Behavioral Systems Analysis: Fundamental concepts and cutting edge applications

Part VII Toward the Future
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Part I of this series of articles:

- describes behavioral systems analysis as an approach that draws from two disciplines, behavior analysis and generals systems theory
- asserts that knowledge from both disciplines is important for practical work because
    - behavioral knowledge about how each person will act within a specific environment and
    - general systems knowledge about how organizations and other living systems function

    is essential in today's complex world
- describes $B = f (O, E)$ as the fundamental concept of the biological, social, and physical sciences, psychology, and general systems theory.

Part II provides a way to analyze any activity into 3 essential components, using the 3 term contingency. The 3 term contingency is the smallest meaningful unit for analyzing individual performance. Part II then describes three different service models used by successful consulting firms. Each firm, in a different way, helps managers apply the 3 term contingency and associated principles within business environments.

Part III describes the smallest meaningful unit for managing organizational performance, the adaptive system. The adaptive system concept is the basis of the total performance system diagram that shows the 7 essential components of an adaptive system. If any one of the 7 components is weak or missing, intelligent performance is very difficult or impossible.

Part IV describes the Value Set, a concept from general systems theory that helps keep the most important organizational variables in focus. It then introduces 3 additional general systems concepts, the concepts of homeostasis, interconnectedness, and living system. These 4 concepts plus 3 described in Parts I, II, and III, support the notion that long term success for any organization in a changing world requires managing it as a whole, not as a collection of separate parts.

Part V describes three cutting edge applications, two in the public sector (a reading clinic and a graduate program) and one in the private sector (a high tech company). The applications are cutting edge in that they explicitly apply behavioral systems analysis to manage a total organization.

Part VI describes two additional cutting edge applications, one in county government and one in a small business.

Introduction

Part VII briefly describes cutting edge behavioral systems analysis work in the International Association for Behavior Analysis and two current initiatives to advance the field. Part VII includes examples of a few of the actual tools that are used in behavioral systems analysis applications.

Application #7—An Application in a Professional Association

The International Association for Behavior Analysis International (ABAI) was formed over 30 years ago and has over 5000 members (see www.abainternational.org). The membership includes many professionals, academics, and students who work in the public sector and a significant number of professionals who work in the private sector. The association is managed as a total system. Dr. Maria Malott, the Executive Director, believes that she can mange the association competently only through behavioral systems analysis. She wants to know and show that she performs competently as executive director while keeping her day job as a consultant and an adjunct professor in several universities. Most of the ABAI members have a strong scientific background and understand the importance of data-based management of the association.

Dr. Malott regularly shows comprehensive and objective data on operations to the ABAI Board of Directors. She demonstrates how paid staff and volunteers are involved in significant issues. She takes delight in demonstrating that she carries the ABAI management system around in her laptop. She can quickly scroll through graphs to show how various subsystems are performing and can scroll through process maps to show in exquisite detail how specific work gets done. For example, she has a complete, detailed, and very long cross-functional process map with a supporting set of job aids that support running the annual conference.

Application #8—An Application to Develop and Deploy Behavioral Systems Technology

The Performance Design Lab is a small consulting firm formed by Geary Rummler two years after selling his former company, The Rummler-Brache Group. Performance Design Lab develops, validates, and transfers performance technology. Rummler is a thought leader in the field; he developed much of the technology used by people who did the work referred to in this series of articles. (Many examples of slightly older but still cutting edge tools are included in the best-selling book by Rummler, G. & Brache, A. 1995.)

The Performance Design Lab operates public workshops and does consulting projects that include new tools that Rummler and his colleagues have developed. The new tools emphasize the development of measurement and management systems to operate total organizations as adaptive systems comprised of adaptive sub-systems. Some of the technology this group has been using was the subject of a symposium at the 2001

International Association for Behavior Analysis conference. (Sasson, Rummler, and Brethower, 2001) The symposium, organized by Joe Sasson, dealt with a very specific problem. How can someone become expert in behavioral systems analysis in a few months?

The ABA Symposium: Research on expertise tells us that experts in any field differ in specific ways from novices. Novices see each new situation as new. Experts see each new situation as similar to ones they have seen before. Novices have to deal with a vast unknown--even if they begin with solid theoretical knowledge.

Another characteristic of experts is that problems that appear very complicated to novices appear rather simple to experts. The novice sees things as a vast array of separate variables, each one potentially important; the expert sees things as a small array of interconnected variables, each one important in a specific way. A novice grounded in theory knows that he or she will discover, on analysis, a few important variables and knows, in theory, what they are but is clueless about how the actual variables can be identified and controlled in a new setting. Experts can say "Oh, that's simple!" and mean it. (They can also spend hour after hour giving intricate, detailed, and confusing-to-novices explanations about the simple thing.)

Another difference between a novice and an expert is that a novice can approach a problem in only one way; if that way doesn't work, the novice is stymied. An expert, on the other hand, can approach the problem from several angles. The novice wants a recipe, a 1, 2, 3 procedure. Experts know that 1, 2, 3 procedures work only occasionally and expertise requires great flexibility in how something is accomplished. The expert can go with the flow whereas the novice tries to control the flow and gets swept under.

Research on expertise is very clear about what it takes for a novice to become expert. First, it takes guided practice. Second, it takes more guided practice. Third, it takes even more guided practice. Students and people newly hired in a consulting firm or an internal unit offering services related to behavioral systems analysis would like to acquire expertise quickly.

Operating a growing consulting firm requires either the ability to bill clients for shoddy work or finding efficient ways to help novices learn quickly. Similarly, operating an effective graduate program in behavioral systems analysis requires efficiency unless we make the program several years in length. That is one reason Geary Rummler and I develop so many job aids. Good job aids help enormously in guiding practice. If we construct a job aid that captures many of the lessons we have learned over the years, someone can use the job aids to become expert in much less time than we required ourselves.
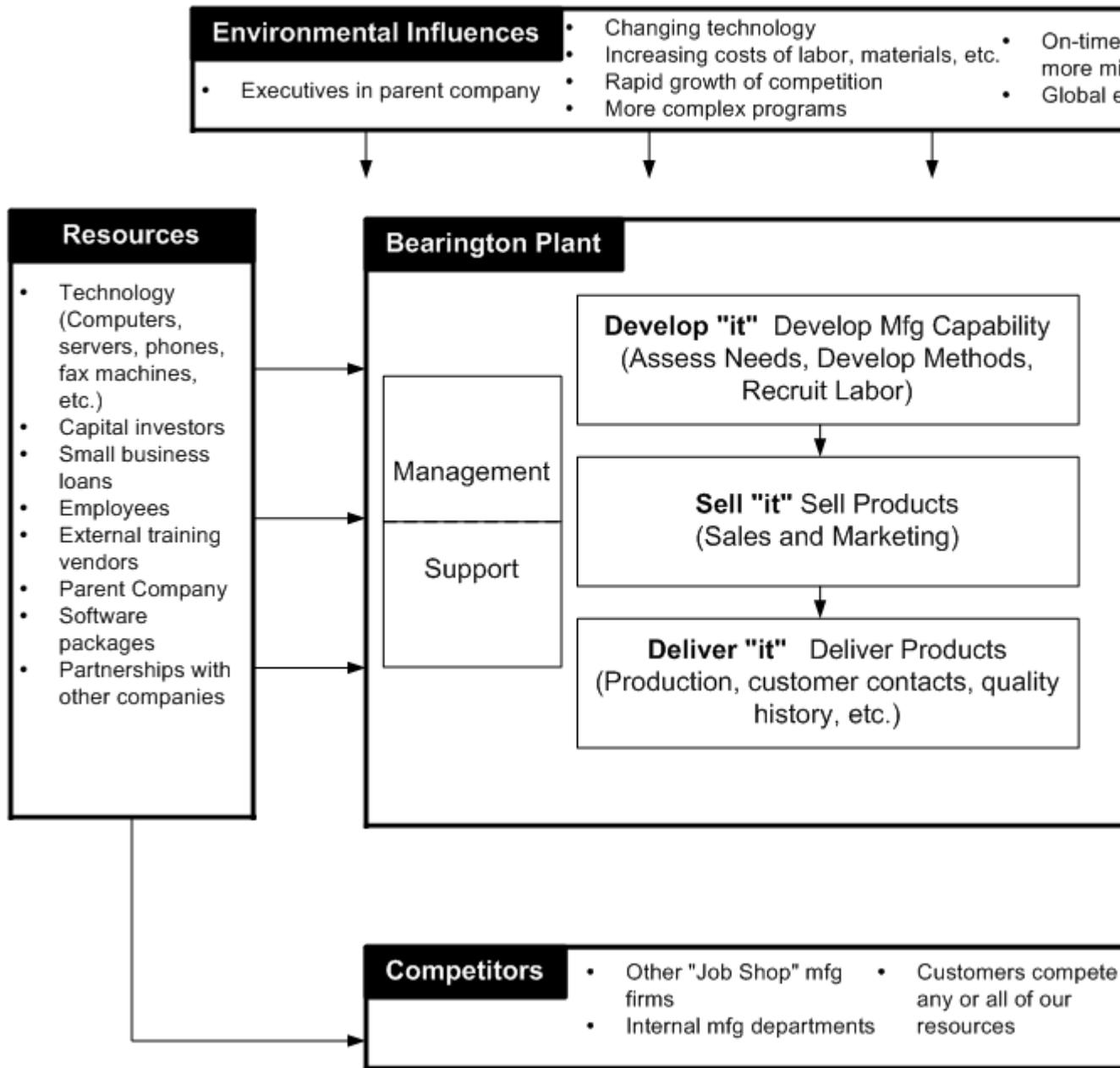
Examples of Job Aids for Behavioral Systems Analysis: The total performance system diagram, shown in Part III is one job aid. Novices practice by using blank diagrams to fill in the details that depict a specific system.

A mission statement job aid helps draft organizational or personal mission statements. The job aid asks a series of simple questions that get the relevant ideas captured on paper quickly. I typically facilitate the efforts of people involved in the organization by helping them weave the answers into a relatively simple mission statement that looks, on the surface, a lot like the mission statements that can be found on thousands of organizational web pages.

Not everyone knows that the words, no matter how they are generated, are essentially meaningless except to the people who generate them. The mission is not "real" until it is "wired in" by with managing based on measures of everything specified in the mission statement. For example, if you analyze the mission statement for the Reading Improvement Service in Part III, you will discover that measures and indicators for everything said are built into managing the work of the Service. Another example that shows the measured connections between the words of the mission statement and the actions of the organization can be found in LaFleur and Brethower, *The Transformation*, (1998).

One of the most important tools is Rummler's Super-System diagram template. It helps people get clear about the importance of the external environment. The diagram below (prepared with a template in a previous version of Microsoft Visio) is one I produced for the fictitious Bearington Plant in *The Goal* (Goldratt & Cox, 1984). It shows the key parts of the Market—investors, the parent company, and so on; key Resources—technology, people, money, and so on; key Environmental Influences—executives in the parent company, changes in the global economy, growing competition, and so on; key Competitors—though on this fictitious diagram the competitors are not listed by name and locus of the competition.

Supersystem Map

Environmental Influences
- Changing technology
- Increasing costs of labor, materials, etc.
- Rapid growth of competition
- More complex programs

- Executives in parent company

- On-time
- more mi
- Global e

Resources
- Technology (Computers, servers, phones, fax machines, etc.)
- Capital investors
- Small business loans
- Employees
- External training vendors
- Parent Company
- Software packages
- Partnerships with other companies

Bearington Plant

Management

Support

Develop "it" Develop Mfg Capability
(Assess Needs, Develop Methods, Recruit Labor)

Sell "it" Sell Products
(Sales and Marketing)

Deliver "it" Deliver Products
(Production, customer contacts, quality history, etc.)

Competitors
- Other "Job Shop" mfg firms
- Internal mfg departments

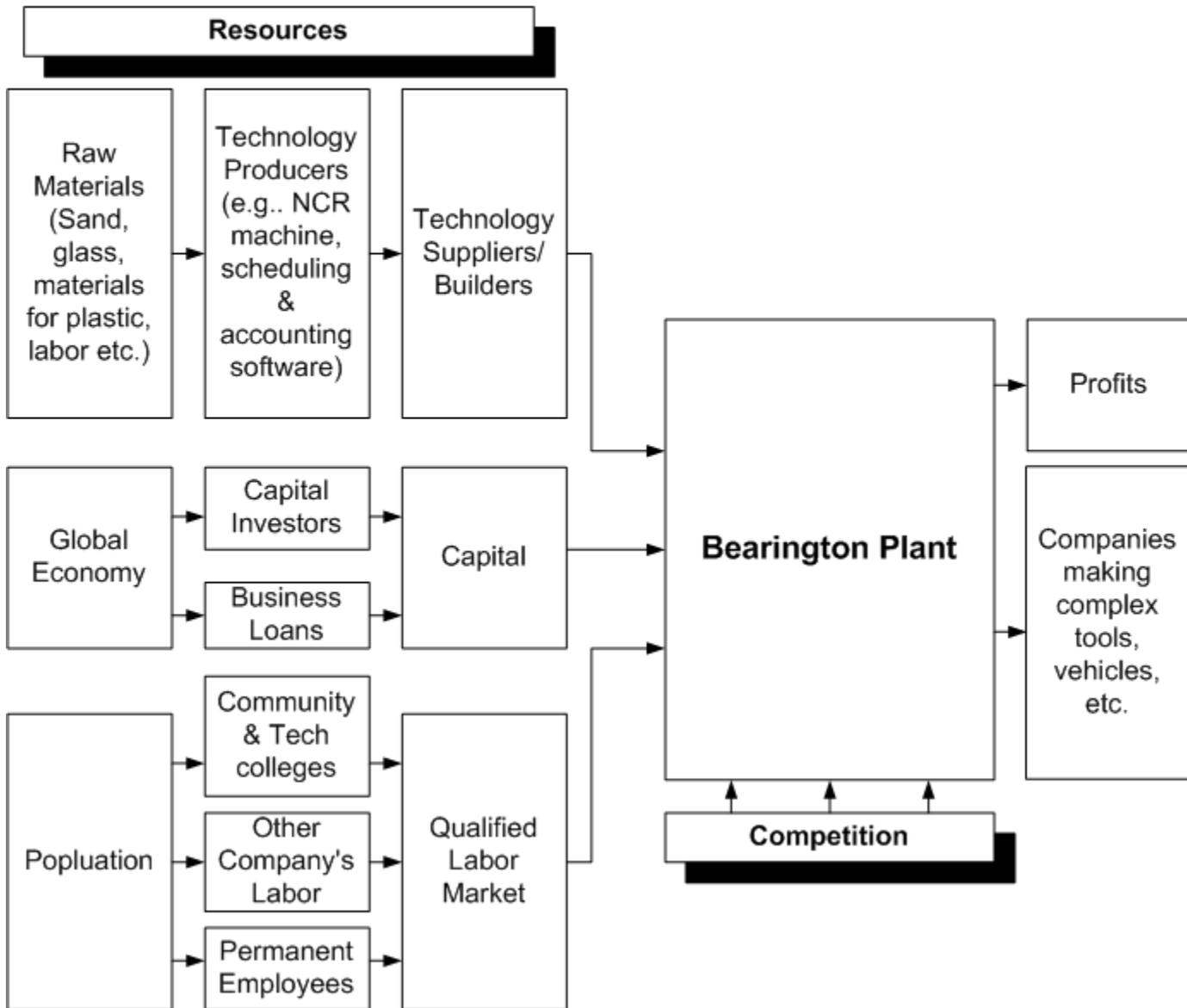- Customers compete any or all of our resources

I drafted it to show that the Bearington Plant processing system deals with the classic functions Developing capability, Selling products, and Delivering products (which includes production). I also show two boxes, Management and Support. Support includes accounting, human resources, information technology, scheduling, maintenance, and so on, all the functions necessary to support the three primary processes. Management includes all the planning, budgeting, leadership, and so on necessary to coordinate all the resources and get the work done in accordance with the constraints

imposed by the marketplace, suppliers, competitors, and the economic, social, and physical environment.

When I draw the Receiving System box in the total performance system diagram, I imagine that it includes the resources, competitors, and environmental influences. The Super-System pulls them out of the little Receiving System box and shows how they literally surround the Processing System. Showing them explicitly is essential for strategic planning and goal setting. Rummler uses another tool, the Super-Duper System Diagram which expands the diagram horizontally to show that the suppliers as well as the receivers are part of a complex value chain. The diagram below is my attempt to show how it would look for the Bearington Plant. The draft shown is weak on the customer/receiving system side. It correctly shows stockholders and banks as customers for financial results and the several departments within the customers' processing systems—the execs, production, and purchasing. The diagram should move at least one more step to the right and show the customers' customers. If the Bearington Plant is to add value to its customers, it must provide goods or services that benefit the customers' customers. For example, Doug LaFleur had to look that far down the value chain to make his chimney business work profitably (see Part VI of this series).
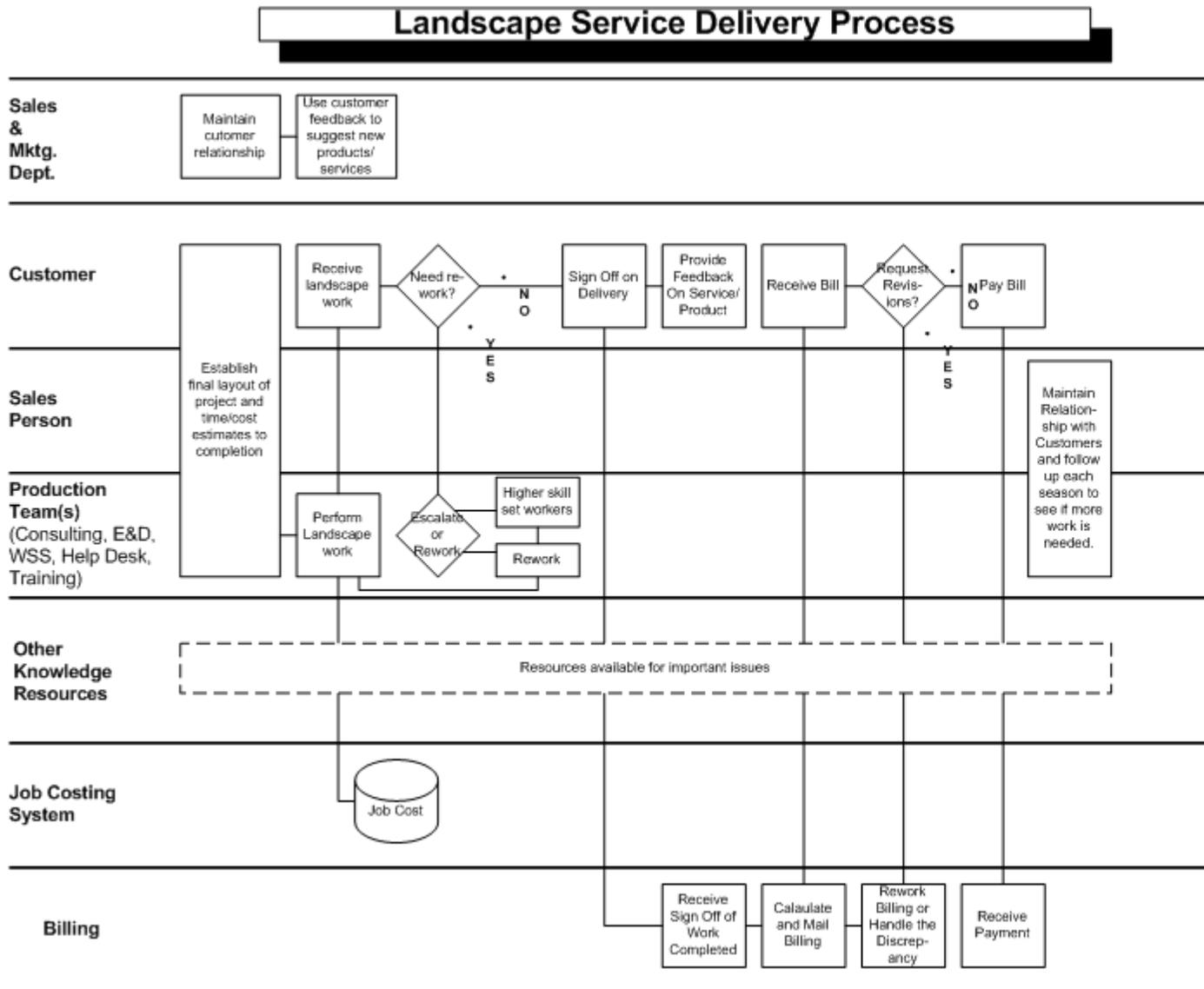
Value Chain

Resources

Raw Materials (Sand, glass, materials for plastic, labor etc.)	Technology Producers (e.g.. NCR machine, scheduling & accounting software)	Technology Suppliers/ Builders

Global Economy → Capital Investors / Business Loans → Capital

Popluation → Community & Tech colleges / Other Company's Labor / Permanent Employees → Qualified Labor Market

Bearington Plant

Competition

Profits

Companies making complex tools, vehicles, etc.

There some extra Competition boxes sprinkled around on the diagram. It is my whimsical way to emphasize that multiple and sometimes unknown competitors surround an organization. We use these particular tools to help executives and managers "think outside the box."

The next diagram shows a reasonably simple cross-functional process map of the service delivery process for a landscaping service. The diagram was developed by Joe Sasson and is based on the process of a real firm, though it departs from what the firm actually does.   One value of this tool is that it shows who has a hand in the process. The

horizontal lines enclose a specific part, person, or resource of the landscaping firm that performs specific activities in service delivery. We, as a convention, always include the customer, at or near the top of the chart. A major value of the chart is that it shows where everyone "touches" the process. This tool (and all the others) is typically used by the analyst by interviewing people, looking at documents, and making a rough draft. The draft is reviewed by the people involved who discuss it and make suggestions and corrections. Typical reactions are: "I didn't know what everyone did!" "That can't be the way we do it; there are unnecessary steps in it!" "No wonder we have trouble getting it right!" Drawing up things the way they are has turned out to be a major motivator for improvement efforts.

Landscape Service Delivery Process

Sales & Mktg. Dept.	Maintain cutomer relationship	Use customer feedback to suggest new products/ services									
Customer		Receive landscape work	Need re-work? N O		Sign Off on Delivery	Provide Feedback On Service/ Product	Receive Bill	Request Revis-ions?	N Pay Bill O	
Sales Person	Establish final layout of project and time/cost estimates to completion		Y E S					Y E S	Maintain Relation-ship with Customers and follow up each season to see if more work is needed.	
Production Team(s) (Consulting, E&D, WSS, Help Desk, Training)		Perform Landscape work	Escalate or Rework	Higher skill set workers / Rework						
Other Knowledge Resources		Resources available for important issues								
Job Costing System		Job Cost								
Billing					Receive Sign Off of Work Completed	Calaulate and Mail Billing	Rework Billing or Handle the Discrep-ancy	Receive Payment		

It takes a few rounds of practice to become competent in using any one of the tools shown here (and several others there is not room for). The benefit is that the tools guide

the process and clarify communication among people involved. A new person can get up to speed a lot faster using the tools than would be possible without them.

The set of diagrams begins to "capture expertise" and show why every new situation looks familiar to an expert. Experts see new situations through the lens of extensive experience. The diagrams capture the essence of those experiences—after the diagrams have gone through a couple of dozen drafts and been tailored to many different situations. That is the good news. The bad news is that each of the pioneers in the field were busily developing their own toolkits, based upon their experiences with specific sets of problems. As a result, each pioneer has a toolkit but each pioneer has a slightly different set (see Dean & Ripley, 1997). There is much in common across experts. Unfortunately, from the perspective of the novice, the theme is almost totally obscured by the variations. That is why application #9 is, potentially, very important.

Application #9—An Application to Integrate Multiple Approaches to Performance Improvement.

Both general systems theory and applied behavioral analysis began in the 1950s accelerated in the 1960s. While both developed their own theory languages, the applied work has not developed standard tools and procedures. The theoretical rigor and fundamental consistency among the pioneers of the field has not been at all obvious to students, clients, or other interested parties. Lack of standardization has been both a strength and weakness of the work. It is a strength in that we have been free to try different tactics and it has been a weakness in sharing the results among ourselves, with clients, and the general public. It appears to some of us that the time has come to begin the difficult task of achieving as much standardization as we can without locking ourselves into static approaches to inherently dynamic work.

An informal group is currently working on developing a language-in-common and a methodology-in-common to reduce the communication difficulties and show one another and the world more clearly just what we do and how we do it. The work is an outgrowth of conversations begun during a think tank sponsored by ISPI, the International Society for Performance Improvement in the fall of 1997. If we use the founding of ISPI in 1961 as the marker for the beginning of the field, the seven members of the group bring a combined total of approximately 280 years experience to the task. The intention is to capture the lessons learned by members of the group, not to capture history, but to create a foundation for moving forward. We will, of course, make use of what has worked in the past but the work product of the group will be cutting edge and systemic, applicable to total organizations both large and small. The group is informal so there is no clear membership roster; we expect to involve more people in the work as soon as we have made enough progress to merit it. (The work is so "cutting edge" that we can not promise results! Yet.) The URLs of web sites of most members of the work group are in the References below. Some of the work of the group is posted on my web site at Western Michigan University.

Comments

I selected applications to describe in this series of articles based upon three considerations.

1. The work had to be applied to total organizations.
2. The work had to apply the behavioral systems analysis concepts described above.
3. I had to have direct knowledge of the work.

There is much excellent work in the field that I did not describe.

Behavioral Systems Analysis works from the outside in. By that I mean that each application looks first at the environment. The total performance system diagram, the super-system diagram, and the value chain diagram are all tools that guide discovery of the environmental influences on value set variables. The purpose of schools and businesses and government agencies is to add value to the environment; the environment must be examined closely to determine where and how it might be possible to add value. It is also helpful to look at the state-of-the art in products or services to find out what others, potential competitors and allies, are doing. Then the leadership of the organization can make an intelligent guess about whether or not the organization can deliver the value better, faster, or cheaper than others. If so, there is an opportunity.

The oldest application, the reading clinic, used the adaptive system diagram to define the mission of the clinic, identify the most critical parts of the receiving system, and specify the added value we aspired to provide and have receiving system feedback confirm. From there we could identify standards for our outputs by specifying typical tasks that our graduates would be able to complete and specifying both how and how well they would complete them. After specifying the tasks and identifying what the tasks had in common we were able to define the processes we would have to use to meet the standards. In many instances, best practices in reading were not good enough to meet the standards. We had to make a choice: either bow to the inevitable and lower our standards to what existing practices could provide or do the research and development work to provide necessary quality and efficiency of service.

Similar choices were made in the other applications. If best practices are not good enough, invent better practices! There is a sense in which that is the essence of behavioral systems analysis. Use these powerful concepts to invent better ways to assure exemplary performance by persons and by total organizations.

Rummler invented his Super-System diagram to unpack the Receiving System box and show what designing from the outside in really means. I have used the Super-System diagram with students to teach what strategic planning must be about and to help a small number of organizations develop strategy. Rummler has used the diagram to help organizations identify the critical (value set) variables they should be tracking, to define the measures that go into the organization's scorecard, to show the external relationships that must be managed, and to identify standards that must be set for internal processes.

Culture change was mentioned specifically in the Office of the Prosecutor application but it was an enabling part of all eight. Each application changed what people talked about at

work, the way people interacted with one another, and the way people worked together to improve the organization. Three members of the group working to integrate language and methodology specialize in systemic approaches to establishing healthy organizational cultures.

Concluding Comments

Another very significant initiative is being implemented by ISPI, the International Society for Performance Improvement (www.ispi.org). ISPI has developed 10 Standards for people to meet who wish to earn the designation of Certified Performance Technologist. The Standards help define good work in our profession, whether we call it organizational behavior management, behavioral systems analysis, or human performance technology. The Standards can be found at www.certifiedpt.org

One of the best summaries I have heard of the nuts and bolts of behavioral systems analysis came from a student in one of my graduate classes. The student was not trained in behavioral systems analysis (before the class) but was in a graduate program in engineering. His summary? "I get it! As an engineer I learned to sweat the details. Now I know that's only part of it. First, get the big picture in focus! Then sweat the details!"

That engineer was right. Detailed technical knowledge is necessary in every endeavor, from laying bricks to designing space vehicles to designing and managing modern organizations to helping our children and grandchildren survive and prosper in the twenty-first century. But, to use expert knowledge, first get the big picture in focus. Behavioral systems analysis has powerful tools for doing that and is developing tools to enable us all to do it better, cheaper, and faster.

I felt honored when asked to share these concepts and applications at the 2002 annual conference of the International Association for Behavior Analysis and doubly honored when asked to share them again with people who visit the Cambridge Center for Behavioral Studies web site. I have been both excited by and proud of the work done by a few dozen, then a few hundred, and now a few thousand people who are building a better world using behavioral systems analysis concepts and technology. The fundamental concepts are deceptively simple, yet require considerable effort to master. The technology being developed is intricate and detailed but it is something that any educated person can understand. If past successes are an indicator, it is worth learning about.

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