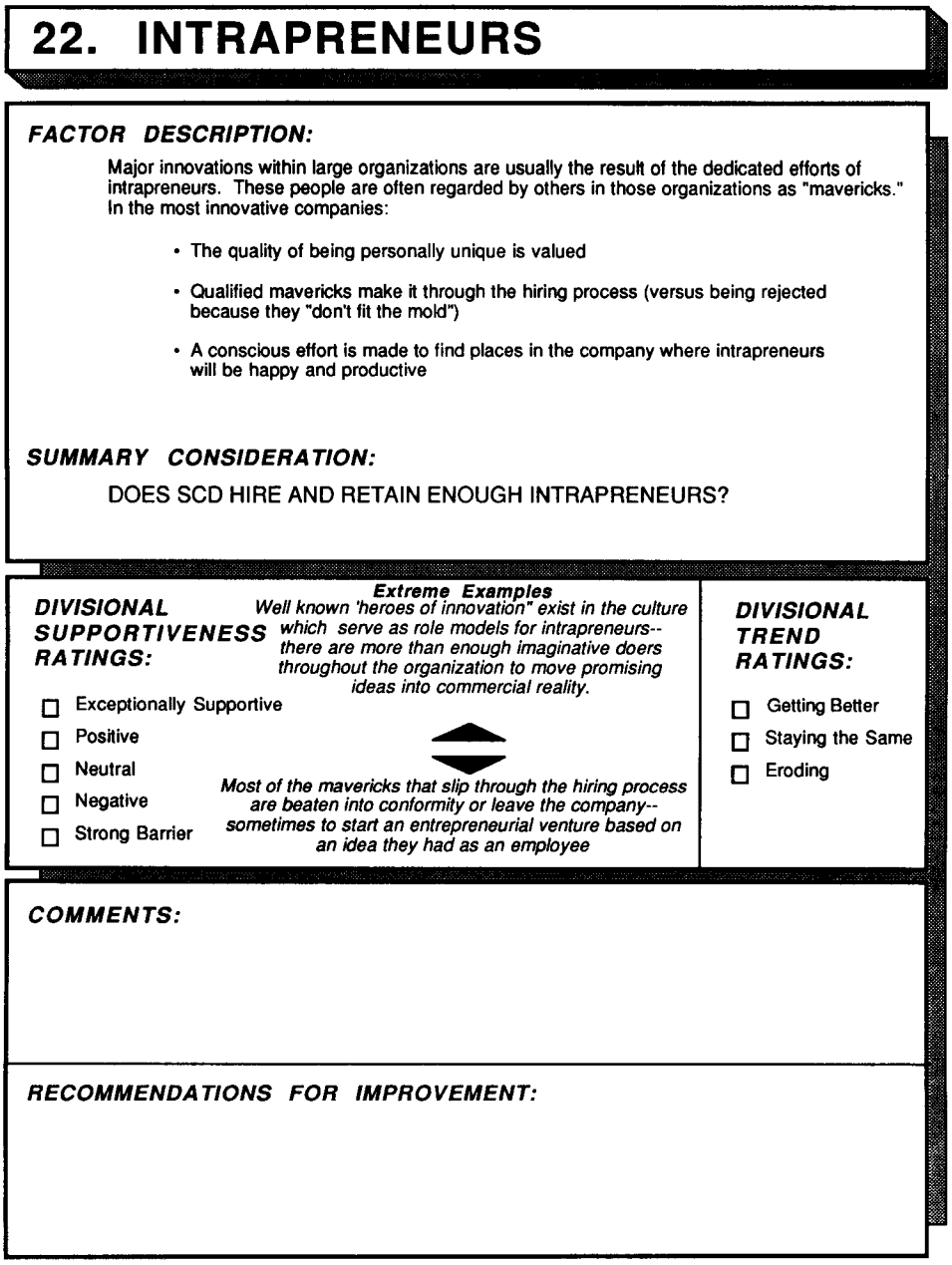
Fortunately, Pinchot's instrument was different. It was conceptually based on a theory of how innovation and new business development actually work inside large organizations, and it was educational as well as diagnostic. The instrument was mailed to a small sample of 100 managers and professionals who, by virtue of their positions, were thought to hold an informed perspective on innovation and new business development in the division. More than 80 percent of the surveys were returned. One associate director of research and development later commented: "I learned a lot about how new-business development works just from filling out the questionnaire."

July 1987. The feedback the instrument provided was action oriented, with potential next steps clearly implied. Figure 3 lists the 24 factors that the instrument covered; Figures 4 and 5 show the format in which the management team received the survey data via a survey item about intrapreneurs. The meeting to review the data began in a developmental mode. Pellman lectured and led discussions on the nature of intrapreneuring, sponsorship, and other factors relating to innovation and new business development.

Figure 3—24 innovation audit factors
Union Carbide Corporation
Specialty Chemicals Division
24 Innovation Audit Factors

Willingness to experiment
Sponsors
Vision and goals
Spirit of volunteerism
Heart values
Approvals
External vs. internal focus
Questioning the status quo
Funding
Discretioning
Acceptance of small beginnings
Creative idea exploration
Access to resources
Rewards
Planning systems
Cross-functional teams
Ongoing reporting and controls
Continuity/hand-offs
Boundary crossing
Multiple options
Replication of improvements
Intrapreneurs
Patience
Long- vs. short-term focus

Figure 4—Item 22 of the survey



22. INTRAPRENEURS

FACTOR DESCRIPTION:

Major innovations within large organizations are usually the result of the dedicated efforts of intrapreneurs. These people are often regarded by others in those organizations as "mavericks." In the most innovative companies:

- The quality of being personally unique is valued
- Qualified mavericks make it through the hiring process (versus being rejected because they "don't fit the mold")
- A conscious effort is made to find places in the company where intrapreneurs will be happy and productive

SUMMARY CONSIDERATION:

DOES SCD HIRE AND RETAIN ENOUGH INTRAPRENEURS?

DIVISIONAL SUPPORTIVENESS RATINGS:

- ☐ Exceptionally Supportive
- ☐ Positive
- ☐ Neutral
- ☐ Negative
- ☐ Strong Barrier

Extreme Examples

Well known 'heroes of innovation" exist in the culture which serve as role models for intrapreneurs-- there are more than enough imaginative doers throughout the organization to move promising ideas into commercial reality.

Most of the mavericks that slip through the hiring process are beaten into conformity or leave the company-- sometimes to start an entrepreneurial venture based on an idea they had as an employee

DIVISIONAL TREND RATINGS:

- ☐ Getting Better
- ☐ Staying the Same
- ☐ Eroding

COMMENTS:

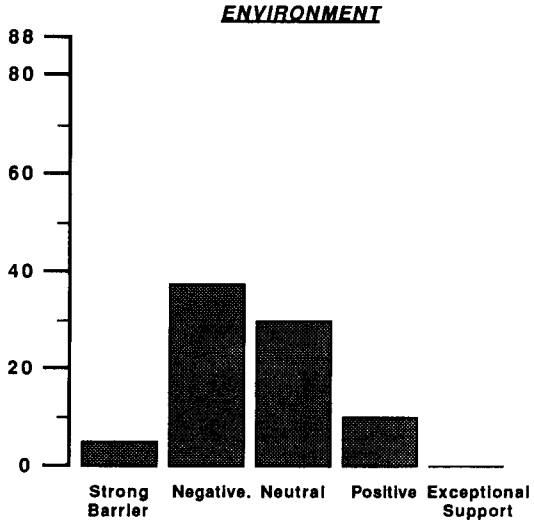
RECOMMENDATIONS FOR IMPROVEMENT:

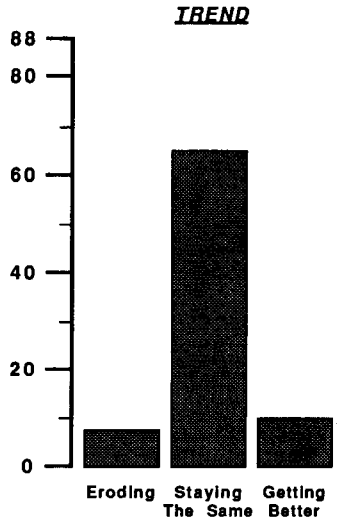
Figure 5—The results from Item 22 of the survey

Intrapreneurs

RANKING:23rd

POSITIVE +	NEGATIVE —
• The attitude towards Intrapreneurs is tolerant rather than supportive -- I sense management is trying to do something more positive about this attitude	• UCC generally hires out of college and must grow their own Intrapreneurs -- the kind they grow are not really Intrapreneurs, but promoters
• Most mavericks are hired in spite of the system -- some effort is made to place these people appropriately and shelter them once they are recognized	• Hiring individuals who "fit the mold" is one of our key objectives
	• The "way to get ahead" in UCC is to follow the current party line more enthusiastically than your peers
	• I don't believe we know how to manage Intrapreneurs





The innovation audit clarified the factors that were supporting innovation in the division and the factors that were inhibiting it. The division got good marks in a number of areas, including

- *Heart values.* "Most employees are personally intrigued by the company's products and take pride in contributing to their production."
- *Questioning the status quo.* "People are constantly looking for a better way to do things."
- *Access to resources.* "Reasonably motivated innovators generally can obtain assistance and materials for early-stage development of their ideas."

After the management team members had listened to Pellman's explanation of intrapreneuring principles and his presentation of the audit results, I worked with them to identify what should be emphasized in the work that lay ahead.

The audit results were not dissimilar from those the team had heard three months earlier during the Innovation for Growth workshops. They clearly showed that the division needed a lot more development of an entrepreneurial spirit; managers needed to find ways to devote more time to discretionary items such as Innovation for Growth. The management team recognized the critical role of management commitment in any change effort and the need to model and encourage sponsorship of more new ventures.

On Pellman's advice, the management team decided to issue a call for volunteers, to provide training in business-plan development to all who volunteered, and to begin the policy-development work—most notably in the area of reward systems—that would be necessary once the venture proposals began to surface. Given the division's bias for action, the team decided to do the training and the policy-development work concurrently. When the members called for volunteers, they acknowledged that all the "i's weren't dotted and all the t's weren't crossed" in terms of policy development. Nevertheless, they made a commitment to decision making in this area. By living up to their commitment, senior management had provided a model for taking appropriate risks.

August 1987. Most salaried people in the division heard about intrapreneuring for the first time when the division president invited them to consider volunteering for the intrapreneuring program. In a letter, the president explained the division's mission for growth and the intent to create new businesses through internal venture teams. He said that volunteering to participate or to lead a team would mean about six months of work, which would then result in the presentation of a business plan to the NBDC. He made it clear that this was a voluntary, overtime effort that would take about 10 hours a week.

The president laid out the risks and the rewards of volunteering. The risks were primarily the possible impact on lifestyles and the fact that not all proposals would be funded. The rewards of volunteering included the opportunity for a tremendous learning experience, possible career advancement, and financial remuneration in the event of venture endorsement and subsequent success. He spelled out the dates for the School for Intrapreneurs. To stimulate the thinking of those considering volunteering, an attachment to the letter listed the opportunity areas that had been identified earlier. The intent was to seed the innovation process by signaling areas in which management would welcome concept development.

Several members of the division's management team again visited each of the 13 major locations to show a short videotape of the division president speaking about the intrapreneuring program and its importance and to explain the program and answer questions. This visist—the second traveling road show by senior management in six months—sent a strong signal to the organization, leaving little doubt as to where senior management's attention was focused. Volunteers were asked to fill out an application and to obtain the signature of a manager willing to attest to their appropriateness as candidates for the program. As the management team waited for the applications to come in, there were a lot of nervous jokes, such as "What if no one applies?"

September 1987. One hundred seventeen volunteers came from all functions, all locations, all levels up through director. They came from the ranks of the exempt and the nonexempt, male and female. They included technicians and secretaries. Almost instinctively, management began to think about ways to cull the list, to lay managerial judgment on this part of the process. On Pellman's advice, the management team permitted nearly everyone who volunteered to participate in the program. (Two people were asked to wait until a later running of the School for Intrapreneurs because they were needed urgently elsewhere.) As it turned out, two nonexempt staffers were subsequently promoted to exempt status and are now members of newly commissioned, full-time venture teams. The diversity of the volunteers has been a considerable strength of the program.

The critical importance of this single intervention—deciding to ask for volunteers versus nominating people to attend—cannot be emphasized enough. The concepts of volunteerism and senior management's attention were, in my view, the two most important success factors in creating a more entrepreneurial business culture. The impact of the decision to call for volunteers was seen in the dedication and enthusiasm of the people who came forward. The program allowed innovators and leaders to emerge—talented people the division did not know it had. It became obvious that management had underestimated the capacity of the people to respond to a clearly stated need.

The power of the intervention can also be explained from a systems perspective. With the decision to call for volunteers, the management team did not push just a single organizational lever and thereby trigger the compensating feedback that creates the systems phenomenon of policy resistance. In terms of the Nadler-Tushman model, the call for volunteers simultaneously pushed levers in all four organizational boxes. The formal organization, the informal organization, the individual, and the task to be done were all affected simultaneously. The changes in the various aspects of the organization were congruent and, therefore, mutually reinforcing.

October 1987. The School for Intrapreneurs that Pinchot & Company ran for SCD consisted of three two-day sessions separated by several months. The school provided momentum and deadlines for the work on new business concepts plus a forum for venture-team formation, team interaction, and teaching and coaching.

In retrospect, the school—which essentially involved on-line training on how to develop a business plan—would have been an important intervention in support of new business development, innovation, and growth even if the division had not scored as low as it did on "intrapreneuring" in the innovation audit. Most of C&P's new hires are technically trained (historically, the organization has promoted from within). The typical new hire is a chemical engineer by major. Without exposure to the nontechnical aspects of a business plan, many potential intrapreneurs would not have had the tools to communicate a business idea to management. Nor might they have recognized their responsibility to think through the business implications of their ideas. Again, the members of the organization had a greater capacity to respond than we had taken advantage of previously. The division's employees may have known more than management thought, but they had to be given the tools, the skills, the confidence, and a forum for communicating their ideas. The School for Intrapreneurs provided what Marvin Weisbord (1978) has termed a "helpful mechanism."

The first session of the school was held with all the participants in one large group. The objectives for the two days were formidable:

- to provide an introduction to the concepts of innovation, entrepreneuring, and intrapreneuring
- to provide an opportunity for introspection and self-reflection in terms of those concepts
- to review the SCD's growth mission, its objectives, the criteria that would be used for venture evaluation, and the opportunity areas
- to form teams to develop concepts and business plans for new ventures
- to provide an introduction to the rudiments of business planning

Pinchot and Pellman taught the basic principles of intrapreneuring. A psychologically validated game of ring toss gave attendees some insight into their approach to risk taking. A cleverly designed advertisement workshop allowed attendees to look collectively at some 100 potential business concepts in only a few hours: Each attendee created a poster-sized ad describing his or her business idea. Then, in two go-rounds (two concentric circles of 50 people each), everyone in the session had the opportunity to sell his or her idea to a half-dozen people and to be sold on the ideas of others.

By the end of the first day, teams had begun to form. Groups ordered pizza so they could continue working that evening. The next day, after being introduced to what is involved in writing a business plan, participants left the session with an assignment: "Come to the second session of the school prepared to report what you have done to move your team's concept for a new venture forward and to receive criticism on your team's first pass at a business plan for the venture."

December 1987. In the six weeks between sessions, teams visited potential customers, cajoled experts to give them free advice, profiled possible partners or acquisition candidates, and defined production facilities. They worked Saturdays, Sundays, after hours, and during lunch.

At the beginning of the second session of the School for Intrapreneurs, a member of the controller's staff presented a brief session on profit-and-loss statements and balance sheets using the regular division control forms. Pinchot and Pellman coached participants on the elements of a business plan. Then the most important event of the second session of the school began. Each team prepared and presented its first-pass efforts at a business plan.

The use of group dynamics was a major reason for the school's success. A fishbowl approach was used for both training and coaching to generate an atmosphere of positive competition, to encourage problem solving, and to facilitate comparative assessments of team efforts. By identifying common learning needs, each team recognized whether or not it was measuring up to the standards being set by others and being reinforced by the trainers. Third-party coaching came across as objective, not as politically motivated. The feedback process allowed participants to think in terms of the success of their concepts, not in terms of personal or career success. The training tended to wean participants away from the typical organizational fascination with guessing what management wants to hear.

At the end of the second session of the school, the 17 teams in the program were urged to recruit sponsors—senior managers who could coach them through the next renditions of their business plans and who could open doors to other help they might need. Nearly everyone on the NBDC became a formal sponsor of one or more of

the venture teams. Watching the process unfold was a bit like observing some exotic mating ritual. Because sponsors preferred to sponsor winners, their assent was not automatic; they had to be persuaded. A subtle but discernible competition arose among senior managers: "I'm a sponsor, are you?"

About this time, it became apparent that many middle managers were not really enthused about the program. They gave it tacit support, but they worried about meeting existing measures of performance while some of their best people had their eyes on two balls at once. The need to provide training for sponsorship, which had been included in the original plans for the intrapreneuring program, was now evident.

For the first time in the division's history, senior management decided to convene 85 high-level managers (assistant plant managers, associate directors of R&D, etc). It was the divisional equivalent to a historic Greenwich meeting in December 1986 at which CEO Bob Kennedy had unveiled the corporate core values to top management. Once again, this intervention was grounded in training and human resource development. Pinchot and Pellman provided an overview of intrapreneuring and explained the critical role of the sponsor. Joe Soviero, Mark Spivack, and a guest from another company with experience in intrapreneuring fielded questions and concerns from the audience. Kennedy joined the group at lunch and underlined the importance of the division's mission for growth. Soviero concluded the meeting with a clear statement that he expected all division managers "to support the program or get out of the way. Not to discount it by so much as a lifted eyebrow." The participants left with this message: "Sponsorship is every manager's job." Prior to the meeting, for a period of time in late 1987, the top and the bottom of the organization had been supportive of the program, but middle middle management had been waiting to see if "this too shall pass." In retrospect, the intervention, which was critical to the ultimate success of the program, might profitably have been held months earlier.

January 1988. Senior managers had high hopes for the plans they would be hearing in the spring, and they had high expectations for the quality of those plans. In between the second and third sessions of the school, Spivack, the team sponsors, and a Pinchot & Company representative visited all teams for one or more days of additional coaching on their business plans. At this point, work on the business plans was consuming an incredible amount of time and energy on the part of many teams. The managers of existing business areas "took it on the chin," as some of their people, in effect, were trying to do two full-time jobs. Something had to give, and it was hard for potential intrapreneurs not to favor their voluntary projects.

March 1988. The teams that believed their plans were ready came to the third meeting of the school prepared to undergo trial by fire. The teams presented their business plans to a group of venture capitalists who Pinchot & Company had recruited for the purpose of providing objective feedback. Once again, these presentations and the feedback that followed were handled in a fishbowl arrangement. Teams were given 90 minutes each to present their plans, and they received a half hour of feedback. The visiting venture capitalists were exceedingly candid. Some teams heard such diverse statements as "If you were asking me to fund your plan, I would not do so because. . . ," "If your management doesn't fund you, come see me." The teams left the third session of the School for Intrapreneurs with an objective assessment of their plan from people who review business plans for a living.

Most of the teams had come a long way from their humble beginnings in business-plan preparation just a few months earlier. Products and service offerings were better defined. In several cases, negotiations had been carried out with potential partners. Prices and costs were pinpointed, with appropriate reasoning, to decimal-place accuracy. The legal implications of innovative marketing techniques had been explored and quantified. People with no prior training in finance were becoming fluent in the language of "net present value" and "internal rate of return." Most important, the teams now were able to identify the not-so-obvious deficiencies in their plans and in their make-up as a team.

April 1988. At this point in the program, eight teams believed they were ready to present their plans to the NBDC. The other nine teams, although having had a positive learning experience, had come to recognize the fatal flaws in their plans that would have to be overcome before a formal presentation to the NBDC would be worthwhile. That recognition was a positive feature of the School for Intrapreneurs. The teams didn't feel turned down; they had learned how to look at things from a CEO's perspective and how to assess whether or not a business concept is worth further pursuit.

The School for Intrapreneurs proved to be a marvelous development tool. Divisional employees did a large amount of definitional work at very low cost by working nights and weekends, doing things themselves, or begging, borrowing, or stealing help from others. We were witness to some inspired research. For example, the members of one team presented themselves on the telephone as market researchers and interviewed all levels of management in a number of companies. Thus, they obtained data about the need for a service they were considering setting up a business to provide.

Everyone who went through the training shared a tremendous personal and professional development experience. Shortly before her team presented its plan to the council for a funding decision, one

young woman said, "Nothing can scare me now. I know I can start my own business if need be, run all the numbers, do everything involved." Personally, I can't imagine a more cost-effective way to provide a profound executive development experience to a large number of people. This experience—lived out over an eight-month period and learned in the gut—left people with self-confidence and a keen sense of the vital contributions all functions make to the success of the overall enterprise.

The SCD's intrapreneuring program had begun with a sense of urgency. While the first round of the school was being run, an internal task force, with support from Pinchot & Company, developed the reward system and supporting policy decisions that were subsequently approved. The system SCD has adopted emulates the risk-reward experience of the external entrepreneur in that it rewards actual performance, not promises. It uses bottom-line quantity and quality measures of performance and is long-term focused, while reflecting short-term contributions and risks. Because this is an intrapreneuring program, the businesses created belong to the corporation, not to the intrapreneurs who started them. Now, when the NBDC funds a proposed venture, the employees who voluntarily become full-time venture employees sign a contract with the corporation that brings them under this reward system.

In addition to the reward program for full-time members of venture teams, all members of the intrapreneuring teams who carried their concepts through to a presentation to the NBDC received special recognition awards. All participants who attended all three sessions of the school received a memento and a letter of appreciation.

June 1988. The eight ventures presented to the NBDC were assessed against the funding criteria. The council also assessed the make-up of the team and its ability to make the plan happen. In a few cases, the almost instinctive managerial response was "That's a really good plan, but how can we let them run with it? They have no experience." But the council kept its commitment to volunteerism and independence. When a team was judged lacking in a critical skill, it was told to recruit a team member with the requisite skill before the venture would be approved. The team then was offered help in identifying individuals who possessed the needed skill. The primary objective was to achieve success for the investors and for the team members involved.

When a venture was approved and funded, the team members who were needed to work full-time on the new venture voluntarily changed jobs. In this way, individual team members became the presidents of new subsidiaries, the marketing directors of new ventures, or the managers of new technologies.

As the council heard the team presentations, I recommended that the group give feedback in terms of what Synectics calls an "itemized

response." That is, the members first state specifically what they like about the plan they have just heard, then their two or three major concerns, and finally, the next steps they would like to see happen. In this way, immediate feedback—appreciation and coaching—is given to every presenting team.

After a short delay to obtain support outside the division, three ventures were approved. All three are now staffed full-time and have received significant capital resources. Some teams agreed to milestones and signed contracts. Other teams are still working on the additional steps the council identified. If those steps, which involve third-party negotiations, are successful, the teams will be invited to re-present. The first chapter in the Specialty Chemical Division's effort to create a more entrepreneurial business culture ended on a successful note. Some eight months after the call for volunteers, three internal ventures had been funded and five others were close to being funded.

Fall 1988. The present goal is to cycle through the process again. Two business concept development laboratories were run in August to seed the next School for Intrapreneurs with additional opportunity areas. Spivack has issued a second call for volunteers, and round two of the school begins in December. Once again, there is a predictable anxiety about the possibility that the division may have already exhausted the pool of potential volunteers. Experience in other companies would indicate that this is probably not the case and that the second wave of volunteers may include a much higher proportion of senior people. Opening the school to volunteers from other C&P divisions is currently being explored.

The intrapreneuring program has affected the division's ongoing businesses in a number of ways. First, there has been a tremendous diversion of effort, people, and resources from the existing businesses. For six to eight months, approximately 50 people juggled two jobs. Many staff people were called in to help them, especially from marketing and from the controller's function. As a result, management has learned to address the new issue of keeping sufficient focus on the division's ongoing businesses. Management will also have to correct the emerging, erroneous perception that participating in the intrapreneuring program is the best or only way to get ahead quickly in the company.

Features of the SCD Approach to Intrapreneuring

Volunteerism is perhaps the most obvious feature of the division's approach to creating a more entrepreneurial business culture. Although a complacent bureaucracy may have gradually crusted over the entrepreneurial spirit that created so many great businesses in

America, it has not managed to strangle that spirit completely. A tremendous amount of entrepreneurial activity was released in SCD by the simple mechanism of calling for volunteers and creating a forum in which volunteers could interact, develop ideas, and begin the process of venture-team formation.

Positive competition and a broad learning experience are also important features of the SCD approach. Competition has been positive rather than negative because the pie is not fixed. All business plans that meet the criteria will be funded. Other participants in the school are seen as competitors, not the enemy. The fishbowl presentations and follow-up coaching make all potential teams aware of what the most energetic and capable teams are achieving. The training provided through the school and through working on the venture business plans has provided a learning experience that participants might have had to wait years to obtain in a more conventional organization.

Minimal structure and maximum sponsorship helped to get this program off the ground with unusual speed. The division's characteristic bias for action, which has been extremely evident in all activities surrounding intrapreneuring, yielded significant results in an extremely short time. One major challenge now is to find the organizational structures that will support a growing and evolving intrapreneuring effort. Another is to pass the baton of venture-team sponsorship to the next level of management as the number of venture teams requiring active sponsorship increases.

Reward and recognition also played a significant role. Interestingly, the existence of a special reward system was not an important feature of the division's intrapreneuring program in the early stages. People didn't seem to have questions about rewards when they volunteered to participate in the school. The existence of a reward program gradually became a factor as more and more energy was poured into the projects. The reward program appeared to become a key factor when people had to decide whether or not to work full time with their venture. Once their decisions had been made, the prospect of rewards no longer seemed to be a driving factor.

General Themes of Executive/Management Development

The decision to run the School for Intrapreneurs capitalized on ideas that already existed in the organization. People often have interesting ideas; what they don't often have is a crucible in which to test and refine those ideas against financial and marketing principles and marketplace realities. The school became a place where formal training and organizational experience could be married.

Participating in the intrapreneuring program provided an on-line development experience. People learned what they needed to know at

the time they needed to know it from a teammate, a trainer in the school, their team sponsor, support staff, potential customers, or a potential venture partner. Such immediately applied learning is the kind that sticks.

Participating in the school created an alternative to job promotions for people who wanted to get ahead in their careers. In today's economy, promotions are not as forthcoming as they once were. Because organizations have been downsized and streamlined, more people are competing for fewer middle-management opportunities. Intrapreneuring allows people a shot at creating their own most-desired job as well as the opportunity to grow with the business they helped create.

For potential management candidates, participating in the program provided lower-risk preparation for the "big job." Most people develop their general management acumen by acting as functional representatives on business teams at the decision-making level or by being promoted to general management positions. Managing a small venture builds the same kind of "muscle," but in situations where the stakes are not so high. As Pinchot asked, "What is the better executive development experience for learning how to skipper the America's Cup: being a winch grinder for ten years or sailing a dinghy?"

Finally, it is important to note the value of the systems thinking and the general management perspective that participating on an intrapreneuring team develops. As Senge states in "Systems Principles for Leadership":

> . . . leaders in the future will be increasingly called upon to develop systemic thinking in organizations. Systemic thinking is integrative, synthesizing diverse viewpoints in order to understand the organization as a whole. It is structural thinking, focusing on the structure of interrelationships among marketing, manufacturing, R&D, and finance that determine organizational success. Systems thinking deals with "dynamics," showing how short- and long-term consequences of management actions may be different, even in the opposite direction. In short, systemic thinking is "general management" thinking. As organizations distribute general management responsibilities increasingly broadly, the process of developing systems thinking must be made more orderly and efficient than in the traditional authoritarian organization (pp. 134–135).

Through eight months of active experience, the School for Intrapreneurs quickly and effectively developed systems thinking in all who participated. Whether or not their ideas were accepted or their ventures funded, people at all levels were recognized for their contributions. In turn, they appreciated the opportunity to learn about how businesses are managed, how marketing and financial decisions are made, and how innovation happens.

Specific HRD implications for senior management

The most significant learning for senior management that has come out of the intrapreneuring process has been learning how to lead a major culture change. If asked, members of the management team can say they have done it through their attention to the people, to the process, and to the calendar. They did not ask middle managers to become venture-team sponsors; they became sponsors themselves and thereby modeled the importance of the activity. Management's active and personal involvement in the effort has been visible throughout the organization, from making on-site visits, to talking about Innovation for Growth, to participating on the new business development council.

Senior management has also learned how to manage the process of innovation with its characteristic nonlinear untidiness. There have been pleasant surprises for top management in intrapreneuring. Over time, those managers have come to adopt the entrepreneur's perspective and to expect the unexpected from their organization.

Specific HRD implications for intrapreneurs

Participating in the intrapreneuring program has given most participants the equivalent of a "mini-MBA." Participants learned how to talk the language of business—finance, marketing, and strategy. Many of them learned how to think beyond the perspective of their technical areas of expertise. They also learned how to sell their ideas and how to make presentations. They learned how to deal with the gamut of issues facing any team, including start-up problems and the need for periodic teambuilding.

Specific HRD implications for sponsors

Today, the new learnings about sponsorship are held largely by senior management. Ultimately, a large number of middle managers will have gained such expertise. Sponsorship skills include how to be an enabler of cultural change (a part of the solution), how to be an effective coach and counselor, and how to use positive political influence. Because intrapreneuring initiatives jostle with ongoing business needs for time and attention, managers have learned how to sort out roles and duties.

Implications for HRD professionals

The major learning for HRD practitioners involved in culture change is how to find the proper leverage points for executive development and management development in the context of implementing the organization's business strategy. Leverage points in this example

included vision and values work, organization design, and team development. Another important learning for HRD is how to design formal educational experiences with immediate applicability to learning needs. Without doubt, the School for Intrapreneurs provided training that was critical to the development of internal ventures. Yet its key attribute—on-line training—holds tremendous implications for other kinds of culture change, including quality improvement programs. The HRD practitioners in this case learned the importance of anchoring and institutionalizing the change process by linking it with other performance management systems. It is hard to imagine pulling a more powerful lever than the reward system to support new business development.

Making Intrapreneuring Happen: Generic Success Factors and the HRD Role

I believe the SCD's success with intrapreneuring is replicable in other organizations, as long as the senior management of those organizations have an urgent sense that new business development, innovation, and growth are absolutely critical to their organizations' survival and success. Organization diagnosis and visioning work are tools the HRD practitioner will find helpful in working with a management team to assess whether or not there is a sense of urgency. The success factors to use in stimulating intrapreneuring initiatives and building a more entrepreneurial business culture are:

- *Management attention.* Management must attend to innovation and new business development publicly and constantly. Without that, nothing of substance will happen. In addition to what they say and how they manage their calendars, the management team can employ other tools and processes to convey management attention, for example, feedback from organization audits, cascading vision and values work, participative workshops, site visits, and internal communications of all kinds. The HRD practitioner has group process expertise to contribute to the change effort.
- *Structure.* Management must build an organization structure that supports new business development and intrapreneuring initiatives. Someone must be in charge, and career success may be linked directly to the effort. The HRD practitioner can bring to the management team a process for thinking through organization design issues.
- *Strategic direction.* Management must articulate the opportunity areas within which they would like people to develop concepts for new ventures and the criteria they will use in evaluating business plans. Determining the criteria may be done as part of a conventional strategic planning process, or, in a less linear way, management can request that members of organization develop

multiple alternatives for consideration. The HRD practitioner can bring processes for idea generation and idea development and can facilitate the development of criteria.

- *Volunteerism.* Management must call for volunteers and provide a forum in which teams may form and interact, as well as other mechanisms that will facilitate team independence. Following management attention, this is the next most significant leverage point for creating a more entrepreneurial culture. The HRD practitioner can help the management team think through how best to issue the call.
- *Sponsorship.* Management must model sponsorship and reward sponsorship behavior in others. The HRD practitioner can help by arranging for executive-development experiences that deepen the team's understanding of the nature of sponsorship. Similar training can be provided to all key managers in the organization.
- *Training of teams.* Management must provide training and coaching to teams in business-plan development. The HRD practitioner can arrange for such training and also can diagnose team-development needs once business plans are approved and intrapreneurs become full-time members of venture teams.
- *Rewards and recognition.* Management must develop a reward system for intrapreneurs that emulates the entrepreneur's experience of risk and reward. The HRD practitioner can help the management team think through the reward system and other policy-development issues concerning venture management. The team can also be encouraged to consider what other formal and informal human resource programs and processes can be managed so as to provide additional reinforcement to the entrepreneurial culture being built.

Finally, at an appropriate point in the process, the HRD practitioner can help the team learn from its successes and failures by proposing data-gathering for evaluation purposes. The collective analysis of the data can lead to a deeper, more systems-based understanding of what it takes to sustain the culture change they have catalyzed.

References

Birch, D. L. (1987). *Job creation in America.* New York: Free Press.

Goodman, M. (1988). Notes on systems thinking. Lecture presented at Advanced Staff Skills Workshop run for Union Carbide Corporation.

Nadler, D. A., & Tushman, M. L. (1977). A diagnostic model for organization behavior. In J. R. Hackman, E. E. Lawler, & L. W. Porter (Eds.), *Perspectives on behavior in organizations.* New York: McGraw-Hill.

Nadler, D. A., & Tushman, M. L. (1980). *A general diagnostic model for organizational behavior: Applying a congruence perspective.* New York: Delta Consulting Group.
Senge, P. M. (1986). Systems principles for leadership. In J. D. Adams (Ed.), *Transforming leadership.* Alexandria, VA: Miles River Press.
Weisbord, M. R. (1978). *Organizational diagnosis: A workbook of theory and practice.* Reading, MA: Addison-Wesley.

High-Performance Systems Process: A New Paradigm

Edmund H. Rieger
Manager, Human Resources Planning
Rockwell International Corporation
Automotive Operations Headquarters

This chapter discusses the application of the High-Performance Systems Process (HPSP) to organization design. The concepts of "fit," socio-technical systems methods, and the general systems model, which are essential to understanding the HPSP model, are described briefly, and various aspects of traditional and nontraditional organizations are defined and compared. The High-Performance Systems Process is recommended as the appropriate paradigm for designing the nontraditional, competitive organization.

The hallmark of a successful company is the ability of its managers to make changes and to sustain profitable growth and performance. Making the difficult organizational decisions to achieve "fit," or congruence, between changing environmental conditions and organizational intentions and capabilities is critical to sustained, profitable growth and performance. Many organization practitioners and scholars have described the concept of fit within the major dimensions of an organization and have established the relationship between fit and economic performance and business success.

Miles and Snow (1984) defined "fit" as:

> A process as well as a state—a dynamic search that seeks to align the organization with its environment and to arrange resources internally in support of that alignment. In practical terms, the basic alignment mechanism is strategy, and the internal arrangements are organizational structure and management processes (p. 11).

Galbraith (1977) discussed the concept of fit when he referred to the relationship of organization design to strategy implementation and the importance of both to economic performance. Organization design is the result of a decision process to bring about a fit between the mission, the external environment, business strategy, systems, the division of labor, the inter-unit coordination, and the people who do the work. Strategic choice implies that mission, goals, purposes, business strategies, organization structures, systems, and management processes are the results of choice. Also, choice implies that any of those organizational elements may be changed in order to

remain competitive and to adapt to changes in the external environment. Competitive organization design, therefore, is concerned with maintaining a fit among intertwined elements over time.

Fit is the primary concept behind the Seven S's of strategy, structure, systems, skills, style, staff, and shared values that Waterman and Peters (1982) and Athos and Pascale (1981) have discussed. Leavitt (1962), who also developed the concept of congruence, or fit, was one of the first to discuss the degree to which task, structure, people, and processes form an integrated whole. Decision makers cannot successfully change structure without adjusting compensation policies and making changes in information and budgeting systems, as well as career and management development systems. In organizations, everything is related to everything else.

Lorsch and Allen (1973) investigated structure, task, people, and administrative practices, the congruence between those dimensions, and the degree to which congruence is related to organization performance. They found that in low-performing organizations either structure or process did not fit with other key organization dimensions.

Stonich (1982) supported the findings that the fit concept is related to strategy implementation and business performance. He indicated that successful organization performance occurs when an appropriate strategy is implemented through an effective rationalization of the organization elements of strategy formulation, organization structure, human resources, management processes, and organization culture. Thus, experience and empirical information suggest that clearly identifying attractive opportunities and setting the right strategic direction do not by themselves guarantee success. The organization will move most effectively toward its strategic objectives when, and only when, all of its elements are synchronized, or fit.

The Socio-Technical Systems Model

The socio-technical approach to designing organizations emphasizes the fit between an organization's external environment and its technical and social systems. Socio-technical systems theory is based on two premises. First, whenever people are organized to perform work, there is a joint system operating that consists of two independent, correlated parts. The technological part comprises the tools, machines, and techniques required for task performance. The social parts comprise the people and the relationships needed to perform tasks. Because the technical and social parts interact to create useful products or services, work is designed to facilitate the interaction between technological requirements and people's needs. Such jointly optimized work designs lead to high levels of productivity and employee fulfillment. Second, socio-technical systems are open

systems that exist in the context of a larger environment. The environment provides the systems with needed inputs, such as raw materials, and serves as an outlet for systems outputs, such as products and services.

Because socio-technical systems are dependent on their environments, they must create and maintain effective relationships with those environments in order to survive and develop. To do so, they may be required to adapt to environmental changes. On the other hand, they may also attempt to influence the environment in favored directions. The socio-technical systems model has many of the characteristics of an emerging organizational paradigm known as the "High-Performance Systems Process" (HPSP).

The High-Performance Systems Process

The HPSP is based on the general systems model, on the theories of Walton, Likert, and others, and on the organization design theories developed and utilized within several organizations. The HPSP, which finds its origins in socio-technical and open-systems theories, is unique in that it permits systematic and in-depth evaluation of an organization's work systems and the subsequent ability to study and learn from organizational experience. Walton's (1980) conceptual model can be used

- to give coherence to the study
- to avoid having the study become merely an attitude survey
- to give consistency to the methodology of the study throughout the organization

A study team generates data for the study through the examination of organization records and written descriptions of programs, procedures, and administrative systems and through extensive interviews of groups and individuals. To the accumulated data, the study team members apply skills, judgment, and experience to produce analyses of the organization's systems. The validity of their analyses may be checked in several ways:

1. At the conclusion of the interviewing phase, via a verbal preliminary report that is presented for review to a group of management and nonmanagement personnel (which the organization selects).
2. Upon completion of the draft of the final report, at which point another group reviews the findings.
3. Throughout the study, while study team members cross-check the validity of the interview data.

Using a general systems framework, as shown in Figure 1, the study team first attempts to provide an accurate representation of "what is." Five areas of organization systems are reviewed:

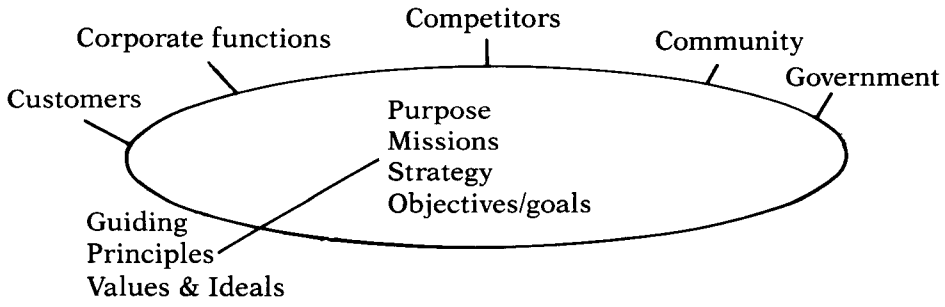
- direction setting
- system analysis and design

• emerging organizational attributes;
• organizational outcomes;
• renewal systems

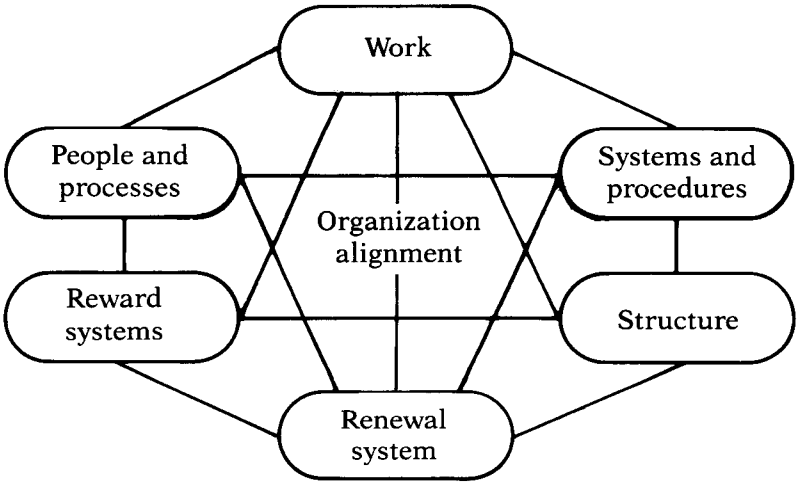
Although each could be discussed independently, the analyses of the five areas are interrelated, and when considered as a whole, they can provide a working "snapshot" of the organization.

Figure 1—General systems framework

Phase 1: Direction setting and demands and expectations from the environment



Phase 2: Systems analysis and design



Phase 3: Emerging organizational attributes
—Attitudes/feelings
—Capacities/skills
—Operating procedures/ outcomes

Phase 4: Organization outcomes
—Business
—Quality of work life

Phase 5: Renewal systems
—Goal evaluation and revision

In the general systems model, an organization is considered to be an entity that

- exists for a purpose
- comprises organizational and technological procedures and physical structures and equipment
- interacts with its environment in the process of accomplishing its purpose

Organizational purpose makes it possible to define ideal outcomes, or those things the organization would like to accomplish. Ideal outcomes may include volume, type, and quality of product and quality of work life for employees. To accomplish ideal outcomes, the environment in which the organization exists must be considered.

The environment—*Phase 1* of Figure 1—is everything that exists "outside" the organization, including

- the physical environment
- the community surrounding the organization
- other organizations, such as industrial, governmental, social, community, state, federal, or international organizations

The organization depends on the environment as the source of all inputs (such as raw material, people, and knowledge) needed to produce products and services and to build, maintain, and expand its physical, social, and technological aspects.

In time, the organization will interact with its environment in at least three ways. First, it will initiate contact with various individuals, industries, agencies, etc., to secure inputs. Second, it will be contacted by various individuals, industries, or agencies (such as OSHA, EEOC, and citizens' groups). Finally, it may be forced to interact with the physical environment (for example, natural events and disasters). To function effectively and to survive, the organization must learn to deal effectively with its environment.

Holding the ideal outcomes in mind and considering the key environmental factors, management then designs the appropriate organizational elements (*Phase 2* of Figure 1). Physical structures and machinery, policies, and social and technological procedures and programs may be developed to produce the ideal outcomes.

As the organization begins to function—that is, as the environment begins to impinge on the organization and the people in the organization begin to carry out their respective jobs (in a sense, operationalizing the design elements), two things happen: First, the organizational attributes emerge (*Phase 3*). Second, actual outcomes are produced (*Phase 4*). The emerging attributes of the organization include

- the actual operating procedures
- the social and technological skills and capabilities that are developed by managers and employees

- the attitudes and feelings of managers and employees toward the organization, their jobs, and each other

Emerging attributes reflect the day-to-day life of the organization and affect overall effectiveness. Outcomes are measured in terms of product volume, quality, or cost and in terms of quality of work life in the organization (safety, security, individual growth, employee satisfaction, etc.).

Because the environment changes, organizations cannot remain static. Work designs become outdated and, when operationalized, are sometimes ineffective. Therefore, organizations must have built-in mechanisms for change, called renewal systems (Phase 5). Renewal systems consist of the ongoing collection of information about the current state of the environment, the emerging attributes and outcomes of the organization, the evaluation of that collected information, and either the solving of identified problems so the organization can continue to function effectively or the development of new design features so the organization can adapt and grow.

The HPSP is dynamic. Changes in any or all of the phases of the model are assumed to occur over time in an ongoing manner. However, at any time, the model can be used to take an organizational "snapshot." Although that description of the process is somewhat theoretical, experience has proven that managers quickly comprehend the model. Even more impressive is the immediate learning that accompanies their first-time use of the model. "Now I finally understand my own organization!" is a fairly typical remark that reflects a manager's sudden grasp of general systems theory and existing complex cause-and-effect relationships.

Characteristics of High-Performance Systems Organizations

Using HPSP allows management to understand better the design features that could make the organization more competitive. It also provides them with a structured process for moving away from traditional, cherished ways of delivering the strategy. The characteristics of high-performance systems organizations (HPSO) can be contrasted with existing, well-accepted, traditional ways of structuring and managing increasingly noncompetitive organizations. The following provides a glimpse of what organizations that use the principles of HPSP look like.

Organizational strategy

In traditionally designed and managed organizations, the mission, goals, objectives, and strategic direction are understood by only a few top-level people, if that. Usually, top-down planning by each function results in many managers never seeing the completed

strategy and its implications for the organization. Strategic information is often controlled and shared only on a need-to-know basis. Employees work to achieve the goals and objectives they think are important to the business. Although some information may need to be controlled, even key senior managers rarely have opportunities to review the strategy together or to understand how they could better assist one another in implementing it. They may not understand the mission or how their tasks, structure, roles, and responsibilities contribute to implementing the strategy successfully.

In high-performance systems organizations, on the other hand, key senior managers work together to develop the mission, goals, objectives, and strategy of the organization. They take responsibility for assisting people at all levels in the organization to understand strategic aims, purpose, mission, goals, and objectives. Thus, employees are able to cooperate, use resources more efficiently, and work together collectively for the good of the whole organization.

Organization structure

The structure in traditional organizations is "tall," and the many managerial layers and staff-support functions are justified by a need to control. The structure relies on an elaborate set of written rules and procedures for coordination and control. The emphasis is on *functional specialization.* Departments are based on specialization, and top-down managerial control and coordination prevails.

In high-performance systems organizations that are striving to become more competitive, the structure of the organization is flat, with few layers. The philosophy is one of flexibility, cooperation, functional integration, and teamwork. Managers rely on well-communicated, well-understood strategic aims and on shared goals, values, and beliefs for coordination and control.

Management systems and procedures

In traditionally managed organizations, management systems for proceduralized planning, and financial and information reporting and control, are built on a mistrust of "checkers checking checkers." Appropriate planning and financial information are not shared with employees, who do not understand materials costs, total product costs, or competitors' costs. Managers assume that sharing financial and planning information with employees is dangerous. The financial planning and reporting systems in most traditionally managed organizations are set up to support low-risk behavior and to reward short-term results.

High-performance systems organizations seek innovative designs and functions to execute the strategy and make an effort to design

financial planning, reporting, and review systems based on trust. Appropriate people are involved at all organizational levels. Systems are designed to eliminate financial "sand bagging," or the withholding of certain financial and planning information from top management to protect lower-level managers.

Management in high-performance systems organizations holds fewer financial and planning review meetings. Entrepreneurial management is emphasized throughout the organization. Financial and planning systems are geared toward rewarding appropriate balance between long- and short-term priorities. Financial information is shared regularly with employees so that they are informed and may see the relationship between their performance and the financial success of the organization. HPSO employees understand competitive pressures, budgeting, and costs.

Management style

Traditionally managed organizations emphasize management prerogatives and positional authorities. Status symbols are used to reinforce the authority system. An autocratic management style is justified by the need to control. Managers and supervisors in such organizations function mostly as monitors, firefighters, and overseers. Problem-solving methods pit supervisors against management and the workforce simultaneously. Management assumes that employees work mostly for money and status rewards and that they need direction from above and need to be controlled through tight supervision.

High-performance systems organizations base authority on expertise and information rather than on position. Managers and supervisors become facilitators rather than overseers. Management assumes that with proper skills and clear responsibilities, employees can coordinate their work effectively and can eliminate many of the tasks of managers. HPSO employees who are provided with enriched jobs and the opportunity to contribute to organizational goals need less supervision. Managers emphasize collaboration and teamwork and tend to assume that employees seek many satisfactions at work, including knowing that they are respected and are considered capable of assuming decision-making responsibilities. They recognize that employees may tire of monotonous routine and that most prefer job variety, autonomy, and discretion.

In high-performance systems organizations, the managers in staff-support roles provide information and assistance to line managers so they may perform at peak levels.

People, processes, and performance

In traditionally managed organizations, people are viewed as a variable cost. Consequently, training and development and retention of employees are not valued. Also, performance expectations are expressed as "standards," or minimum acceptable levels of job performance. Both job standards and job definitions are based on the least common denominator of employee skills and motivations. Performance standards are based on measures of work and are not oriented to results valued in the marketplace.

In high-performance systems organizations that systematically plan to change, people are viewed as assets to the organization. They are recruited, selected, and trained to work effectively within the culture of the organization. Performance expectations are set relatively high and are stated in the form of stretch objectives. Performance objectives are dynamic, emphasize steady improvement, and are often oriented to the value of performance in the marketplace.

Shared values and beliefs

Traditionally managed organizations tend to tie their guiding values, beliefs, and goals to the achievement of economic gain, such as return on assets and return on sales and profits. Achieving economic goals is why the organization exists. Such narrow purposes often cause dysfunctional trade-offs between quantity and quality and long-term versus short-term decisions.

In contrast, high-performance systems organizations that are striving to improve guiding values and beliefs acknowledge the rights of multiple stakeholders—shareholders, employees, suppliers, customers, and the public. In such organizations, managers assume that the various stakeholders will share the organization's long-term interests. Fulfilling many employee needs is taken as a goal, rather than the means to other ends. A formal statement of organizational values and beliefs is developed and discussed throughout the organizaion. It is often prominently displayed and shared with new employees as a guide for behavior, thus eliminating the need for many formal rules, regulations, and procedures.

Reward and compensation systems

Traditionally managed organizations base employee rewards and compensation on individual performance and on a fair day's pay for a fair day's work. Because job requirements are carefully prescribed, they can be systematically evaluated and priced. Fairness in compensation is assured by comparing jobs on a point-factor scale. Where feasible, pay is varied to provide individual incentives for meeting performance expectations. Often the reward system is geared to

support the performances of individuals at the expense of the performance of the total organization.

High-performance systems organizations that are undergoing comprehensive change attempt to design compensation policies to emphasize group achievements. Compensation policies acknowledge the contingent nature of job definitions and the expanded possibilities for individual contributions. Some organizations initiate skill-block pay and progression systems to focus on pay for performance. In others, gainsharing, stock ownership, or profit sharing is the cornerstone of management's approach to rewards and compensation. In many organizations, the trend is away from individual incentives and individual merit pay.

Job design principles

In traditionally managed organizations, job design is based on the principle of deskilling. Jobs are subdivided into small, unrelated, repetitive tasks. Job responsibilities are clearly fixed, and individuals are held accountable for specific job results. Rules, regulations, and procedures control the work, and efficiency and output are emphasized.

In the high-performance systems organizations, teams are the unit held accountable for performance. Attempts are made to build into jobs key features that encourage sustained high performance, productivity, and employee commitment and motivation. Such features include autonomy and job discretion, job variety, challenging work and the opportunity to learn, the possibility of supporting others and expressing mutual respect, the prospect of a meaningful future, the opportunity to complete whole parts and to see that the work performed is related to achieving the goals of the organization and appropriate rewards, and the latitude to affect the quality and quantity of the work.

Employment security

Traditionally designed and managed organizations offer little or no employment security. When labor is managed as a variable cost, employees are viewed as expendable—spare parts to be discarded when economics and other factors demand it.

High-performance systems organizations often go to great lengths to avoid laying off or discharging employees. They may assist with outplacement. Employees who remain are given priority status for training and retraining as their jobs are eliminated and new ones created.

Employee opportunities to participate

In traditionally managed organizations, employees are given few opportunities to participate in management decisions that affect them. Involving employees in decision making is often seen as a waste of time and resources. Managers believe that involvement will slow the decision-making process or will cause unnecessary confusion.

A central feature in high-performance systems organizations is the opportunity for employees to participate in work-related decisions. Managers assume that employees at all levels will work more effectively if they understand the need for job and wage decisions, participate in making them, and accept them as legitimate. Direct involvement in strategy formulation and goal setting is seen as an effective way to gain job commitment. Another way to achieve commitment is to communicate the specific goals of the performance unit and how accomplishing these goals contributes to achieving the goals of the organization. It is also assumed that people who participate in defining problems and their solutions and who are involved in making changes will be committed to the new directions.

Egalitarian status

A multiclass society exists in traditionally managed organizations. Depending on their level in the hierarchy, employees receive different rewards, enjoy different privileges, and perceive different work experiences. The hierarchical arrangement creates inequities and produces a number of dysfunctional behaviors. Inequities of power undermine trust, create "we/they" factions, inhibit candid and open communication, increase alienation, and reduce the likelihood of collaboration and teamwork.

High-performance systems organizations move toward greater power parity by developing structures and systems that encourage and build in egalitarian status. Rather than designating separate areas for managers to eat and spend their nonwork hours, space design considerations assure that everyone uses the same entrance, parking, eating, restroom, and recreational facilities. In some organizations, all-salaried compensation systems and common benefits are joined with other measures to send the message of equality. Such arrangements can lead to a greater sense of community and commitment for all.

Summary

The fit, or congruence, among key dimensions of an organization and the elements of organization design are important management concerns. The degree to which task, structure, employment systems,

technology, and process form an integrated whole must be consciously designed to support and deliver a particular organization strategy. This strategy-organization alignment must continually be assessed because a change in the environment, which suggests a change in strategy, will require a corresponding realignment of organizational elements to regain congruence through a new configuration. Management can use the High-Performance Systems Process to identify alternative organization design choices for delivering the strategy.

References

Athos, A., & Pascale, R. T. (1981). *The art of Japanese management.* New York: Simon & Schuster.

Galbraith, J. R., & Kazanjain, R. K. (1986). *Strategy implementation: Structure, systems, and process (2d Ed.).* St. Paul, MN: West Publishing.

Leavitt, H. (July-August 1962). Unhuman organizations. *Harvard Business Review, 40*(4), 90–98.

Lorsch, J., & Allen, S. (1973). *Managing diversity and interdependence.* Boston: Division of Research, Harvard Business School.

Miles, R., & Snow, C. (1978). *Organizations and their members.* New York: Harper & Row.

Stonich, P. J. (Ed.). (1982). *Implementing strategy.* Cambridge, MA: Ballinger.

Walton, R. E. (1980). Establishing and maintaining high-commitment work systems. In J. R. Kimberly, & R.H. Miles (Eds.), *The organization life cycle: Issues in the creation, transformation, and decline of organizations.* San Francisco: Jossey-Bass.

Waterman, R. H., & Peters, T. J. (1982). *In search of excellence.* New York: Harper & Row.

A Systems Approach to Training Development

Oliver W. Cummings
Director of Research and Evaluation
Arthur Andersen & Co., S. C.
Center for Professional Education

In this monograph Ronald Jacobs refers to Arthur Andersen & Co.[1] as one of a group of organizations that have constructed specific instructional development models. He presents these as examples of applied systems models. Arthur Andersen's instructional development methodology is Method/E™. In this chapter, I will present the rationale for using a systems approach and a description of the methodology.

Why a Systems View?

The developers of this instructional development methodology are products of an educational era (the 1950s through the 1970s), when general systems theory was emerging as a world view (see, for example, von Bertalanffy, 1968). Thus, the philosophical base for systems thinking was present at the inception of what was then perceived as a project to document Arthur Andersen's methodology for training development. However, the real motivators in developing the methodology were economics, politics, and tradition.

Economics

Three prime economic needs drove the development of the methodology: the need to manage the training investment, the need for efficient development procedures, and the need to improve the flexibility and effectiveness of the project teams.

The need to manage a large and complex investment. With 300-plus training programs in the total curriculum, at that time being delivered to more than 30,000 people per year, we could not afford to

[1]Arthur Andersen & Co., S.C., is an international firm. Its businesses are accounting and auditing, tax consulting, and management information consulting. With over 40,000 people in more than 50 countries throughout the world, Arthur Andersen & Co. makes a substantial investment in the expertise of its business consultants and auditors through training. Andersen's Professional Education Division and European Professional Education employ professional instructional designers and other educational personnel to design, develop, and support appropriately planned training programs throughout the world.

train wastefully. The systematic development and monitoring inherent in the systems approach provided a framework for consistently addressing the multitude of issues that must be resolved during planning, designing, developing, and supporting a curriculum or a training program. One major benefit of the systems approach is that the training is linked to strategic business plans and to identified training needs. Thus, training hours for participants are more relevant and productive.

The need to promote efficiency in the training-development process. The construction of an overall methodology made up of subsystems with feedforward and feedback loops and with standard phases, segments, tasks, and steps, gave us a convenient way to organize and plan a project quickly. It assured us that at least a minimum set of issues would be considered for all projects and that duplication of effort in creating project approaches and organizing the project team would be minimized.

The need to improve the flexibility and effectiveness of project teams. The use of a systems approach gave us two key advantages in managing project teams:

- It allowed for a phased approach in program development, with feedforward documentation required at the interfaces between phases or subsystems (for example, between training design and training development). With a phase organization segment in each subsystem, it allowed us to redeploy resources and to change the skill mix of the project team at several key points in the project. That meant that we were able to operate at a higher level of overall effectiveness because each phase is accomplished most efficiently with a different mix of personnel, as we work with constantly upgraded teams.
- It gave us the ability to leverage the skills of our professional staff by delegating some of the required steps and tasks to lower levels of the education staff or to content specialists or other line personnel. The decomposition of the training development process led to the identification of many tasks that do not require extensive educational expertise to accomplish. Those tasks can be done by less expensive personnel.

Politics

Politics was a second motivator for developing Method/E™. I use the term *politics here* in a neutral, or even positive, sense rather than its usual negative connotation. Politics here means using what is known about the character and the operating style of an organization to effect appropriate changes or approaches.

Arthur Andersen has a tradition of developing and using methodologies. Further, Andersen Consulting is the world's largest

information systems consulting group and brings a strong bias toward systems thinking to the organization. Using approaches and language (such as a systems approach) that are familiar to the line enables the training staff to describe and sell the appropriate process for training development. This was a key reason for the use of a systems approach in Method/E™.

Tradition

The third motivator for the systems approach was tradition. While Andersen Consulting was a leader in developing information systems design methodology, with its Method/1™, the Professional Education Division depended on that tradition as well as on the instructional systems approaches established by Gagne and Briggs (1979), Briggs and Wager (1981), Dick and Carey (1978, 1985), and others. As a product of both an educational tradition that promoted a systems view and a firm that was steeped in systems thinking, it is perhaps not surprising that Method/E™ follows from a family of computer systems and instructional design models that have systems theory at their base.

Instructional Development Models and "Systems"

Instructional development models are important tools of the trade in training. Some are simple and some are complex. Some are oriented toward a particular discipline, and some are more general. Larger, more complex problems require powerful and more sophisticated tools. Instructional development models generally attempt to capture the processes that make instruction work and attempt to build them into a repeatable methodology. The three most common building blocks are:

- *Analysis/Objective Setting*: doing the front-end analysis and planning, needs assessment, problem definition, and solution specifications to address gaps between a current and a desired performance.
- *Strategy Selection/Design and Development*: generating and selecting training alternatives that will result in a desired outcome, and developing training solutions to a level of detail where they can be implemented successfully.
- *Tryout and Evaluation*: trying out the training solutions and making judgments about the value of the result.

Almost all instructional development models contain the basic process elements of analysis, design, development, evaluation and revision to help designers create targeted, validated products. Method/E™ and a few other methodologies add project management functions to thc system to help designers handle the process.

Some instructional development models are referred to as systematic and others are described as "systems" models. Briggs and Wager (1981) addressed the systems nature of a multistage instructional design model (see also, Gagne & Briggs, 1979; Gagne, Briggs & Wager, 1988). They said,

> The "systems approach" to the design of instruction results in a model to be followed to be sure that all components are designed to fit with each other. In part, this is accomplished by planning that the objectives, the teaching, and the testing of learner achievement are all congruent with each other. . .[that they] are planned to work together to achieve the goals and objectives of the instruction. . . [and that] components are analyzed and developed in a planned sequence, although each is reviewed again as new components are planned. . . . The entire process is orderly, but flexible. There is both "feedback" and "feedforward" in iterative cycles of work (p. 4).

In their conceptualization of educational technology, Verhagen and Plomp (1988) laid out a model designed to include

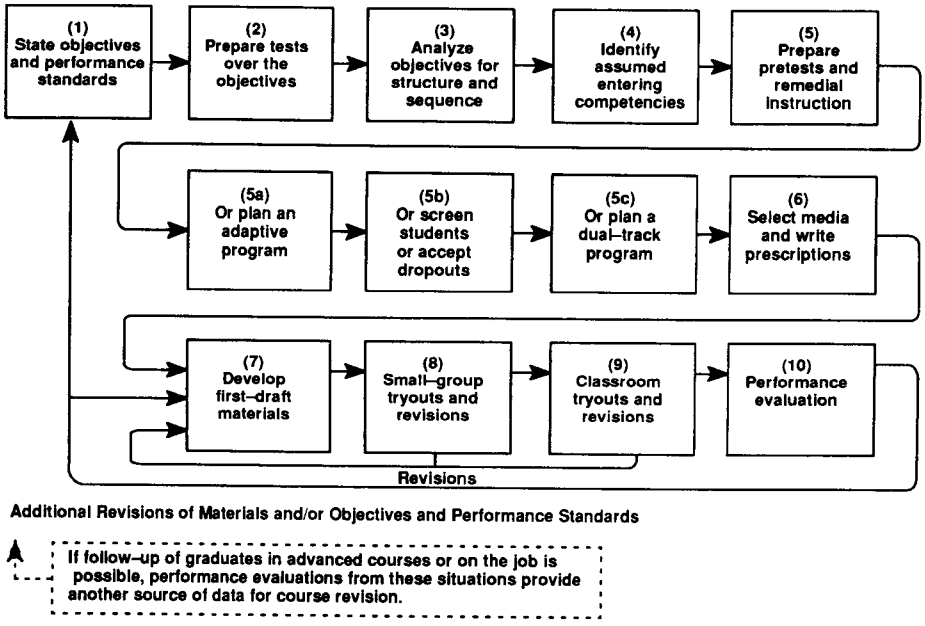
> . . .taking into account the problem to solve and its context. It is a holistic approach, often also called the systems approach of educational technology. . . . The systems approach leads to a systematic description of the variables (constraints as well as design factors) which influence the problem-solving process, thus defining the problem space in which the prototype has to be designed, developed, and tested in a cyclical process until an acceptable result is accomplished (p. 30).

The Gagne, Briggs, and Wager model and the Verhagen and Plomp model are shown schematically in Figures 1a and 1b. Gustafson (1981) presented a typology of instructional development models that included four categories: classroom focused, product focused, systems focused, and organization focused. The systems-focused model, he said, has as its goal the

> . . .development of instructional output, which is itself considered to be a system. The output of the development effort may include materials, equipment, a management plan, and perhaps an instructor training package. This "system" can then be implanted or disseminated to target locations. The systems focus usually demands extensive analysis of (a) the use environment, (b) characteristics of the task, and (c) whether or not development should even take place. It is a problem-solving approach usually requiring data collection to determine the precise nature of the problem (p. 7).

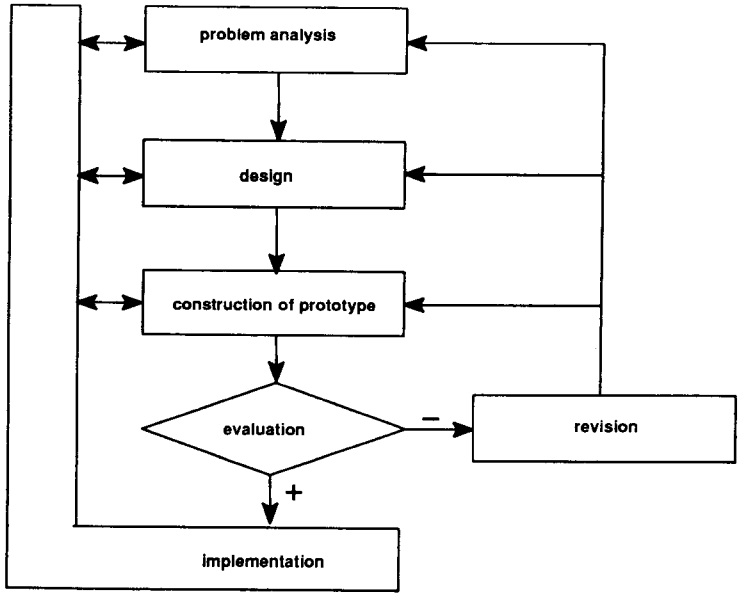
Method/E™ meets these definitions of a systems model and goes beyond to define interfaces with other organizational systems.

Figure 1a—A flow chart showing major stages in design of instruction



1a. Reproduced by permission. Briggs & Wager (1981)

Figure 1b—General model of educational problem solving



1b. Reproduced by permission. Verhagen & Plomp (April 1988)

Method/E™[2]

Methodology

The Method E™ methodology is a four-phase, four-tier, systems approach to training development. Each of the four phases—Curriculum Planning, Training Design, Training Development, and Training Support—is made up of several segments. Each segment involves a number of tasks, and each task is accomplished by a series of steps. The hierarchy within the system is phase-segment-task-step. Figure 2 shows the overall approach to the segment levels.

The major purpose of Curriculum Planning is to identify groups of training programs and courses needed to address business opportunities and performance problems and to implement business plans. In Curriculum Planning, the project team analyzes the business plans and current operations to develop the following:

- Curriculum Plans: high-level descriptions of the organization's curriculum needs and long-range plans for implementing the curricula.
- Project Definition Reports: plans (for example, work plans, staffing requirements, conceptual designs, and resource requirements) for completing high-priority course design and development projects.

In Training Design, the project team (typically including both education and content specialists) conducts an in-depth analysis of the training needs to be addressed by each course. Once the needs have been clearly defined, course specifications are developed. The major product is a Training Design report, which becomes the blueprint for developing the training in the next phase.

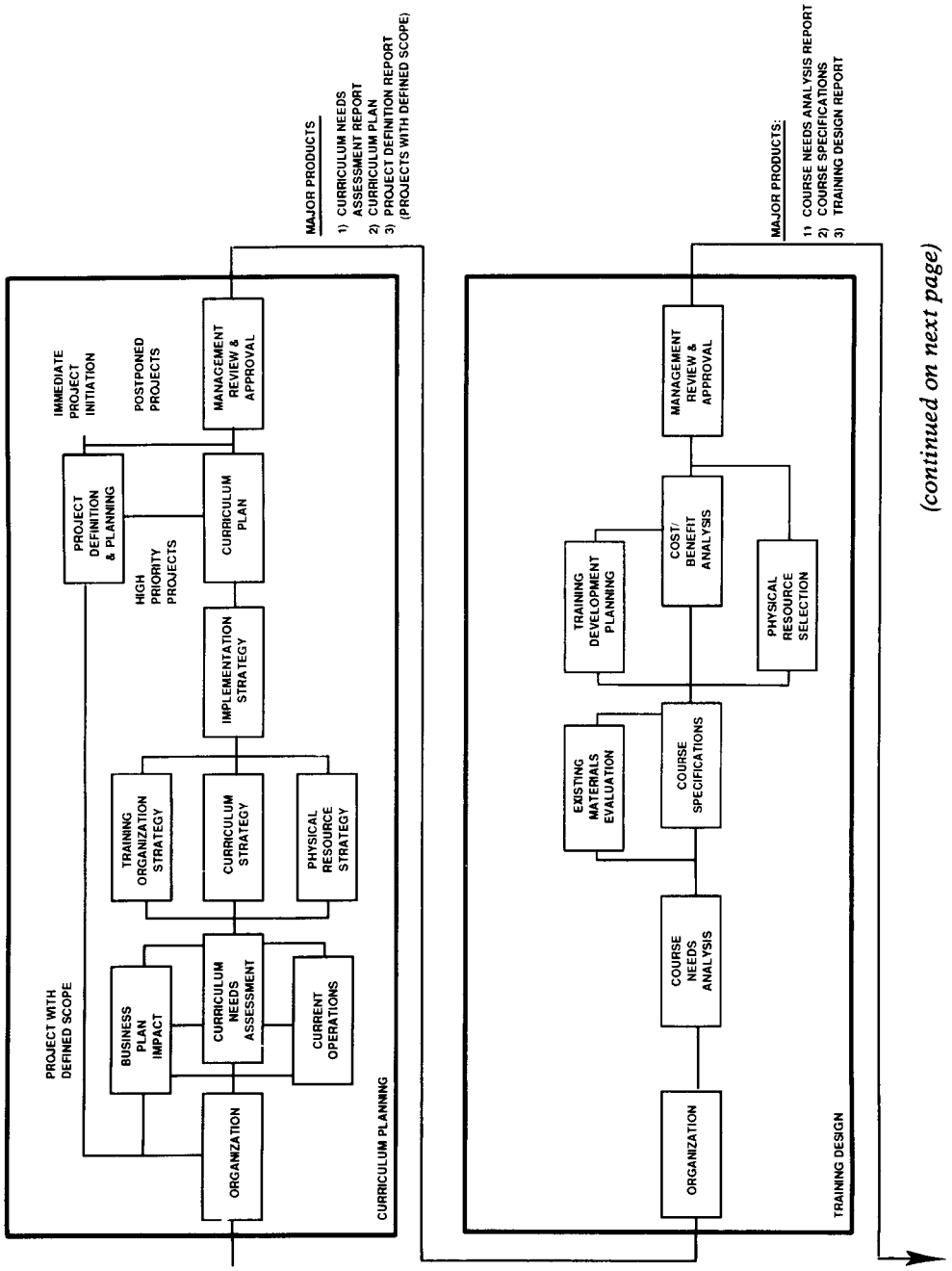
In the Training Development phase, the course materials are written, tested, and revised as necessary to ensure that they meet the training needs effectively. The major products are finalized training materials (for example, camera-ready print materials, video/audiotape masters, and master discs for computer-based training).

The Training Support phase closes the loop on the training life cycle. The training is monitored on an ongoing basis. As problems arise, they are prioritized and the necessary changes are designed and implemented. A complete record of the course (for example, initial design, history of changes, impact on job performance, and participant/instructor evaluations) is stored in a maintenance file. The information is used by maintenance project teams to revise and update the training.

---

[2]This description of Method/E™ is based on Method/E™ published by Arthur Andersen & Co., 1984.

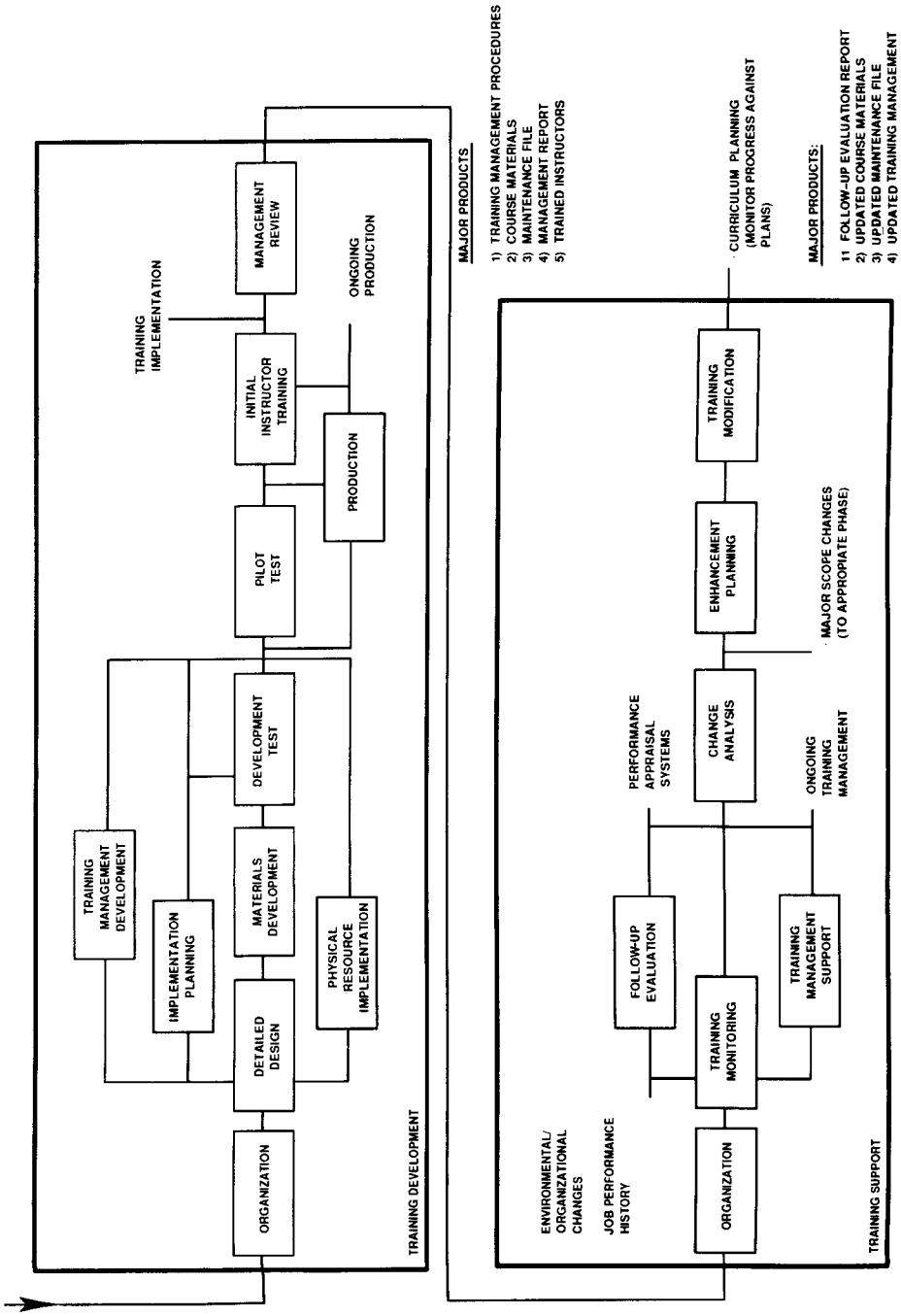
Figure 2a—Method/E™: Curriculum planning and training design



(continued on next page)

(continued)

Figure 2b—Method/E™: Training development and training support



The primary focus of Method/E™ is on the work associated with planning, designing, and developing training courses, programs, job aids, etc. However, the methodology must interface with other existing systems. Four of these are

- business planning systems
- performance appraisal systems
- production systems
- conduct/delivery systems

Interface with business planning

The entire process described in Method/E™ is driven by business plans and strategies. All training programs should directly support those plans and strategies to ensure management's support and to enable the organization to implement its business plans. Therefore, one of the first segments within the Curriculum Planning phase requires an investigation of the organization's business plans and the training implications.

The information gathered during the planning, design, and development of the training, and the ultimate impact of the training may affect business plans. For example, while the project team is determining the curriculum and course needs, the team may uncover problems for which there are no training solutions. Such problems should be communicated to management so that they can be considered in the development of future business plans.

Interface with human resource systems

Another major input to the training process is the organization's human resource system. Project personnel must have a good working knowledge of this system if the training is to be effective. If the links among job descriptions, hiring practices, career paths, and personnel performance measures are not clear, then the training that is intended to affect them may not address the organization's business needs adequately.

In Method/E™, the project team reviews human resource and performance appraisal systems in the current-operations segment of Curriculum Planning. Any problems are identified, and suggestions to remedy those that may jeopardize the success of the training project(s) are communicated to management.

To close the loop, information regarding participant performance and the training's impact on job performance is input to the performance appraisal and human resource systems during the the Training Support phase.

Interface with production systems

Production issues and considerations are addressed throughout Method/E™. In Curriculum Planning, the project team reviews existing firm and vendor production systems and assists firm management in planning for a production system that will support the design and development of the planned training programs. Similarly, many of the decisions made during the design and development phases interact with the structure of the production system. One of the key interfaces is the transfer of final production drafts (such as camera-ready print materials, video/audiotape masters, or computer-based master discs) from the development team to production personnel during the Training Development phase. Those materials, as well as the plans for long-term production of the courseware, become a part of the ongoing production system.

Interface with delivery systems

Similar to production issues, delivery issues and considerations are interwoven throughout the methodology. They are considered in Curriculum Planning when strategies are developed to establish an environment that is supportive of training. Delivery plans for specific courses are prepared in Training Design and implemented in Training Development. Finally, in the Training Support phase, the team gathers maintenance data on an ongoing basis to assist in revising training policies, procedures, and course materials.

Summary

Method/E™ includes organization and logistics. It is an iterative system with defined inputs and outputs, feedback and feedforward loops, and quality monitoring at many points in the process. The successful implementation of the methodology depends on good project management, planned work, and staffing by skill requirements at each phase of a project. Its implementation results in a highly targeted, organized, and successful training program. The methodology includes needs analysis and a performance-oriented, problem-solving focus. Plus, it carries a detailed set of guidelines through to the ongoing support of the training program. Finally, there are logical interfaces between this instructional development system and other key systems within the organization.

Systems models, such as Method/E™, provide the kinds of project definition and control mechanisms needed to coordinate project teams and their project activities adequately. These kinds of mechanisms are needed, because team-based projects tend to involve many risk factors. Typically, such projects are

- large scale
- complex in content
- sophisticated in instructional strategies and perhaps in delivery systems selected
- developed by heterogeneous teams (experienced/inexperienced, staff/line, instructional designers/content specialists, etc.)

Well-defined methodologies can be detailed enough to guide performance. They define roles and responsibilities, which helps to reduce ambiguity and to facilitate communication among team members. They also may eliminate the need for designers to reinvent a process at the same time they are creating a product.

References

Briggs, L. J., & Wager, W. W. (1981). *Handbook of procedures for the design of instruction (2d Ed.).* Englewood Cliffs, NJ: Educational Technology Publications.

Dick, W., & Carey, L. (1978). *The systematic design of instruction.* Glenview, IL: Scott Foresman.

Dick, W., & Carey, L. (1985). *The systematic design of instruction (2d Ed.).* Glenview, IL: Scott Foresman.

Gagne, R. M., & Briggs, L. J. (1979). *Principles of instructional design (2d Ed.).* New York: Holt, Rinehart & Winston.

Gagne, R. M., Briggs, L. J., & Wager, W. W. (1988). *Principles of instructional design (3d Ed.).* New York: Holt, Rinehart & Winston.

Gustafson, K. L. (1981). *Survey of instructional development models with an annotated ERIC bibliography.* Syracuse, NY: ERIC Clearinghouse on Informational Resources.

Verhagen, P. W., & Plomp T. (April 1988). Educational technology: A Dutch contribution to the debate. In H. Mathias, N. Rushby, & R. Budgett (Eds.), *Aspects of educational technology, Volume XXI: Designing new systems and technologies for learning.* New York: Nichols.

von Bertalanffy, L. (1968). *General systems theory.* New York: Braziller.

SECTION 4

Five Metaphors: Alternative Theories for Human Resource Development

Karen E. Watkins
Assistant Professor
Graduate Program in Adult Education and
Human Resource Development
The University of Texas

Despite the seemingly ubiquitous presence of general systems theory in discussions about a theoretical perspective for human resource development (HRD), many other disciplines with their own dominant theories have also influenced human resource development, thought, and practice. A theory is a coherent system of propositions that purport to explain something. Without theory, consistent explanation is impossible, and every new piece of information is isolated and unexplained (Mintzberg, 1980). Theories from different disciplines attempt to explain the universe, using the tools and perspectives of that discipline. An interdisciplinary applied field like HRD can thus be expected to make use of many different theories. Ronald Jacobs's argument centers on a defining metaphor for the field that characterizes human resource developers as organization problem solvers. General systems theory is a robust and useful diagnostic theory, which befits Jacobs's metaphor. His discussion arises from a conception of the human resource developer as a staff person or mid-level manager in the hierarchy of the organization. Others in this volume have argued for the use of a systems perspective at the strategic apex—the top-most strategic perspective of the organization.

Just as different disciplines and different system levels may call for different theories, so may alternative *metaphors* for the role of human resource developers call for different theories. Five such metaphors will be considered here and are depicted in Figure 1: The human resource developer as organizational problem solver, organizational change agent/interventionist or helper, organizational designer, organizational empowerer/meaning maker, and developer of human capital.

Figure 1—The human resource developer as . . .

Metaphors	Organizational problem solver	Organizational change agent	Organizational designer	Organizational empowerer	Developer of human capital
Underlying theory	**General systems**	**Field and intervention theory**	**Theory of work, Design theory**	**Critical theory**	**Human capital theory**
Key idea(s)	All human organizations can be viewed as made up of the same parts that are found in biological organisms and exist in the same ecological balance. The parts are inputs, processes, and outputs.	Behavior is a function of the field in which it is embedded, and intervention must promote the health and the autonomy of the client.	The design of an organization's structure, work, information flow, and environment will influence human performance positively or negatively.	People need to be freed from self-imposed constraints and to construct new meaning states in which to act.	People acquire productive capacities at some cost and will command a price in the labor market because they are useful in producing products and services.
Application to HRD practice	General systems theory is a useful aid for analyzing increasingly complex aspects of organizational functioning and for determining what the "whole" should be.	Force-field analysis helps change agents determine where to intervene to bring about a change; intervention theory suggests *how* they should intervene.	Projects in work redesign and organizational effectiveness and research on unprogrammed activity can encourage higher levels of strategic action by human resource developers; they, in turn, can help design organizations that develop people, not just products.	Assisting people and organizations in critically reflecting on what is oppressing them and how their organizations can free them to create new worlds and to design organizations not for control but for adaptability.	Techniques such as cost-benefit analysis, human resource accounting, and econometric modeling enable human resource developers to determine and predict the long-term impact of their practice on people and organizations.
Key limitation	There is a fundamental determinism underlying systems theory that disturbs many; moreover, it is so often at such a macro level that few know how to make practical use of it.	Many argue that the first question is *whether* one should intervene to change people and organizations. The ethics of the change may not be explicitly examined.	Human resource developers seldom have the opportunity to act at a strategic level. Also, unprogrammed activity may not be "programmable"; thus this may not be a training situation, but a staffing situation in which one hires people who can handle nonroutine work.	A focus on social control as oppression obviates discussion of how people and organizations might need control, and it ignores the costs of freedom.	When people do not have control over the capital system, training may not change their economic status; thus training may not improve their capital worth.

Organizational Problem Solver

For many years, the dominant image of the trainer has been one of a person who designs instructional programs to respond to organizationally defined problems. Training has been largely behavior oriented, in keeping with the emphasis on skills training. Systems theory is a useful tool for designing programs to respond to clearly defined problems. It enables people to attend to the whole and to classify and define the parts of a system. Depending on how broadly they define the system, they can think about the problem in increasingly broad terms. From the level of the individual to the "whole wide world environment," systems are made up of the same parts—context, inputs, processes, outputs, and feedback loops. These parts not only help clarify the elements of a system, but they have definable characteristics that can be tinkered with to produce alternative outputs. By increasing the number of inputs, by improving the processes that produce the outputs, or by drawing resources more effectively from the environment, or context, we can alter the cost and effectiveness of our outputs. Because systems theory has been so useful for helping trainers think about the nature of the problems they are trying to solve, the theory has been widely favored. But there are problems with relying on it.

Systems theory is a useful diagnostic theory, but it does not help us decide which parts are working and which are not. It is not normative, so there is no hint about what might be a more ideal solution to the present situation. Moreover, systems theory focuses more on problem solving than on problem finding, yet the complex, turbulent environments in which organizations find themselves today demand much greater emphasis on the problem-identification phase of the problem-solving process.

Systems theory has grown out of the recognition that to solve the problems of the world, we need models that are more holistic than analytic, as were those in favor previously. Greenman (1978) suggested that efficient system models help people and organizations maintain purposeful, goal-directed behavior. He pointed out that there are inherent dilemmas in the use of systems models, such as the dilemma of oversimplifying complex environments or the dilemma of idealism versus realism. To accompany the classic systems model, Greenman developed a decision-making cycle that moves through three phases: *policy making, preplanning evaluation,* and *action implementation,* which therefore incorporates problem solving. Senge (1987) has noted that decision making is where most problems occur. Decision making is the product of a mental model, and if a manager's mental model is inadequate, he or she will make poor decisions. Senge hypothesizes that managerial learning processes will be more effective if they are the result of a systemic and

a dynamic perspective or world view. He concludes that the task of HRD professionals is to map, challenge, and improve existing mental models. The systems approach, when conceptualized broadly, may be a useful model for addressing short-term perspectives, truncated problem-solving processes, or limited world views.

Because systems theory does not include even an implicit normative model, it is often coupled with other theories of organizational change or effectiveness to enable decision makers to move from diagnosing problems in a system to prescribing action. Systems thinking is often at a fairly macro or abstract level, and some other model or theory is needed to identify operational constructs that can be enacted in organizations. The following metaphors are often used in concert with systems theory.

Organizational Change Agent/Interventionist or Helper

Many would argue that the most compelling metaphor for HRD is that of organizational change agent or helper (see Mink & Watkins, 1983). In this conception, human resource developers help people and organizations change. To do this, they need a theory of how human beings and groups are led to act as they do and what interventions might influence them to act differently. To start at the beginning, we must start with Kurt Lewin, the father of organizational change agentry.

Lewin's field theory is a comprehensive depiction of human behavior. First there was Freud, who gave us a theory to help us understand the importance of individual history, and then there was Lewin, who helped us understand the group, especially as a means of understanding people (Argyris, 1952). These two remain the most influential thinkers in psychology. Lewin developed field theory out of the field concept in physics—the study of electromagnetic fields—which eventually led to Einstein's theory of relativity. The first psychologists to use field theory were the gestalt psychologists, who believed that the way an object is perceived is determined by the context in which it is embedded and that the relationship between the parts of that perceptual field is more important than the characteristics of those separate parts (Hall & Lindzey, 1970). Lewin, who was associated with these early gestalt psychologists while at the University of Berlin, developed field theory as a way to represent psychological reality. He had three major premises:

- Behavior is a function of the field that exists at the time the behavior occurs. This has often been expressed as the equation $B=f(P,E)$, or behavior (B) is a function (f) of the interaction between a person (P) and his or her psychological environment (E).

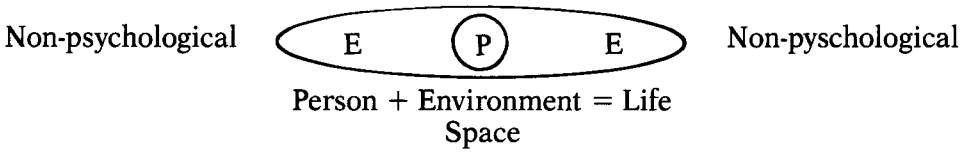
- Analysis begins with the situation as a whole (the gestalt) from which we may differentiate parts.
- The concrete person in a concrete situation can be represented mathematically (Hall & Lindzey, 1970).

To amplify the first premise, Lewin termed the environment, as the person perceives and organizes it, the psychological field, or the *life space.* Lewin suggested that the life space was made up of the person and his or her environment. He believed these parts were dynamically interrelated and held in equilibrium, with changes in any part affecting the whole just as in an electromagnetic field. Field theorists believe that a field not only surrounds the individual, but it also combines or overlaps with that of others to make up the *social field* (Argyris, 1952). Thus, by studying the organization in the individual, we can know the organization. A related idea in field theory is that past events only influence behavior in the present in terms of present conditions. For example, growing up with an alcoholic does not affect one's present behavior, but the mental "tapes" and embedded shame-based behavior one carries over from the past may.

Lewin sought to understand the psychological field with enough rigor that it could be represented mathematically. He even developed a new mathematic to help him represent psychological reality. Using topology, he could mathematically depict the connectedness of regions in the life space. Such concepts as Karl Weick's (1976) loose and tight coupling and the idea of having no permeable boundaries for the self illustrate ways we have conceptualized the degree of connectedness between regions. Although that degree of connectedness is more psychological than spatial, it is nevertheless clear and observable and hence may be represented mathematically. Organizational researchers, for example, sometimes measure the degree of loose or tight coupling in decision making by the number of decisions that organizational members say must go to the top of the organization.

Lewin developed "hodology," or a mathematic of path, to express psychological distance and direction. Lewin's concern was for powerful, scientific discourse, and the language of mathematics was considered the most powerful. He chose the mathematics of spatial relationships because he wanted to explain that it is the person in his or her life space. He depicted the person as a circle within a larger circle, much like the boy in a bubble. Thus, people have boundaries that differentiate them from each other and from their environment. Yet they also are included in a larger area or context, which also defines who they are. Bordering the entire life space is a *foreign hull,* which Lewin described as made up of all the data to which a person is not now attending but which is nevertheless part of his or her environment (Hall & Lindzey, 1970).

Figure 2—The psychological lifespan



By varying the thickness of the circle around P, we can indicate a person's accessibility or inaccessibility. Lewin divided the life space into regions based on relevant psychological facts at any given moment. Those that are relevant to the person are *needs*; those that are relevant to the environment are *valences*. Needs are a system in a state of tension, or psychological energy, directed toward the boundaries of the system (Argyris, 1952). Needs are directed toward *goals*—regions in the life space that are attractive to the person or, in other words, have a positive valance. Here the electromagnetic analogy seems clear. Lewin said there may be *barriers* in the life space that create resistance to goal attainment, and these barriers may be social, physical, or psychological. The clarity with which a person perceives the field in terms of structure, the amount of differentiation, and the relationships between regions is the *cognitive structure.* The regions of the personality are organized in definite relationships to each other; this arrangement is called the *psychological structure.*

Force in the psychological field is the tendency toward movement in people or groups. *It is the cause of change.* It is a vector with direction and magnitude or size. Every force in one direction has its opposite, so the direction of movement will depend on the strength of a given force. A force field is a constellation of forces. Human resource developers commonly use force-field analysis to analyze conflict situations, to problem solve, or to identify change strategies. It consists of analyzing the forces promoting and inhibiting change and determining the strength of each of those forces, followed by developing strategies to reduce the strength of the restraining forces and testing those strategies in action.

Lewin's theory can also be viewed in terms of adult development. Adults, he said, have more regions in their personality and are thus more differentiated than children. The boundaries between regions of the adult are less permeable, making adults more rigid but also less affected in one region by frustrations in another. In contrast, the child who wants an apple and can't have it will find that his frustration spreads to his play, his ability to concentrate, and so on. Long periods of frustration may produce de-differentiation in adults. For example, when workers are underutilized, their behavior deteriorates in all areas of their lives.

The *social field* is made up of the group life space and may contain many subgroups or regions. The group has its own unique properties, both structural (the degrees of differentiation, stratification, and unity, as well as the type of organization or social hierarchy) and dynamic (group goals, ideal goals, style of living, and psychological and social climate) (Argyris, 1952).

Most people are part of many groups. Often these groups create *overlapping situations* for people. Chris Argyris (1952) used the example of a foreman who is both part of the worker group and part of the management group. The degree of *consonance*, or similarity in values, norms, and goals, between the groups will increase or decrease the amount of conflict in the foreman's life. Conflict is further affected by the potency of each group under the foreman, the amount of overlap, the valence or desirability of that overlap, and the nature of the barriers between the groups (Argyris, 1952). A clearer understanding of the nature of groups, intergroup conflicts, and the psychological reality internalized by individuals as members of groups grew out of Lewin's work.

Finally, people vary in terms of the relative accessibility of various regions in their life spaces. This concept is defined as their *space of free movement.* A person may view a region negatively or may have a barrier imposed around a region. In either case, movement toward personal goals will be impeded. For example, adults who have difficulty playing have limited their space of free movement. Also, in the case of a foreman in a newly unionized company, the union will circumscribe the foreman's ability to hire, fire, and work directly with the workers. Psychologically, the foreman's space of free movement also will be circumscribed.

Perhaps the most significant aspect of field theory is that it does not purport to be or to explain objective reality, but rather to explain a person's psychological reality, which is not what *is* but what that person perceives reality to be. But Lewin did not develop his theory only to explain human behavior at an abstract level. Like most human resource developers, he was interested in observing these abstract concepts at work at the practical level. He believed that one had to have a theory that was broad enough to encompass the multifaceted nature of human action and that the way to test that theory was through a process called *action research.*

Action research can be thought of as a series of successive approximations. Interventions are developed while looking at the whole (at the individual level, at the life space, at the organizational level, and at the social field). Interventions are made and their effects studied. They are followed by new interventions, which are developed upon reflection of the previous effects on the whole. Lewin depicted the process of movement from a present state to a desired state through action and reflection as a process of unfreezing, changing, and refreezing.

Lewin's concepts will not lead to simple prescriptions or step-by-step instructions for human resource developers wondering what to do on Monday, but they do bring into sharper focus the architectural structure of human and organizational relationships in a way that permits a rich analysis of organizational life.

The work of Chris Argyris, who was one of Lewin's last students, furthers our understanding of how to use field theory in organizational change efforts. He defined intervention as entering "into an ongoing system of relationship, to come between or among persons, groups, or objects for the purpose of helping them" (1970, p. 15). In field-theory terms, to intervene is to interrupt the forces in the life space in such a way as to disrupt the quasi-stationary equilibrium.

Argyris emphasized that the system exists independently of the intervenor and that despite the interdependencies that develop between the client system and the intervenor, the intervenor should focus on how to maintain or increase the autonomy of the client system, how to differentiate even more clearly the boundaries between the client system and the intervenor, and how to conceptualize and define the client system's health, independent of the intervenor. *The client must be the system as a whole regardless of where one initially begins to work,* he said. Interventions, must, over time, provide all members with opportunities to enhance their competence and effectiveness (Argyris, 1970). Perhaps because of the ethical implications of tinkering with a person's or an organization's life space, the intervenor's primary tasks are to seek valid information, to provide for free and informed choice, and to encourage the client's internal commitment to the choices made in the interventions.

As HRD practitioners, our theories of practice usually contain intervention theories—theories of action aimed at increasing our effectiveness (Argyris & Schon, 1982). Because these theories are largely tacit, we need to reflect critically on what we actually do in order to examine and test our assumptions about what causes us to be effective. Argyris developed a normative theory of intervention. Having observed repeated patterns in people's theories of practice, he identified the pattern most commonly found in people's actual practice as a control orientation. In contrast to this pattern is a learning-oriented intervention theory that encapsulates Argyris's prescription for effective intervention.

Viewed from the perspective of field theory, Argyris can be seen to have defined the intervenor-client relationship in a way that will minimize the potential conflict in an overlapping situation (or field) in order to decrease the conflict that might be produced by attempts to control others and in order to permit learning to occur. His primary tasks for intervenors are designed to minimize the production of perceptual barriers in the forms of defensiveness, negative attributions about the intervenors' motives, and other self-protective responses that could limit the intervenor's space of free movement and

subsequent learning. By emphasizing the need for shared meaning between client and intervenor about goals and the personal causal responsibility of the client for actions and choices, Argyris hoped to increase the consonance between the two overlapping situations.

Action science (Argyris, Putnam, & Smith, 1985) has been defined as "an inquiry into how human beings design and implement action in relation to one another." It has three key features:

- empirically disconfirmable propositions that are organized into a theory;
- knowledge that human beings can implement in an action context;
- alternatives to the status quo that both illuminate what exists and inform fundamental change, in light of values freely chosen by social actors (p. 4).

These three propositions have traveled far from Lewin's three key tenets. Like Lewin, Argyris believed that human action is the result of subjective human perception that occurs within a behavioral world or a life space. Both agreed that this knowledge of the perceptual world can inform and reform action. Lewin believed that for adults, education was most often re-education, a process of unfreezing that begins with a disconfirmation of one's present beliefs or perception of reality, which leads to anxiety or guilt and finally to a search for psychological safety. The critical theory that people change as a result of an internal critique in which they perceive that their own action is in conflict with their own values has refined Argyris's concept of re-education.

Argyris described re-education as a process of disconfirmation based on internal critique, which leads to a sense of personal causal responsibility (as in, "I produced this mismatch—this action that conflicts with my values"), which can then lead to psychological success or congruence between one's internal critique and the external feedback one receives. Argyris noted that people and organizations develop elaborate defensive routines to deny that these mismatches occur and to save face. Only by interrupting those defensive routines will people and organizations experience psychological success.

In both Lewin's and Argyris's work, the emphasis is on a way of understanding people, especially in their social context. They offer, not a technical prescription for action for change agents, but rather a rich conceptual framework for action in any change situation.

Organizational Designer

A third metaphor for HRD is that of organizational designer. Organizational design is the process of first diagnosing and then selecting the structure and formal system of communication,

authority, and responsibility to achieve organizational goals. Organizational designers attend to environmental flux, strategic choices, and the uncertainty or certainty of task or technology (Hellriegel, Slocum, & Woodman, 1986). People who work from this conception or metaphor see a clear connection between the structure of work and work organizations and the development of the organization's human resources. A foundational theory for students of organization design is Herb Simon's administrative decision-making theory.

Simon (1965) theorized that individuals have a bounded rationality that leads to satisficing in decision making. Given the quantity of information we deal with, we need to find boundaries within which to make rational decisions. We may use heuristics or rules of thumb, which, experience suggests, usually lead to acceptable solutions; but heuristics may limit the search for solutions, especially in large, complex problem spaces (note the Lewinian image). In contrast, algorithms are more rigorous, systematic procedures. One goal of management science is to discover more algorithms by which managers may make more consistently effective decisions.

To meet this goal, we need to have a concept of the elements that make up decision-making activity. The response of managers to a stimuli is a program, the basic element of Simon's theory. A program has basic parts:

- a stimuli—the information that evokes a program
- inputs—both facts and values
- content—a series of execution steps
- outputs

There are programmed and unprogrammed activities: A programmed activity is prompted by a single clear stimulus. An unprogrammed activity is evoked when there is no tried-and-true method for handling the stimulus, either because it is a new situation, its nature is elusive and complex, or because it is so important that it deserves a customized response. Unprogrammed activity has three stages of individual activity, each stage of which is so rich that the stage itself has theories. The stages are:

- intelligence activity—searching the environment for conditions calling for a decision
- design activity—inventing, developing, and analyzing courses of action
- choice activity—selecting a course of action from those available

For intelligence activity, theorists have explored the differences in problem framing between novices and experts. Schon (1983) found that experts frame problems through a kind of artistry that defies routinization, whereas novices follow more of a technical, by-the-numbers process. Jaques (1985) suggested that individuals vary in cognitive complexity or work capacity. Work capacity is the longest time period one can plan a project or work without the need of

feedback. This variable, Jaques said, is a given in individuals, like their height, and it varies enormously. Most people have a work capacity between three months and one year. A few scientists, politicians, and leaders have work capacities that exceed their lifetimes; they are designing new worlds. People with limited work capacities cannot fall back far enough to view a problem with a wide-angle lens, nor can they conceive of long-term solutions or parallel implications. Thus, they are limited in the scope of work that they can design.

Design activity has also been studied extensively. We see design as having both a conceptual and an aesthetic quality, whether we conceive of it

- in the dictionary sense, as in conceiving an idea or a form, planning and shaping a structure, using tools and materials creatively, and making something useful;
- in the broader context used by Simon, as in converting actual to preferred situations;
- or in accordance with C. West Churchman's (1971) notion that design is occurring whenever we consciously attempt to change ourselves and our environment to improve the quality of our lives (p. vii).

Churchman (1971) stated that design is "thinking behavior which conceptually selects among a set of alternatives in order to figure out which alternative leads to the desired goal or set of goals" (p. 5). Schon (1983, 1987) understands design to be a process of problem framing or problem setting, in which the artistry of expert practitioners is a "reflective conversation with a situation," which may lead to a reframing of the situation and thence to an architectural plan or a therapeutic intervention. Pfeiffer and Jones (1973) described the design process in training as dependent on four considerations:

- the parameters of the situation (time, place, resources, staff, etc.)
- the skill needed to design
- the components to be designed
- outcome criteria, which are defined in terms of client needs

Those considerations will be influenced greatly by the conceptual skill (thinking behavior) and the design expertise (artistry) of the designer. Design is artistic because in these nonroutine, unprogrammed activities, we must create a new artifact, plan, or training program.

Most of what human resource developers do is unprogrammed activity. Organizational design has emerged as a distinct field within the study of organizations. Galbraith (1974) noted that "the ability of the organization to successfully utilize coordination by goal setting, hierarchy, and rules depends on the combination of the frequency of exceptions and the capacity of the hierarchy to handle them" (p. 29).

Organizational design was thus the creation of responses to uncertainty, which he said could be done, either by

- reducing the need for information processing through creating slack resources or self-contained tasks, or by
- increasing the organization's capacity to process information through investment in vertical information systems or through the creation of lateral relationships.

Lorsch (1971) focused on the design dimensions of differentiation and integration. In each of these theoretical models, organizational design is triggered through a process of assessing the gap between where the organization is now and where it needs to be, based on a normative model of organizational effectiveness.

Design theory has emerged from the literature of art, architecture, computer science, decision making, and education. Houle, in *The Design of Education* (1972), found that design is a two-part process consisting of first examining the situation in which the learning activity occurs and then applying a framework to that situation. The framework can be systems theory, field theory, or some other theory; although designers who operate only out of a credo or belief system, such as Malcolm Knowles's andragogy, will find that their frameworks are not broad enough to guide a program design process. Thus, the systems approach is a useful theoretical tool to guide the design stage, but other theories may be more useful for Simon's other two stages of unprogrammed activity.

Organizations increase productivity by increasing the level of routinization. Thus, a major task for human resource developers is to help managers design routine responses for nonroutine, unprogrammed activities. There are many ways to do this, from designing a learning program for training machine operators to use a new machine, to designing strategic systems for monitoring unstable or unpredictable processes. General systems theory is an analytical process model, not a content model. In order to develop models for diagnosis and prescriptions for action, organizational design theorists add to systems theory other normative content theories, such as a theory of an open, healthy person or a theory of organizational effectiveness.

Organizational Empowerer/Meaning Maker

Theorists who embrace this metaphor seek to transform people and organizations in order to foster long-term health and effectiveness. They view the organization and its people as repressed and disenfranchised. As adherents of the philosophy that meanings are in people, they would agree with Smirich (1983) that "organizations are socially constructed systems of shared meaning" (p. 221). In modern terms, they follow the prescripts of critical theory. Critical theories

are aimed at producing enlightenment in those who hold them and are inherently emancipatory in that they help people free themselves from self-imposed coercion.

Critical theorists contrast their type of knowledge, which is "reflective," with that of normal science, which is "objectifying." They argue that because knowledge is never objective, the search for objectivity in normal science tends to objectify people and natural phenomena. Critical theory emancipates by offering a critique of "what is" from the perspective of "what might be." It seeks to stimulate self-reflection so that people may freely choose to transform their world. Geuss (1981) has defined emancipation as a movement, or transformation, from an initial state to a final state.

- The initial state is one of false consciousness, error, and unfree existence, in which
  - this false consciousness is interconnected with the oppression
  - the false consciousness is self-designed, and the oppression is self-imposed
  - the power in the above lies in the fact that people do not realize their oppression is self-imposed
- The final state is one in which people are free of false consciousness (enlightened) and free of self-imposed constraints (emancipated).

People move from one state to another by engaging in a process of self-reflection, or critical reflectivity, in which they

- dissolve the illusion of objectivity
- become aware of their own origin and
- bring to consciousness the unconscious determinants of their action (Geuss, 1981)

As a result of this reflection, a perspective transformation will occur (Mezirow, 1981), and the person will generate new knowledge, which may be generalized into a critical theory. This reflective thinking has also been referred to as an internal critique of a person's epistemic beliefs (second-order beliefs about which beliefs are acceptable) in which the person's values are seen to contradict his or her ideal of a good life.

The critical theory so generated will consist of three parts:

- a demonstration that change is possible
- a depiction of the practical necessity of the change, as the present situation has produced frustration and suffering and is only thus because people hold a particular world view that, upon critical reflection, is no longer acceptable
- an assertion that the movement or transformation can only come about if people accept the critical theory as their "self consciousness" (Geuss, 1981, p. 76).

The best-known critical theories are psychoanalysis for individuals and Marxism for social systems. Action science comes closest to operationalizing the idea of a critical theory for organizations.

The strategies used to transform perspectives in action science include determining the potential unintended or unjust consequences of action strategies; ensuring that participants feel personal causal responsibility for their actions; and offering an alternative for action in the form of learning-oriented behavior rather than coercive or control-oriented behavior.

Developer of Human Capital

The fifth and final metaphor of the human resource developer is that of the developer of human capital. A derivative of economics, human capital theory refers to "the productive capabilities of human beings that are acquired at some cost and that command a price in the labor market because they are useful in producing goods and services" (Parnes, 1986, p. 1). Flamholtz (1985) emphasized that it is the "expected realizable value" of a person, given opportunities for training, expected turnover, age to retirement, promotability, and so on, that has ultimate value in a human resource accounting system. Value is typically perceived as the relationship between costs and benefits (or the return on investment). Gordon (in LaBelle, 1988) outlines the economic assumptions that underlie human capital theory: "Product and labor markets are competitive, firms attempt to maximize profits, workers seek to maximize earnings, and the labor force has both knowledge and mobility to take advantage of the best opportunities available" (p. 206).

Salaries are seen in supply-and-demand terms. A worker's skills and abilities are a form of capital because they influence the worker's productivity for the organization as well as the worker's opportunities for higher wages, greater economic security, and increased employment prospects. Education, or training, is seen in the human capital model as a major tool to influence workers' acquisition of the needed knowledge and skills.

Dierkes and Coppock (1975) suggested that human needs are met in organizations as the result of a chain of interventions that have allowed a problem to bubble-up from a state of recognition by subgroups in society, to legislation, to organizational enforcement of new human resource standards. An example is the human need for equal pay for equal work. A more proactive approach—one that attends to the organization's long-term human resource needs—is human resource accounting.

To illustrate how difficult it is to justify training without the concept of human resource accounting, Dierkes and Coppock compared how we now account for management's spending $100,000 on a new piece of equipment and how we account for spending the same amount on employee training or on efforts to improve the quality of the work environment. When purchasing equipment, the manager

anticipates amortizing the costs over the expected life of the equipment and being able to document benefits by listing the equipment as an asset over a number of years. When purchasing human resource development, the manager anticipates incurring costs for the current year, with no amortization over the useful life of the skills gained.

Human resource accounting systems have been developed to attempt to overcome this short-range distortion in measuring organizational economic effectiveness. Initially, the focus was on developing accounting procedures to determine investments in human capabilities. Human resource information systems attempted to inventory human resources, determine outlay and replacement costs, and determine the economic value of the human resources employed in the organization. Succession plans and lists of high-potential employees are recent outgrowths of organizational attempts to develop inventories of their human resource assets. These approaches led to a definition of the economic value of human resources as "the present discounted value of their [individuals'] future contributions less the costs of acquiring, maintaining, and utilizing these resources in the organization" (Pyle, in Dierkes & Coppock, 1975, p. 313).

The first extension of the application of human resource accounting systems was to health and safety measures, because, if people are assets, anything that diminishes those assets will diminish the organization's expected realizable value. The costs of investments in employee health, rehabilitation, safety measures, and safety training can be compared with the costs of days lost because of accidents and illnesses. It is a short step from there to examining the economic impact of the psychological work environment. The research and literature on job satisfaction, matching jobs and people, climate, leadership, motivation, etc., illustrates the high degree of interest in this approach. However, research linking these tertiary effects to productivity typically involves assumptions of correlation when, for example, both climate and productivity change in value without careful concomitant control of any intervening social, historical, demographic, or political variables. Such research is difficult to conduct. Rensis Likert and David Bowers (1973) made perhaps the most comprehensive attempt to capture such relationships. In analyzing the result of a large number of studies, they found a .67 correlation between organizational climate and subordinates' satisfaction and a .42 correlation between subordinates' satisfaction and total productive efficiency. Given the large number of studies they used, these are fairly strong relationships, which suggest that climate influences satisfaction and leads to at least modest gains in productivity.

Human capital theory provides a strong, bottom-line-oriented justification for HRD. It breaks down the barriers that now exist between

organizational development approaches that attempt to influence climate and quality of work life, employee assistance, and other employee health and safety areas, and the more conventional training and development arena of HRD. Each area makes its contribution to the organization's long-term effectiveness. The human capital, or human resource accounting approach, is perhaps most valuable for this long-term emphasis.

Changing demographics and higher labor participation by women and minorities along with recent technological changes are creating an enormous need for long-range thinking. "It becomes increasingly clear that economic security in the post-industrial economy depends less on expertise and more on *flexpertise*—the ability to continually adapt individual knowledge and skill. . . . Virtually the entire adult population needs retraining and new learning to be economically productive. . . . The emergence of a knowledge-based economy requires a new synthesis of the functions of training, education, and other forms of communication and learning under the single umbrella of the learning enterprise" (Perelman, 1984, pp. xvi–xvii).

Carnevale (1984) has offered a similar analysis of the role of training and development in developing human capital. According to Carnevale, workplace learning and formal education account for more growth in economic output than employee health, capital, the composition of the workforce, population size, or resource adaptation. Workplace learning, he said, accounts for 85 percent of the variance in lifetime earnings. The relationship between learning and training and economic returns for both people and organizations enjoys a distinguished, currently prominent place among the theoretical underpinnings for HRD.

Critics of human capital theory point to the limits of capitalism and to economic explanations of what people gain from investments in learning. In the first instance, they discuss the role of training as a means of social control, using as examples

- training as a means of deskilling, or "cooling out" the aspirations of many people so they will accept low-level jobs, and
- organizational training programs to socialize newcomers into conforming to the organization's norms and values.

Moreover, the inherent class structure and objectification of workers in bureaucratic organizations may produce lower productivity despite training efforts (LaBelle, 1988).

People gain considerably more from training than simply an enhanced economic value. Intrinsic satisfaction, enhanced life skills, the increased capacity to function effectively as parents, as citizens are alternative benefits derived from training. In fact, people often regard training as a fringe benefit—a view human resource developers deplore, as it often leaves training budgets seeming as expendable as other fringe benefits. Yet this perspective may also correctly capture a more holistic, value-added approach to understanding the benefits of training.

Conclusion

The underlying root theories of the field of HRD are rich and varied. Figure 1 offers a brief comparison of the theories presented in this chapter. Increasing understanding among practitioners of their potential to enrich and improve practice often requires translations, such as Peter Senge's translation of systems theory to mangement practice, and Argyris's translation of field theory to HRD practice. When human resource developers come to embrace many different theoretical foundations, practice will be enlarged and will rise to the level demanded by the present complex, nonroutine, ambiguous business environment. Not one, but many metaphors, can be used to guide our understanding of the field of our practice.

References

Argyris, C. (1952). *An introduction to field theory and interaction theory.* New Haven, CT: Yale University Labor and Management Center.

Argyris, C. (1970). *Intervention theory and method.* Reading, MA: Addison-Wesley.

Argyris, C., Putnam, R., & Smith, D. (1985). *Action Science.* San Francisco: Jossey-Bass.

Argyris, C., & Schon, D. (1982). *Theory in practice: Increasing professional effectiveness.* San Francisco: Jossey-Bass.

Carnevale, A. (1984). *Jobs for the nation: Challenges for a society based on work.* Alexandria, VA: American Society for Training and Development.

Churchman, C. W. (1971). *The design of inquiring systems: Basic concepts of systems and organization.* New York: Basic Books.

Dierkes, M., & Coppocks, R. (1975). Human resources accounting: A tool for measuring and monitoring manpower utilization in a business environment. In W. T. Singleton & P. Spurgeon (Eds.), *Measurement of human resources.* New York: Halsted Press.

Flamholtz, E. (1985). *Human resource accounting, (2d Ed.).* San Francisco: Jossey-Bass.

Galbraith, J. (May 1974). Organization design: An information processing view. *Interfaces, 4,* 28–36.

Geuss, R. (1981). *The idea of a critical theory.* New York: Cambridge University Press.

Greenman, J. (Ed.). (1978). *Applied general systems theory.* New York: Harper & Row.

Hall, C., & Lindzey, G. (1970). *Theories of personality, (2d Ed.).* New York: Wiley & Sons.

Hellriegel, D., Slocum, J. W., & Woodman, R. W. (1986). *Organizational behavior (4th Ed.).* New York: West Publishing.

Houle, C. (1972). *The design of education.* San Francisco: Jossey-Bass.
Jaques, E. (March 3, 1985). His brilliant theory scares management. *Sunday Express News,* San Antonio, TX.
LaBelle, T. (September 1988). Nonformal education for industrialization in Latin America: The human capital approach. *Alberta Journal of Educational Research, 34,* 3, 203–214.
Likert, R., & Bowers, D. (March 1973). Improving the accuracy of P/L reports by estimating the change in dollar value of the human organization. *Michigan Business Review,* 15–24.
Lorsch, J. (Autumn 1971). Organization design: A situational perspective. *Organizational Dynamics.* New York: American Management Association.
Mezirow, J. (1981). A critical theory of adult learning and education. *Adult Education* 3–24.
Mink, O., & Watkins, K. (1981). Implementing a competency-based program. *Models and concepts for T&D/HRD academic programs.* Washington, DC: American Society for Training and Development.
Mintzberg, H. (1980). *The theory of management policy.* Management course text, McGill University.
Parnes, H. (1986). *Developing human capital.* Columbus, OH: National Center for Research in Vocational Education.
Perelman, L. (1984). *The learning enterprise: Adult learning, human capital, and economic development.* Washington, DC: Council of State Planning Agencies.
Pfeiffer, J., & Jones, J. (1973). Design considerations in laboratory education. *1973 annual handbook for group facilitators.* San Diego: University Associates.
Schon, D. (1983). *The reflective practitioner: How professionals think in action.* New York: Basic Books.
Schon, D. (1987). *Educating the reflective practitioner.* San Francisco: Jossey-Bass.
Senge, P. (1987). Catalyzing systems thinking within organizations. In F. Masarik (Ed.), *Advances in organization development.* Norwood, NJ: Ablex.
Simon, H. (March 1965). Administrative decision making. *Public Administration Review,* 31–37.
Smirich, L. (1983). Implications for management theory. In C. C. Putnam & M. E. Pecanowskey (Eds.), *Communications and organizations: An interpretive approach.* Beverly Hills, CA: Sage Publications.
Watkins, K. (in press). Human resource development. In S. Merriam & P. Cunningham (Eds.), *1990 annual handbook of adult education.* San Francisco: Jossey-Bass.
Weick, K. E. (1976). Educational organizations as loosley coupled systems. *Administrative Science Quarterly, 21* 1, 1–19.

About the Authors

Barry A. Boothe
Training Manager
Caterpillar, Inc.
P. O. Box 504-B22
Joliet, IL 60434
815/729-6287

Barry Boothe manages a performance engineering group that solves performance problems at all levels of the organization and in all types of work. He is known for his massive application of job aids/performance guides and for his use of individualized, fast-tracked courseware.

Boothe, who has been with Caterpillar for 30 years, is a former president of the Chicago Chapter of the National Society for Performance and Instruction and a member of NSPI's National Board. The focus of his work has always been on bottom-line outcomes as they are revealed through measured results.

Neal E. Chalofsky
Associate Professor
George Washington University
8108 Roanoke Avenue
Takoma Park, MD 20912
301/588-4667

Neal Chalofsky is an Associate Professor of Human Resource Development at the George Washington University. He is also president of his own consulting firm in the Washington, DC area. Formerly he was on the faculty of Virginia Tech's Northern Virginia Graduate Center. He has also worked as an HRD specialist, manager, and researcher for several federal and private-sector organizations for more than 10 years.

Chalofsky has consulted with such organizations as Computer Sciences Corporation, the Smithsonian Institute, the World Bank, Arthur Young & Co., the National Alliance of Business, and the U.S. General Accounting Office. As an active member of the American Society for Training and Development, he sits on the Standards and Competencies Task Force, the National Research Committee, the 1989 National Conference Design Committee, and the Editorial Board of the *Training & Development Journal.*

Chalofsky has presented at numerous national and international conferences. He is the co-author of *Effective Human Resource Development* and *Up the HRD Ladder,* plus numerous journal articles and handbook chapters.

Oliver W. Cummings
Director, Research & Evaluation
Arthur Andersen & Co., S. C.
Center for Professional Education
1405 N. Fifth Avenue
St. Charles, IL 60174
312/377-3100

Oliver Cummings is a principal in Arthur Andersen & Co. and directs a group responsible for educational and training technologies research and for evaluation of training programs at the Center for Professional Education. Prior to joining Arthur Andersen in 1981, he worked as an educational researcher and evaluator at the Grant Wood Area Education Agency in Cedar Rapids, Iowa, and as a senior editor and regional coordinator for Houghton Mifflin Publishing.

Cummings is an active member and frequent contributor to several professional societies and serves on the Board of Directors of the American Evaluation Association. He received his Ph.D. from the Department of Educational Psychology at Southern Illinois University-Carbondale.

Henry L. Dahl, Jr.
Director, Corporate Employee Development
and Planning
The Upjohn Company
7000 Portage Road
Kalamazoo, MI 49001
616/385-6910

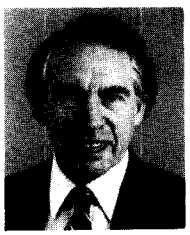
Henry Dahl heads a group that focuses on helping Upjohn management improve the effectiveness of the organization, its executives, and its managers. He has 30 years of human resource management experience with the company in many corporate and divisional positions. He has published and lectured widely on the topic of measuring and improving the return on investment in human resources.

Dahl has co-produced two motion pictures communicating the employee management philosophy at Upjohn. He has also co-produced a management development computer simulation that is designed to help managers learn the short- and long-term economic results of their decisions in human resource development.

Dahl holds a B.B.A. degree in industrial relations from the University of Minnesota. He is a member of the American Society for Training and Development, the American Society for Personnel Administrators, and the Human Resource Planning Society and vice-president of the Midwest Human Resource Planning Group.

Deane B. Gradous
Human Resource Development Consultant
15413 Holdridge Drive
Wayzata, MN 55391
612/473-1607

Deane Gradous is a consultant and author. She received a B.A. in English and business from Valparaiso University and an M.B.A. from the College of St. Thomas. She is currently pursuing a doctorate in Training and Development in Industry and Business at the University of Minnesota. With Richard A. Swanson, she co-authored *Performance at Work* (1986) and *Forecasting Financial Benefits of Human Resource Development* (1988). *Performance at Work* received the Outstanding Instructional Communication Award of 1987 from the National Society for Performance and Instruction, and *Forecasting Financial Benefits* received the Society's 1989 award.



G. Richard Hartshorn
Program Manager
Ford Executive Development Center
300 Renaissance Center, Suite 3800
P. O. Box 43350
Detroit, MI 48243
313/446-8072

G. Richard Hartshorn's 24-year career in human resource development with Ford Motor Company has been characterized by broad experience in design, development, and implementation of education and training systems. His educational credentials include a B.S. in engineering and an M.S. in instructional technology. His professional achievements include management assignments in major manufacturing divisions, corporate staff, and financial services.

Hartshorn has been active in designing technical and managerial training and development programs and has accumulated extensive experience with performance-oriented training systems. He is currently associated with the Executive Development Center located in Detroit's Renaissance Center.

In ASTD, Hartshorn has served in leadership positions at the local (Detroit Chapter) and national levels. He is chair of the National Issues Committee and was involved in founding the Technical and Skills Training Division of the Society.

Carolyn D. Holt
Senior Organization Development Consultant
Union Carbide Corp.
39 Old Ridgebury Road
Danbury, CT 06817
203/794-2244

Carolyn Holt is Senior Management and Organization Development Consultant with Union Carbide Corp. She provides consulting services in all aspects of organization change and renewal to senior managers in the Chemicals and Plastics Group. She has received special recognition awards for successfully supporting the line organization—with organization and management development technologies—in addressing a critical business problem: how to catalyze and facilitate new business development.

Holt holds a graduate degree in English from Yale University. She was a college professor before she joined Union Carbide 13 years ago. She and her son, Christopher, live on a lake in Ridgefield, Connecticut.

Ronald L. Jacobs
Assistant Professor
160 Ramseyer Hall
The Ohio State University
Columbus, OH 43210
614/292-5037

Ronald Jacobs is Assistant Professor and Coordinator of the Training and Development Graduate Program of the College of Education at the Ohio State University. He holds a B.F.A. in film arts from Ohio University, an M.S. in Educational Technology from the University of Toledo, and a Ph.D. in Instructional Systems Technology and Organizational Communications from Indiana University. He is a former faculty member of Southern Illinois University at Carbondale.

In addition to the research presented in this monograph, Jacobs is engaged in research on team concepts and synchronous approaches in a manufacturing setting, with an emphasis on understanding the effects on both hourly and management employees.

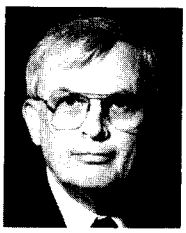
Jacobs serves as a member of the Research Committee of the American Society for Training and Development, as assistant editor of the *Journal of Industrial Teacher Education*, and as a member of the editorial review board of *Performance Improvement Quarterly*.

Patricia McLagan
Chief Executive
McLagan International, Inc.
Rosedale Towers #300
1700 W. Highway 36
St. Paul, MN 55113
612/631-2034

Patricia McLagan is head of McLagan International in St. Paul. She has worked with many major corporations to design performance management and human resource development systems and programs. With senior management and human resource executives, she has developed strategies for the management of change. She and her organization have worked with AT&T, GE, NASA, Citibank, 3M, Honeywell.

McLagan is widely published in the field. Her publications include "Competency Models" (*Training & Development Journal*); "Computer Aided Instruction" (*Training Magazine*); *On the Level: Action Ideas to Help Managers and Employees Communicate about Performance and Development*; *Getting Results Through Learning*; and *Helping Others Learn*. She directed a major study of competency requirement for the training and development field and has served as a national board member of the American Society for Training and Development.

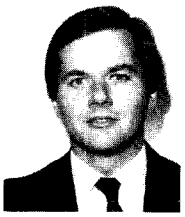
McLagan has a masters degree in Adult Education from the University of Minnesota and has received many awards, including ASTD's Gordon M. Bliss award.



Frederick W. Nickols
Senior Vice-President, Systems and Operations
Monarch Financial Services, Inc.
3342 Phelps Road
West Suffield, CT 06093
203/668-4743

Fred Nickols is Senior Vice-President, Systems and Operations, for Monarch Financial Services. Prior to joining Monarch, he was an independent management consultant, specializing in productivity and performance improvement. His background and experience encompass "hard" systems, such as naval weapons systems and computer-based data processing systems, and "soft" systems, such as training, organization, management development, and work-control systems.

Nickols has published many articles on the subjects of systems, productivity, human performance, and knowledge work. He is an unabashed fan of the work of Frederick Winslow Taylor.



Edmund H. Rieger
Manager, Human Resource Planning
Rockwell International Corp.
Automotive Operations Headquarters
2135 West Maple Road
Troy, MI 48084
313/435-1763

Edmund Rieger is Manager of Human Resource Planning for the Automotive Operations of Rockwell International. He has responsibility for the organization development and management training activities of four divisions within the company. In addition, he has human resource responsibility for Rockwell's five high-performance systems plants.

Rieger was formerly with SCM Corporation in New York City, working as project manager for SCM's internal consulting group. He has a B.A. from Carroll College in Wisconsin and an M.B.A. from the Illinois Institute of Technology. He is completing a Ph.D. in Education/Organization Development at Wayne State University.

Karen E. Watkins
Assistant Professor, Graduate Program in Adult Education and Human Resource Development
The University of Texas, EDB 244
Austin, TX 78712
512/471-4285

Karen Watkins, a native of Wisconsin, has completed degrees at St. Olaf College, the University of Wisconsin-Madison, and the University of Texas-Austin. She has extensive staff and organizational consulting experience, having served at one time as the director of a national institute for staff and organizational development, which offered training and consultation services to community colleges throughout the United States and Canada.

Watkins has more than 50 published articles, chapters, and monographs. In 1987, she was selected one of the most promising young scholars in adult education by the Kellogg Foundation. She serves on the board of the Commission of Professors of Adult Education and of the Professors' Network of ASTD. She will serve as a consulting editor for the *Adult Education Quarterly* in 1989 and as a referee for the *Human Resource Development Quarterly.* She is currently directing a research project on facilitating workplace learning for adult children of alcoholics, funded by the Hogg Foundation on Mental Health.