CENTER FOR QUALITY OF MANAGEMENT JOURNAL

Vol. 6, No. 3

WINTER 1997

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ESCAPING FROM THE BOX: USING A NEW PROCESS MODEL TO SUPPORT PARTICIPATION AND IMPROVE COORDINATION

by Grant Harris and Steve Taylor

"All models are wrong, some are useful" - W. Edwards Deming

Many organizations have achieved gains in quality by emphasizing customer focus and by increasing worker participation. But while these quality management approaches have been successfully applied to formal, rationalized processes, many organizations are experiencing difficulty in applying them to informal, difficult-to-rationalize processes such as research, development, design, engineering, and planning. In this article we describe a new process model: organizational processes as networks of conversations among people who are coordinating their actions to satisfy their customers. We also present a case study where we used this "coordination model"[1] in a participatory process design effort. The coordination model provides a view of process as interactions among skilled, experienced, creative individuals with clear accountabilities, rather than as a series of tasks connected by inputs and outputs. This concept offers numerous benefits when used in quality-oriented organizations where customer-focused processes and broad participation are the watchwords.

Organizational Processes

Process-oriented managers view the organization as a chain of recurrent linked processes whose end point is a customer, actual or potential. By aligning the structure of the organization with the work processes that the business performs, a firm can more effectively serve its customers. Within an organization many different processes occur**,** ranging across a spectrum from the relatively cut-and-dried processes typically found in the "factory" part of a firm to the informal, creative processes typically found in the "office." In the 1980s, office automation researchers began to recognize that "office" processes are qualitatively different from processes occurring in the "factory." That difference has to do with the ease with which a process can be *rationalized*. In simple terms, to rationalize means to define explicit work procedures, often with the goal of optimizing efficiency or automating the process. In order for a work process to be capable of rationalization,[2] it needs clear, unambiguous, and mutually compatible goals; reliable inputs;

A multicompany CQM study group on TQM in service industries (see the paper by Aramati and Woll in Vol. 6, No. 2 of the *CQM Journal*, pp. 5-27) has investigated the widely-held perception that processes exist only in "operational" (e.g., factory) environments and that explicit processes are not possible in "non-operational" environments such as often exist in service industries. The study group concluded that explicit processes do occur regardless of the type of work that is being done — but that different kinds of processes exist. The CQM group defined three kinds:

● Operational processes: Processes that most people think of as being highly step-by-step, such as are often found in manufacturing and administrative activities. Examples include mass production of consumer goods and routine payroll transactions.

● Moment-of-truth processes: Processes in which a person has to deal with a user or customer in real time. An example is an interaction involving a customer support hot-line staffer.

● Innovative processes: Processes in which people are inventing new knowledge, as in new product development or the creation of a marketing plan.

When we speak of more easy-to-rationalize processes, we have in mind more operational processes, especially those involving routine flow of material or information. When we talk about more difficult-to-rationalize processes, we have in mind the moment-of-truth and innovative processes. (There may also be other types of processes in the more difficult-to-rationalize category that are not included in the CQM taxonomy.)

While it may be difficult to make important parts of moment-of-truth and innovative processes be step-by-step, one can think explicitly about the factors that lead to a highly effective moment-of-truth or innovative process. For instance, suppose we want to "create" an airline reservations clerk who performs the task in a highly flexible and empowered way that satisfies customers while looking out for the best interests of the company. We might devise explicit programs incorporating factors such as training in the value equation of the company, policies that allow an appropriate degree of empowerment, selection for and training in interpersonal skills, role playing in dealing with unanticipated customer questions, installation of information services technology to provide information so the clerk can make flexible offers and commitments, and so forth.

component tasks that can be articulated in an unambiguous manner; and activities whose conduct can be unambiguously evaluated in every situation. Most processes within an organization benefit from some amount of rationalization.[3] However, "office" processes such as research, development, design, engineering, marketing, planning, and resource allocation often seem to be characterized by:

● Multiple, vague, or conflicting goals. The process goals may have to be defined or refined as part of the process itself. In a "cross-functional" process, people may have multiple agendas and be competing for resources.

● Inputs that are uncertain or ambiguous. For example, a process may involve components that may be undergoing experimentation, testing, or prototyping during the course of the process.

● Component activities that cannot be articulated beforehand. It may not be feasible to create precise statements of the tasks to be done until the process has already begun.

● Unclear relationships between means and ends. Where it is not possible to unambiguously identify cause and effect, any sort of objective evaluation of performance is impossible or largely arbitrary.

To the extent that office processes have these characteristics, they are harder to maximize for productivity. That is not to say that such processes are irrational; nor is it to say that analytical or methodical approaches should not be applied for the purpose of managing and improving these such processes. While few, if any processes are completely rationalizable, almost none are without some parts that can be rationalized. But the more difficult to rationalize a process is, the less we are able to define in advance the best way of doing the process; and the more we have to rely on human creativity, innovation, intuition, and sometimes a bit of luck. Variability and adaptability become increasingly vital to the success of processes that are difficult to rationalize.[4] We need explicit methods to support and promote such human ingenuity, variability and adaptability. As participants in hard-to-rationalize work processes, we coordinate our actions by talking ... and talking ... and talking. Much of the "work" in a process may consist of conversing with other people to share our visions, enlist support, negotiate what roles people will play, plan out who will do what for whom, find and allocate resources, and decide how performance will be evaluated. Often things don't happen according to plan and customers always seem to be changing their minds, so we may devote much of our time to dealing with breakdowns, solving problems, and renegotiating commitments or expectations.

Those of us who participate in such processes are sometime known as "knowledge workers." We tend to deal primarily with information and have to "use our brains" to be effective in our roles. Because these processes are typically cross-functional (or even inter-organizational), we engage in innumerable conversations through which we create and sustain a network of formal and informal relationships with other people. Over time we build trust into these relationships by making commitments to and fulfilling the expectations of our "customers," some of whom may work for us. These interpersonal relationships are the means through which we can successfully cooperate to complete a difficult-to-rationalize work process. Many managers now recognize the degree to which an effective work process can rely on experienced people with the autonomy and resources needed to innovate or improvise as necessary in order to satisfy the expectations of customers. In some work processes, dealing with unanticipated situations or contingencies may be most of what the process participants do. These participants must be sufficiently empowered to use their skills, and creativity to respond to surprise, ambiguity, and breakdowns. There is a trend toward broader, more autonomous participation in organizations,[5] reflecting management's recognition of the many benefits that accrue when individuals and teams take part in the design and evaluation of their own work.

Participatory Design and Process Improvement

Participatory design (PD)[6] aims to go beyond technical design to address organizational issues and create shared understanding and knowledge among the individuals who do the work: the process participants. When we use a PD approach, we actively involve the process participants in the design and management of the work process. Practitioners of PD recognize that work process design is a social activity[7] that involves creativity, negotiation, experimentation, and collaboration.

Organizations that use participatory design explicitly create structured opportunities for process participants to come together for collaboration and negotiated decision making. The design of any substantial process can require the involvement of individuals from numerous different organizational groups. These groups are often separated by "boundaries" that may include functional, professional, financial, legal, political, and cultural distinctions. Different groups usually speak different "languages"; the same word, phrase, or acronym can have very different meanings within different groups. PD provides a forum in which the participants can gain a better understanding of these boundaries and explore ways to bridge them. The PD approach fosters effective cross-functional collaboration[8] by creating:

- Common goals that are strong enough to overcome conflict;

- A shared context of language, meaning, and interpretation;

- Clearly defined roles and accountabilities (authority, jurisdiction);

- Appropriate, but not oppressive, rules and procedures;

- Sufficient proximity (physical or virtual) and access to other group members; and

- Clear understanding of how performance will be assessed.

The collaborative climate of PD can help build shared knowledge among the participants. Work processes of any complexity depend crucially on experienced individuals, but most attempts to "extract" this experiential or tacit knowledge so as to rationalize processes have had limited success. In a sense, the process participants are a community within which informal storytelling is often the predominant source of learning. As individuals share stories, they are contributing to the community as well as building their own identity. Not only are these "communities-of-practice"[9] storehouses of practical knowledge; they are often the source of innovation within an organization.

The PD approach recognizes that the people who do the work understand that work in ways that a process designer cannot. The only way for a process design to reflect such tacit experiential knowledge is by directly involving the individuals who do the work in the design process. Also, individuals who participate in the analysis and design of the work process not only come to understand but also help to paint the "big picture." This increases their ability to anticipate the consequences of their actions and enables them to innovate intelligently within the process in response to the inevitable unanticipated situations that arise.

Organizations can also use PD to provide an opportunity for individual contributions to be recognized. Involving people in the PD process indicates that their experience and opinion is respected. Participation in the design process can also lead to a feeling of ownership and an increased sense of responsibility for the work process. The use of PD can help create motivation and readiness for change by bringing problems and opportunities to people's attention while providing a forum in which to explore alternative futures, thereby laying the groundwork for organizational change. "Participation in decision making can help reduce stress and improve employee quality of life by giving workers a greater feeling of control and effectiveness" and by giving them "a clearer idea of what is expected of them, and of what is to be rewarded."[10] All in all, real involvement helps individuals to build their own identity and also helps individuals to identify more closely with the organization. Increased participation is often accompanied by more decentralized organizational structures that can be more responsive and flexible, enhancing the organization's ability to structure effectively around processes, rather than around functions, and to move away from top-down, command-and-control management. But, as Robert Eccles points out, "whenever authority and responsibility are decentralized, there emerges the problem of coordination: How can autonomous parts be made to work together to produce what is best for the whole?"[11] Coordination is the central issue in process design.

Process Models

In a participatory design context, process models help focus and guide collaborative efforts to decide how the work process will be coordinated. A model is like a lens through which we view the world. The quote from Deming at the beginning of this article highlights the fact that no model allows us to see everything: Each model reveals some things about the world to us, while at the same time hiding others. As members of organizations, we use different models to speak about and make sense of what goes on around us. At one moment we may imagine the organization as a machine; at other moments we may view the organization as a brain, an organism, a

culture, a political system, or a community.[12] Each of these images or models of the organization reveals and hides different things; each gives us a different perspective.

When we design organizational processes, we use the spoken, written, and symbolic language associated with a model to communicate our understanding of how things are, as well as our vision of how things might be. Our chosen model allows us to see the aspects of the process that it reveals–but we don't see the aspects that it conceals. And different models can give us very different perspectives.[13] Therefore, the process model we use can strongly influence how we view, analyze, design, and manage a work process.

As Richard Coyne notes, "*the dynamics of privileging and exclusion cannot be viewed apart from purpose. Models focus on certain characteristics of the design process that fit certain purposes, in which there are priorities*."[14] That is, by defining the kinds of "things" that exist and how they can interact, a model leads us to ask certain kinds of questions and to frame problems in certain ways. A model provides not only a "model of" a process but also a "model for" creating new possibilities in the design process.

The Input-Process-Output Model

Most process models are rooted in the input-process-output, or IPO, model.[15] Looking through

the lens of the IPO model, we see a world consisting of materials, information, tasks, and decisions. A process is viewed as a series of boxes (processing elements) connected by inputs and outputs. Information or material objects flow through a series of tasks or activities based on a set of rules or decision points. Flow charts and process diagrams are often used to represent the process. The IPO model originated during the industrial revolution and has been used to great benefit in many domains, from manufacturing to communications to computer programming. Continuous process improvement tools including statistical process control, cycle time analysis and reduction are all based at least in part on the IPO process model.

The image of the organization as a machine evoked by the IPO model leads to engineering approaches to work process design — approaches that emphasize rationalization aimed at increasing "efficiency" or leveraging opportunities for automation. In order to define a process using the IPO model, we have to define the inputs to and activities that occur within each box before the process begins. But when there is uncertainty about inputs and component activities, it becomes more challenging to fit a process into boxes. This can lead process designers and managers to ignore — if not actually strive to eliminate — the variable, creative aspects of the process. The engineering approach also tends to separate the design of

work from the execution of work within an organization, an effect antithetical to participatory design. Additionally, as a process is decomposed, detailed, and rationalized, it becomes more difficult to change the process later without "breaking" it; this difficulty reduces the flexibility and adaptability of the process design.

Process design or redesign usually involves changes in the roles and responsibilities of the process participants. But while the IPO model effectively reveals the material and information flows in a process, it seldom highlights the interpersonal interactions and relationships. To the extent that people appear in an IPO scheme, they are abstracted as processing components or as inputs to or outputs from the processing components. This abstracting tends to depersonalize the process; tasks are to be done because "that's the way the process works." In many organizational cultures, process participants avoid raising role issues, as these are often perceived as political or cultural issues to be worked out after the process design is completed. And because the IPO model seldom leads us to ask questions about why and for whom a task is to be done, it doesn't help us much with negotiating the role changes that necessarily accompany process changes.

Language As Action

Despite the recognized importance of conversations in the process of organizing, most process designers continue to use tools based on the IPO model.[16] The IPO model is so ubiquitous that many people are unaware that it is only one model among many. It seems as if they are not aware of the lens through which they observe the world. But another process model, the coordination model, escapes from the IPO box and offers an alternative perspective. It takes into account more of the human, more difficult-to-rationalize aspects of a process; and it stresses the fact that language can be a form of action.

The rising interest in tools and techniques that focus on language reflects the recognition that a critical and often unacknowledged aspect of any work process is the informal web of conversations. It is through language that we create shared understandings, articulate our visions, and coordinate our actions in order to achieve our goals as members of an organization. Management theorists have come up with numerous tools to help make us more conscious of how we speak and how we engage in conversation. One such tool, *dialogue*,[17] is a "discipline of collective thinking and inquiry, a process for transforming the quality of conversation and, in particular, the thinking that lies beneath it." Another tool, *Action Science*,[18] focuses on overcoming organizational

defensive routines that can inhibit learning, and on improving interpersonal interaction by balancing advocacy with inquiry. Other tools, such as CQM's *Language Processing® Method*,[19] help people to come to consensus about the meanings of terms and ideas and to find patterns in seemingly chaotic data. The *ladder of abstraction*[20] can help us to become aware of the process of abstraction that often leads to misunderstanding. And the *coordination model*, as we'll explain in detail below, helps us clarify interactions that define people's roles and accountabilities.

All of these tools emphasize collaboration and cooperation. They give people the means to have conversations about conversations, to talk about the conversations that they are or aren't having, to discuss where and why conversations break down, and to negotiate ways to improve how they work together. All of these conceptual tools *must be used in a participatory context*; people must engage in conversation to negotiate collectively the meanings of the words they use and the roles they play in the organization. These tools can help participants discover tacit assumptions that, if not raised into view, are hidden from scrutiny and act like concrete to restrain change.

In contrast to the view of communication underlying the IPO model, "people process information and make decisions," the coordination

model states that "people act through language." We often think of "work" as the things we do and not the things we say; but words are not only descriptions — they are actions. We engage in conversation in order to interact with other people. If we observe the conversations that go on in an organizational setting, we can see that they generally serve one or more of four purposes:

- To develop and maintain relationships
- To build shared context
- To explore possibilities
- To coordinate action

Behind all the tasks and activities that we call "work," people have engaged in or are engaging in conversations to coordinate what they do. These *conversations for action*[22] "can be the central coordinating structure for human organizations. We work together by making commitments so that we can successfully anticipate the actions of others and coordinate them with our own."[23]

The Coordination Model

Looking through the lens of the *coordination model*, we focus not on materials and information flowing through mechanical procedures, but on people interacting. Based on language action theory,[24] the coordination model views an organization as a dynamic structure of social relations where people act through language. The image of the organization that we see in this model is not a machine of

many parts but a community of people engaged in conversation. People are talking, reading, writing, and interacting through information and communications technologies of all sorts. Analog Devices Chairman Ray Stata describes the coordination model this way: "A business process is a network of requests and promises linked across the company as performers become customers in requesting commitments and actions from other performers." He believes that it is "possible to operationalize the soft stuff" by focusing on the conversations for action and developing "competence in making and fulfilling commitments both to internal and external customers"; and he argues that "important conversations should be deliberately planned to achieve their intended purpose."[25]

According to the coordination model, then, the conversation that occurs in the space between people, rather than the tasks that people do, is the basic element of the work process. Using the coordination model allows us to identify the commitments[26] that people make to each other as they coordinate their actions. For process analysis, we focus on identifying the recurrent patterns of conversations for action that make up the work process. This type of analysis, when done in a participatory fashion, not only produces a map of the process, but builds shared understanding of who is expected to do what for whom, and why.

Satisfying Customers

For J.M. Juran, quality management is not simply the task of identifying and eliminating variation. It is serving customer needs. It focuses the entire company on customers; it gives the company one externally focused goal that all departments and functions can support... This customer focus provides not only an objective for the company but also a mechanism that unifies processes. Serving the external customer may be viewed as the final link in a chain of supplier/customer relationships that extends throughout the company from R&D and purchasing to sales, distribution, and customer support. Under such a system the demands of the final customer drive a demand-pull sequence of relationships, where the goal of the each stage is to satisfy the requirements of the subsequent stage.[27]

The coordination model gives us a tool for explicitly defining the chain of customer-performer relationships. Every process has a customer or a potential customer. The customer of a process can be a customer requesting product support; but it can also be an employee requesting a reimbursement, the government requiring tax information, or stockholders needing financial data. And the purpose of each process is to satisfy the customer.

The basic element in the coordination model is the conversation for action between a customer and a performer. By *customer* we simply mean the person who makes a request or receives an offer, nothing more. The *performer* (or supplier or provider) is the person who makes an offer or is made a request of.[28] Customers or performers may be "inside" or "outside" of some organizational boundary. The customer and performer labels do not necessarily connote hierarchical position or social status. Also, the fact that person A is person B's customer in one conversation does not preclude person B from being person A's customer in another; in fact, some sort of reciprocal set of commitments almost always lies behind any interaction. For instance, the client is the "customer" and a software developer is the "performer" with respect to the conversation about providing a software solution. But the software developer is the "customer" and the client is the "performer" in the conversation about getting paid for the work. Note that conversations are between specific individuals acting in specific roles, not between groups such as teams or departments. It is important to identify who will act; otherwise, no one in particular is accountable for a link in the coordination process. There are customer-performer relationships even within teams. In some cases, process participants do not know who

their customer is! Sometimes, we discover, there is no customer at all — a process has continued to function in spite of the fact that the need has long since disappeared.

Once the customer is identified, the customer's *conditions of satisfaction* (COS) need to be articulated. While COS often include "requirements," "deliverables," or "outputs," these things alone don't always get to the essence of what the customer wants. The COS may prove elusive, requiring substantial group effort to articulate in a meaningful way. Sometimes no one person understands the COS and they come into focus only through collaborative exploration of the whole work process. In some processes, customers don't know their own needs or requirements as they begin a conversation. In such cases we need to "manage the expectations" of everyone involved by making sure that the process includes conversations for action among all the appropriate people. For instance, a potential client might approach a software developer with a "request" that may be as general as "Can you provide me a solution that meets my needs?" A series of conversations will ensue in which the client's people and the developer's people will work together to negotiate and define this customer's specific COS. The software development organization will often have internal processes that must also be coordinated, such as processes for estimating the costs of various potential software solutions.

Coordination Mapping

Using the coordination mapping convention, each conversation for action is visually represented by a loop (see Figure 1). Each coordinating conversation between a customer and a performer moves through four phases: (1) preparation and the making of a request or an offer; (2) negotiation and agreement (or failure to reach an agreement); (3) performance and a report that the work is complete; and (4) assessment of the work and a declaration of satisfaction or dissatisfaction. The loop symbol appropriately connotes closure, as each conversation must be explicitly or implicitly completed.[29] Within the conversation a limited number of pragmatic "moves" are allowable; these include *request, offer, counteroffer, agree, report complete*, and *accept*.[30] Moves can be explicit or implicit, and not all of the possible moves will be taken in every conversation. In many processes, too, these moves may be mediated[31] by some "artifact" such as a paper form or by a technical system such as a computer.

Unlike identifying the instrumental acts involved in tasks and activities, learning to "see" and distinguish conversational moves or language acts takes some

Figure 1: A Conversation for Action
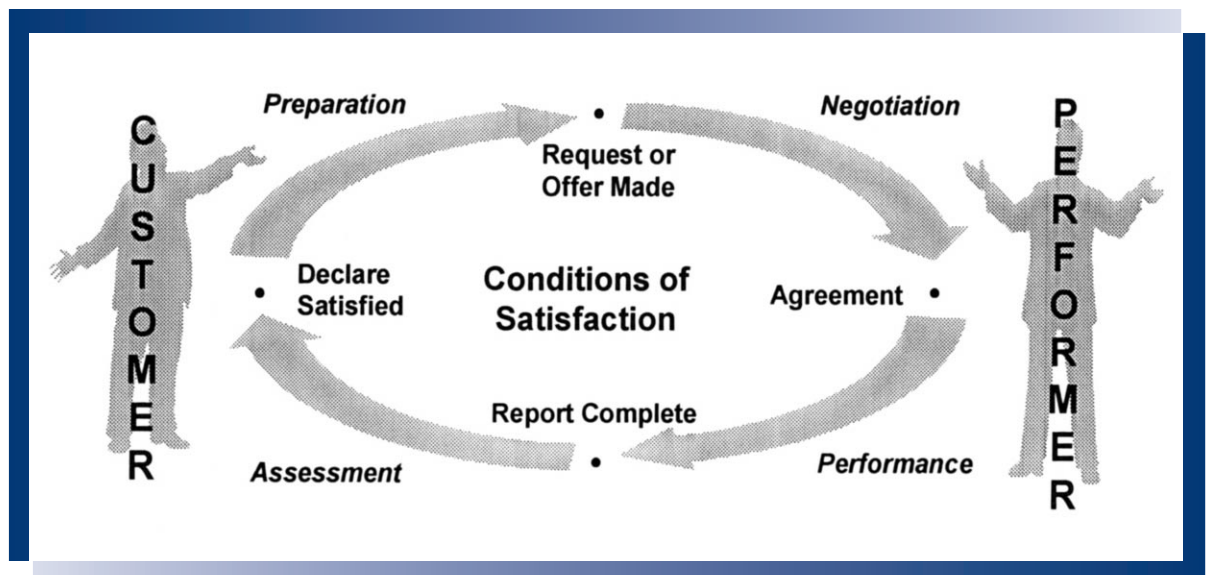
practice. The mapping process involves identifying each conversation, its customer and performer, the customer's conditions of satisfaction, and how each of the moves is taken. By encouraging the identification of all the moves in each of the conversations that make up a process, the coordination model provides a powerful framework for unambiguously analyzing and defining a work process. Working through and analyzing the interactions one by one often reveals hidden or implicit coordination conversations that the participants may not even be aware of. Many tacit, taken-for-granted assumptions underlying a process can get unearthed by the participants, leading to insights, clarifications, and discoveries of breakdowns that might not otherwise be possible. In coordination mapping, the interdependencies among conversations are represented by links drawn between the conversation loops. The move that triggers or is triggered by a dependency is indicated by where the link is connected to the loop.

Managing Commitments Rather Than Tasks

Under the coordination model, we manage the interactions that form commitments or expectations, rather than managing tasks or object flows. This makes the model especially useful when we are designing or carrying-out hard-to-rationalize processes, where the tasks and objects often cannot be defined

a priori. By focusing on the coordination of people acting in specific roles, the coordination model gives us a means for articulating and visualizing the interactions between people needed to get the customers satisfied, regardless of whether or not the process is rationalizable.

Both complexity and decentralization in organizations tend to increase the cost of coordination and the potential for costly breakdowns in communication. For example, continuous improvement through the elimination of variance is not effective in many processes involving knowledge workers (research, design, planning, and so on), as we don't know what the tasks or inputs or outputs are going to be. Knowledge workers are often hired precisely because they are smart and creative enough to handle diverse situations in diverse ways; in other words, variance is desirable in some processes. Because much, if not most, of the "work" knowledge workers do consists of conversations (rather than tasks), quality improvement results from reduction of the number of coordination breakdowns. For instance, if the appropriate people are not informed when someone reschedules or revokes a commitment, significant wasted effort may result. By focusing on the management of commitments, people in a process become more aware of their interdependencies with others and can coordinate more effectively. Also, to the extent that individuals assume

more accountability, they can operate more autonomously.

The Coordination Model and Participatory Design

Both participatory design and the coordination model are rooted in the idea of design as a social process. The coordination model supports participatory design by drawing attention to the roles and responsibilities of the people in the work process while providing a language (and visual mapping convention) to express and make explicit the specific interactions among individuals. All but the most trivial processes involve numerous interrelated and interdependent conversations for action. If the appropriate process participants come together to engage in a dialogue, they can mutually build a "shared mental model" of the work process. This shared perspective enables individuals to improvise and innovate within the process in order to deal with unanticipated situations.

Process analysis using the coordination model consists of mapping the conversations for action as they currently exist and identifying problems such as missing conversations or actors, ambiguous conditions of satisfaction, or systemic coordination breakdowns. Process design or redesign involves exploring alternative ways of structuring the interactions, redefining or expanding the roles played by each individual, establishing

missing conversations with other departments or vendors, or facilitating better understanding of the conditions of satisfaction of the customer the process serves.

While the IPO model addresses the questions of *what*, *how*, and *when*, the coordination model addresses the questions of *who* and *why*. People are central to the coordination model–the people *are* the process. And people in difficult-to-rationalize processes are not replaceable components. These individuals have unique skills, experience, and styles; the process may need to be adapted or designed around the individuals. The sidebar on "innovation" and "moment-of-truth" processes (page 26) points out the kinds of factors that support highly effective processes.

People in an organization may not be conscious of many of their day-to-day interactions. But people must interact with one another in order to identify these interactions and to discover the breakdowns that may be occurring. Participatory Design provides the forum, and the coordination model provides the framework, in which customers and performers can identify each other and the conversations that they are (or are not!) having. Along the way, the participants can come to understand better the complexity and constraints associated with the work and can negotiate a mutual understanding of their conditions of satisfaction. When the conditions of satisfaction

cannot be defined a priori, participants can design into the process explicit conversations for action to provide for adequate negotiation or review/reassessment to keep the customer and performer on track with respect to their mutual expectations.[32]

Of course, a work process operates within a set of resource constraints. The people in a customer support process, for instance, strive to satisfy the requests made by customers while working within a budget that results from a budgeting process. In this case, the customer service person has to satisfy not only the paying customer, but also the person who provides the necessary resources. Many processes within an organization are interrelated, and it is important to involve all of the appropriate "customers" when designing a process.

Processes of any complexity involve iteration (trial and error) and negotiation. For instance, the customer may ask the performer for help in solving a problem; the performer may propose a solution that the customer declines; the performer then comes up with another   plan and offers it to the customer; and so on. This type of interaction is naturally handled within the coordination model, such as: when "backing out" of a partially completed process involves significant work; when a customer cancels a request; or when a process calls for ad hoc (on-the-fly) adaptations to satisfy the

customer. Certain critical steps do need to be formalized in most processes, but by over-specifying we can seriously dampen people's enthusiasm and discourage creativity and innovation.

Like other models, the coordination model provides a framework to guide the analysis and design process. But this framework is rigorous and unambiguous. It identifies specific acts by specific people, not faceless boxes serving abstract goals. In this model goals exist because someone creates them. Anyone can easily learn the coordination model by participating in an actual mapping and design process.[33] People seem to learn the model inductively, with little formal instruction, when they use it in a concrete situation. Participants can "see" themselves playing the roles and engaging in the interactions that are being mapped out. After the first day of one group training session, a man whose title is, appropriately, "coordinator" in a clinical research group said: "This is exactly what I do all day! Up until now, I didn't have a way to describe it."

One of the strengths of the coordination model is that it provides a language in which people can speak explicitly about the reasons for coordination breakdowns. Rather than expressing problems in vague terms such as "He's always dropping the ball," "I find working with her difficult," or "I never know what they want, they just

Figure 2: Coordination Map for a Computer Systems Integrator
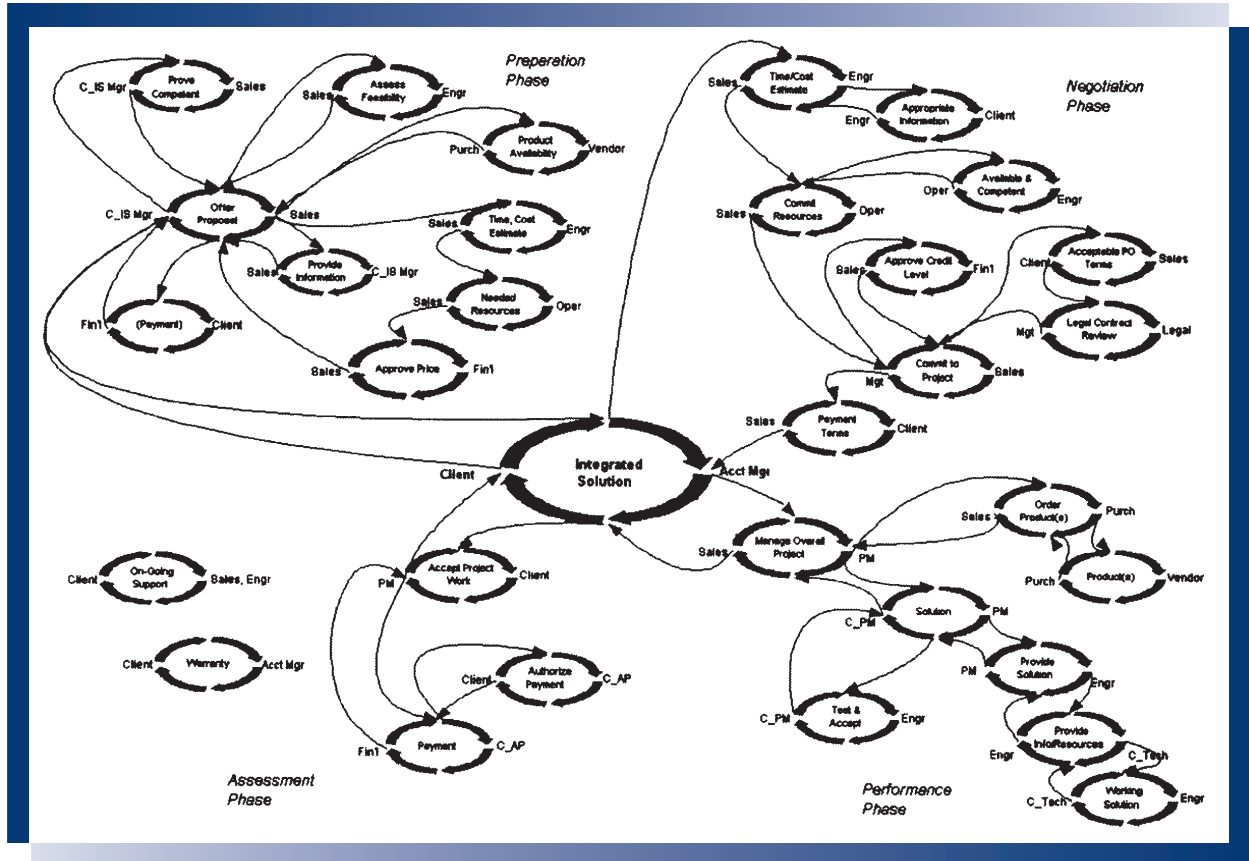
throw it over the wall at me," people can articulate the breakdowns in specific terms: "He agrees to do something, but when his priorities change, he doesn't let me know that he has been forced to revoke his commitment." This tenor of discussion can remove some of the emotional charge around the issues. In terms of the "ladder of abstraction," the model may help to drive the analysis down to lower levels of abstraction by providing a way to talk about specific acts that are or aren't occurring rather than about interpretations or generalizations. This can make it easier for people to imagine new possibilities for change in the way that they are interacting. As Ray Stata points out, "we need to establish a shared mental model of business

processes where breakdowns are interpreted and dealt with as system defects–not personal conflicts."[34]

Using the Coordination Model: A Case Study

To illustrate the use of the coordination model in participatory process design, we'll look at a computer systems integration firm where we facilitated a series of process analysis and design sessions. This firm designs and engineers solutions to meet the unique requirements of each customer. In most cases, they create a specifically tailored proposal and then execute the project. Using the coordination model, we collaboratively mapped the firm's

project-oriented work process, exploring the roles and accountabilities of all the participants as they worked together to identify and then satisfy a client's needs.

The coordination map we developed, shown in Figure 2, shows the firm's core work process when things go 'correctly' — there are no breakdowns in coordination. Mapping took seven days of facilitated sessions involving 18 employees (out of a total of 28), including people from sales, marketing, management, engineering, support, and finance. The firm had evolved a process of a kind that can be quite effective; but the frequency of breakdowns, the

need for rework, and interpersonal tension had increased as the firm grew rapidly from 12 to 28 people in one year. The map's purpose is to show the interdependencies throughout the process and to highlight the causes of problems and the missed opportunities. The map provides a "landscape" on which to pinpoint existing problems or to anticipate new ones.

Each element of this firm's project-oriented process is driven by the specific needs of a client. The large loop in the center represents the *primary conversation* between the client and the firm. Its goal is to define the crucial *conditions of satisfaction* for each client and each project. Although the conditions of satisfaction are abbreviated in this map as an "integrated solution," the participants actually spent considerable time articulating these conditions–which include quality and reliability of service, trustworthiness, technical competency, professional appearance and behavior, objective advice, and what they called "a fun time." The central loop is surrounded by loops representing the conversations for action that occur in each phase of the process. (The conditions of satisfaction in all of the loops were articulated in depth during the analysis of the process, but on the map they are abbreviated.) First comes the *preparation* phase (upper left area of the map). This phase begins with the client informally requesting a project proposal or formally submitting an RFP and ends with the firm offering a

project proposal to the client. If the client accepts it, the next phase involves the *negotiation* of the specifics of the project–the firm's and the client's obligations; the specific dates, costs, and payment terms; and other contractual issues. The *performance* phase begins once there is mutual agreement on the client's specific conditions of satisfaction, this usually being signified by a signed contract. Project work then proceeds, typically with the involvement of numerous people from both the firm and the client organization. When the project work is completed, the firm reports completion to the client. Then, during the *assessment* phase, the client evaluates the performance of the work and makes payment.

The coordination mapping exercise enabled the group to explore in detail the interdependencies of people's commitments throughout the process. Most participants expressed some level of surprise as they came to understand parts of the process that they were not directly involved in. Through the process of drawing the coordination map, they collectively discovered specific causes of problems that they had been aware of only generally. Through the analysis of their interactions, they were able to diagnose and articulate specific breakdowns that were plaguing the process.

The participants discovered that several major problems resulted from insufficient coordination between the people who sold the

project and the people who would do the work. In some cases a salesperson made promises to a client without knowing if the engineers were capable of delivering on the promises. The salesperson was, in effect, committing the engineers to deliver specific services without obtaining their agreement as to their ability, availability, desire, and so on. While some of the services that the firm delivers are routine and don't require this level of negotiation, most projects do involve unique customer requirements; and salespeople did not always take the time during proposal development to involve the engineers in setting the client's expectations. Such projects tended to turn into crises because of overcommitted resources or client expectations that simply couldn't be met within the budgeted cost or time frame. This would force renegotiation of the conditions of satisfaction with the client–an event that was costly, not just in lost time and revenue but in the customer's lost confidence in the firm. The coordination map reflects the need to involve the engineers during the preparation and negotiation phases. The participants came to recognize that when this involvement was compromised in the name of expediency, the downstream costs could be substantial.

Other problems revolved around discontinuities associated with the "hand off" between salesperson to project manager at the beginning of the performance phase. The salesperson, who had been

involved in both formal and informal conversations with the client, had made various promises on behalf of the firm. Most of these promises and conditions would get captured in the proposal or otherwise conveyed to the project manager–but some might not. In such cases the project manager and the engineers were in for a few unpleasant surprises as the project went forward.

Once the "hand off" occurred, the salesperson typically lost contact with the project. If the client's requirements changed during the course of the project, the engineers and project manager either felt unprepared or were not in a position to negotiate the financial aspects of the changes. If they found it difficult to reengage the attention of the salesperson, the project might be delayed, or the engineers would just do the additional work to make the customer happy. The group recognized that these situations were causing not only reduced profitability but the waste of opportunities for selling additional services and products.

Project "closure" was another area that the participants explored and found wanting. When the project team completed their work, they would usually "throw it over the wall" and move on to the next project; there would be no assessment as to whether the client was satisfied. The group felt that they were not getting as much repeat business as they might, but they could only

speculate on why. As they looked at the assessment phase, they began to talk about the benefits of getting reliable information on clients' level of satisfaction and of understanding the reasons for any dissatisfaction. They decided to have regular "post mortem" meetings to review projects both internally and with clients in an effort to learn from their mistakes. While reviewing the assessment phase, the participants also began to think of ways to create new opportunities for follow-on sales. A project review meeting with a client could provide an opportunity to identify additional client needs and to make new offers.

Problems of omission–what is not being done, as in the lack of assessment and closure in this case–can be very difficult to find in process analysis and are rarely revealed through interviews. The closed-loop conversation of the coordination model leads the participants to explore each of the four phases. This often reveals implicit interactions and dependencies in the work process that might otherwise not be recognized. In our case study, the coordination model led the participants to see what was missing–the assessment of the customer's satisfaction–and to look for ways to complete the interaction and improve the work process.

Most of the issues we saw surfaced while working with this systems integration firm were similar to ones we have found in other project-oriented

businesses. Veteran project managers may find many of these problems and issues obvious and may suggest that what this firm needs is a good dose of project management training. But while this firm would certainly benefit from some formal training, our experience leads us to believe that employing the coordination model in participatory process design offers significant additional benefits. Involvement in the process of discovering problems and inventing solutions gives participants a sense of ownership and some level of commitment to changes in the work process and in their roles. But possibly the most important advantage of our approach is that it provides an opportunity for relationship building among the participants.

First, participants develop a shared understanding of the roles and accountabilities in the work process. Second, they build a shared context of meaning around words, symbols, and actions. And finally, they can build stronger interpersonal relationships through repeated interaction. By opening a dialogue where there may have been none, participants learn more about each other's concerns and personal style of interaction; they learn more about strengths and weaknesses of others, and of themselves. As participants explore a process together, there is a noticeable change in the collaborative attitude of some of them. One of the biggest impediments to building effective cross-functional processes is the

continued use of function-oriented job titles. The boundaries perceived to exist between traditional job titles such as "salesperson," "project manager," "engineer," or "manager" create significant barriers to reorienting roles around a work process. Initially, when a problem was identified with respect to roles and how they might be altered to address a coordination issue, the response was, "that's not part of my job." We experienced the engineers resisting involvement in the sales process and salespeople resisting involvement after the deal was signed. But, as individuals began to see the details and subtleties in the coordination process and understood the consequences of their own action or inaction, some of them began to express a willingness to explore new or modified roles for themselves.

Additionally, by providing a representation of the process where people's roles and relationships are made explicit, the coordination models leads participants to talk openly and directly about their interactions. The model can help move the conversation from ambiguous statements, such as "The salespeople don't know what they are doing," toward more concrete observations, such as "The salespeople are making commitments that the engineers cannot fulfill." Negotiating changes in roles can be politically sensitive, and such discussions can degenerate into blaming and scapegoating. But the firm in our case study managed to analyze the issues clearly and rigorously without allowing the discussion to degenerate into a political battle. We believe that the explicit language of the coordination model took some of the politics out of the discussion and allowed them to focus on the common goal of getting the customer satisfied.

Summary

The coordination model provides a rigorous, customer-focused framework for the analysis and design of work process. It is especially effective for looking at hard-to-rationalize work processes such as those in industrial design, engineering, computer systems integration, or software development. This model gives us a new way to view a work process–as a dynamic structure of social relations established and maintained through language: a network of conversations for action. By planning and managing conversations for action between the process participants, rather than tasks and objects, we can improve processes by better defining roles and accountabilities without beating the flexibility, creativity, or innovation out of the process. Using participatory process analysis and design, participants mutually discover problems and collectively explore opportunities for change. The resulting awareness of the big picture enables participants to understand how their actions (or lack thereof) may impact others, and this in turn helps them improvise as necessary to satisfy their customers.

Notes and References

1. We are using the term "coordination model" to refer to the business process analysis, mapping, and design technology called ActionWorkflow, which is based on the language action approach (see notes 21 and 24 below). ActionWorkflow is a registered trademark of Action Technologies, Inc. Software tools based on this approach, including a process mapping and analysis tool, a workflow process design tool, a workflow enactment engine, and various interfaces are available. In this paper we discuss the model as a tool for process analysis and design: we do not discuss the issues concerning the workflow technology. We avoid the term 'workflow' because it is usually associated with process automation technologies. For a discussion regarding a system implementation, see Richard Kesner's, "Employing Groupware in Business Process Redesign: ActionWorkflow," Center for Quality of Management Journal, Vol. 5, No. 2, 1996.

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26. Commitments can be thought of as "contracts," but the word "contract" is usually too strong; while people commit, they also demit (decline or revoke). Commitment means promise, offer, agreement, intention, obligation, arrangement, declaration, vow, pledge, or contract. A commitment can be strong or trivial. (See also note 28 below.)

27. From Grant, Robert, Rami Shani, and R. Krishnan, "TQM's Challenge to Management Theory and Practice," Sloan Management Review, Winter 1994.

28. There exist no words for some of the "things" that the coordination model reveals. The inventors of the model chose to adopt and essentially redefine existing English words, and the meanings that these words assume within the context of the coordination model are crucially different from the meanings in common usage. This has caused considerable confusion. Worse, out-of-context interpretations have led to surprisingly vociferous and, in our opinion, mostly ill-founded criticisms of this model. When learning the model, it is best to start out by jettisoning the common usage connotations associated with the terms (especially the terms customer, performer, conversation, commitment, promise, and conditions of satisfaction) and to treat them as new terms with new meanings.

29. Conversations can be "completed" without the customer's conditions of satisfaction being met. Conversations can also be terminated when the performer declines a request or revokes an agreement, or when the customer rejects an offer, cancels a request, or declares dissatisfaction.

30. The full set of moves consists of initiate, request, counteroffer, offer, counter-counteroffer, decline, agree, revoke, report completion, declare satisfaction, decline to accept, and cancel.

31. Interactions may be "mediated" by various objects, artifacts, systems, or media, including paper, telephone, fax, and computer programs and networks. Mediated interactions tend to "distance" the "interactants," sometimes to the point that neither party is aware of the identity of the other. This is

especially and increasingly the case with computer systems. We say "the program has a bug," but the fact is that the person who wrote the program (or the operating system or the microcode or whatever,) made a mistake or did not anticipate the situation that caused the "bug." Computers, for all practical purposes, never do anything wrong! This mediation of interactions by technology can lead to increasing ambiguity and confusion with respect to who is accountable for what.

32. A customer-performer conversation never exists in a vacuum. There is almost always some level of reciprocity or *quid pro quo*, explicit or implicit. For instance, Joe "works for" Jill: Joe performs the work that Jill requests of him. But he does this because Jill, in employing Joe, has made a commitment to pay, train, review, discipline, coach, and mentor him. Joe is Jill's customer in the employment conversation, while Jill is Joe's customer in the work conversation.

33. In fact, we have found that people with a "business" focus seem to learn the model more quickly than people with a "technical" focus. We speculate that technically oriented people have IPO-type models that they have to overcome, whereas the business-oriented people don't harbor such models and find this model to be simple and natural. Also, an abstract presentation of the coordination model using hypothetical process examples is not nearly as effective as a "hands-on," experiential learning method. The unusual language and symbols associated with the coordination model seem to be easily assimilated in a hands-on training session.

34. Stata, note 25 above.