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Dr. Thomas H. Lee, along with CEOs and senior managers from seven companies in the Greater Boston area, founded the Center for Quality of Management (CQM) in 1989. As President Emeritus of CQM and a member of its Board of Directors, Dr. Lee is instrumental in working with members and thought leaders to identify and define the multiple facets of an integrated management system.

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DESIGNING INTEGRATED MANAGEMENT SYSTEMS

Thomas H. Lee and David Walden

Abstract

This paper surveys the evolution of management methods and encourages study and design of integrated management systems. In section 1, we discuss the proliferation of management methods and emphasize the importance of combining methods that work well together to address specific circumstances. In section 2, we introduce an organizing principle with which to study management methods: the evolution from the mechanical model of management through the biological model to the social model. We also describe some of the pressures of change and complexity that drive and support this evolution. In section 3, we argue that to date Total Quality Management has been the most comprehensive system for supporting organizations' transition from the mechanical and biological models to the social model, although TQM also has weaknesses. In section 4, we discuss issues relating to the actual implementation of an integrated management system—particularly human behavior issues. Implementation must be phased-in in a way that lets people see the benefits of the new methods. In section 5, we discuss the Center for Quality of Management's efforts relating to integrated management systems and our interest in working with others who are testing different management system designs.

It appears to many people today that there are more choices of management methods than ever before. Newspapers and management journals are full of reports on one or another management method or technique. Thousands of consultants teach or coach various methods. A sampling of the methods that are currently being promoted:

- Ackoff and Interactive Management
- Argyris and Action Science
- Bohm and Dialogue
- Davidow and Virtual Companies
- Deming and Total Quality Management
- Flores and the Language/Action Perspective
- Goldratt and the Theory of Constraints
- Hammer and Champy and Reengineering
- McKenna and Relationship Management
- Peters and Liberation Management

- Pine and Mass Customization
- Senge and his Five Disciplines
- Womack and Lean Production.

A perception exists that the various management methods are rivals and that practitioners must choose among them. And indeed, the various management methods are often positioned by whoever is doing the writing or speaking as competitive with each other. For instance, the press often presents stories stating that one management theory or another is now obsolete, has not lived up to its billing, or has been replaced with a newer theory. Also, in the interests of instructional efficiency or their own market positioning, consultants and gurus sometimes describe their own methods in memorable but simplistic terms that downplay or exclude other methods.

Such explicit or implicit competitive positioning of the various management methods is natural and understandable. But, in many cases it is not as beneficial to people in companies, to companies themselves, or to society at large as a more integrative approach would be. Essentially, we must recognize that there is no panacea, and there is no single "right" method.

Our view is that the coherence and understandability of the management system practiced in an organization are often more important than the particular methodology the organization adopts. While research into and

teachers of individual methods are needed, we also see a need for more researchers, organizations, and teachers to address how to provide integrated combinations of proven management technologies tailored to individual situations. The Center for Quality of Management (CQM), with which we are associated, and we personally are making this integrated approach an important part of our work.

In this article we will start with a look at how management models have evolved; we will then examine the contributions of Total Quality Management, the challenges involved in implementation of management systems, and the integrative efforts of the CQM.

1. The Need for Evolution and Integration

Analogies between sports and business always have their limitations; however, we think there is a useful analogy between the evolution of management methods and the evolution of (American) football systems. The way the game of football is played has changed substantially over football's history. These changes have happened:
(a) partly because the rules of the game have slowly evolved (often in the interests of making the game more exciting for fans but sometimes to make it "better" for the players);
(b) partly because player skills have improved (as new training

techniques have been developed and the fundamental moves of the game have become better understood); and, (c) partly as a result of conceptual innovations in how the eleven men on the field might be used in various situations that occur within the rules (for instance the increasing emphasis on the forward pass, or the creation of the "wishbone" offense). The way football is played at the professional level today is vastly different than the way the game was played 50 years ago, and a team of the past would be no match for a team today.

Each team typically designs a basic system for playing the game that fits the rules of the league in which it plays, the skills of the players available to the team, the philosophy of the head coach, and the demands of the expected competition. For instance, the highly successful San Francisco Forty-niners have used an offensive system in the past few years that depends almost entirely on a passing game. Within the basic system, which the players are trained for and adjust their fundamental skills to optimize, the teams have a book of plays that they learn to run under the system. There also may be sets of plays in the play book that are parts of other basic systems that the team has available to run in appropriate situations. In fact, a team play book may actually be based on a hybrid of several different named systems. For each game, a subset of the plays in the play book that is expected to be useful against the specific competitor is practiced

especially hard and perhaps a few new plays may be invented and added to the play book. Before the game, the coaches put together lists of plays that are practiced and available for particular situations and perhaps a scenario of an order they'd like to run various plays in with the purpose of "faking out" the opposing team. Each of these plays typically has many optional forms, and the exact form is chosen in real time reaction to what the opposition does as the play is being run.

Many of us in the United States have become so accustomed to a particular set of management practices that we feel they represent the natural way to manage. But, as happened in our football analogy, some of the management practices that have been well known and widely used in business over much of this century are no longer as applicable as they once were. We are not saying that these methods are not useful at all anymore; just that they don't seem to be as effective as they once were and that other systems and combinations of systems are now more appropriate.

These familiar practices include the ideas found in the first column of Table 1, which we call Table 1a. (Ignore the second column for the moment.) Many people don't realize that this set of management practices is itself relatively new—and that some elements were never well accepted in some other important parts of the world, or by some groups in US. companies, such as labor unions.

As we will discuss in more detail later, the primary problem the Table 1a methods suffer from today is that they were intended to optimize organizational operation based on the premise that the future could be predicted or at least that what was currently working would continue to work. In today's world of rapid and difficult-to-predict change, these methods (at least when taken alone) are less effective and the evolution of improved methods is desirable.

Management methods have always evolved—and continue to evolve—to address changing business and societal needs. Over the centuries new methods have come about either because someone believed they had new understanding of how to do something or because the environment changed and a prior method was no longer as effective. Each new method has been built on the basis of past experience and has attempted to improve on older methods. Often older methods are integrated into newer methods. Thus, as in all other fields, management methodology evolves by redoing, sometimes discarding, and often building on what has gone before.

New or improved management ideas and methods typically take one of several forms:
(a) one good new idea or improvement of an idea (e.g., statistical process control from Walter Shewhart); (b) a whole system contributing some ideas and integrating many ideas (e.g., W. Edwards Deming's 14 points); or (c) a case study (e.g.,

Alfred P. Sloan's description of General Motors in *My Years at General Motors*).

The process of developing and trying new management methods is a completely natural human learning process[1]. Participation in this process is laudable. It is not appropriate for the press, for example, to characterize those who are working in this area or the methods on which they are working as losers because of problems that may be revealed when we try new methods.

There is much potential synergy among various methods being promoted today and among various parts of the familiar methods of the past, and there is a need to discover or confirm useful combinations of management methods for different situations. The promotion of one method to the exclusion of other methods is counterproductive. For instance, Tom Peters, in a review of the book *Mastering the Dynamics of Innovation* by Jim Utterback[2] suggests that a CEO's bold innovation alone is sufficient and that benchmarking, core competence, and other aspects of management are unnecessary. But, top managers have to take responsibility for dealing with their complete environment and all their resources. They can't focus only on one or two areas. By analogy, the producer or managing director of a Broadway show cannot get by with just a great play or just great actors; rather, he or she must worry about having a good script, good actors, a good orchestra if there is a

Table 1

Table 1a—Traditional set of management methods	Table 1b—Underlying models and current difficulties with the methods
Strategic planning: The idea that we can predict the future sufficiently to make plans 5 or 10 years ahead.	Consistent with the biological model. Because of the rapid rate of change, it is increasingly difficult to predict the future 5 or 10 years hence; and, as typically practiced, strategic plans are not revised often enough to adapt to changing times.
Cost accounting and control: The idea that we should keep track of the profitability (or at least the expenses) associated with specific products, cost centers, etc. Traditional cost accounting assumes (a) that there are lots of fixed costs that should be pooled and allocated on a pro rata basis, and (b) that the costs of various activities are the key determiner of whether the activities should be done or not.	Consistent with the mechanical model. As typically practiced, traditional cost accounting tends to lead to much counterproductive internal politics and many bad investment decisions.
Concept of the functional organization: The idea that the organization should be divided into functions such as sales, marketing, development, administration, customer support, manufacturing, and so forth.	Consistent with the biological model. Typical interactions in functional organizations tend to make projects take longer than can be afforded in today's rapidly changing world.
Job descriptions and standard procedures: The idea that workers should have specific jobs that they are to accomplish in specific ways, that no one else is supposed to do their job, and that they aren't supposed to do any other job.	Depending on how rigidly the job descriptions and standard procedures are to be adhered to, consistent with either the mechanical model or the biological model. The standard-procedures approach tends to lead to specialization so extreme as to be counterproductive, where individuals focus only on doing their job rather than on the greater task the organization is trying to accomplish.
The division of labor between those who improve work methods and those who do the work following the prescribed methods: The idea that certain people in the company don't do the end work themselves but rather specify how others are to do it. (Related to the use of job descriptions and standard procedures.)	Depending on the purpose of the work-method improvement effort, consistent with either the mechanical or biological model. In today's world, this method has difficulty reacting fast enough and developing sophisticated enough solutions.
Management by objectives: The idea that when a manager assigns a task to an individual or a team, all that matters is whether the task gets done or not; the manager is not particularly concerned with the means used for accomplishing the task.	Consistent with the biological model. This method depends exclusively on individual capability and is not particularly effective for transferring skill from one individual throughout an organization.
Management by exception: The idea that as long as workers follow the specified procedure or accomplish the specified task, managers assume a hands-off posture; managers move to a hands-on posture only when there is an exception to the expected results.	Consistent with the biological model. In today's rapidly changing world, the two main difficulties of the method are that improvement cannot be done fast enough and, that top management is usually unaware of important details of the business.
Economic order quantities and long production runs: The idea that efficiency requires long production runs and large orders of supplies.	Consistent with the mechanical and biological models. The method tends to lead to an organization that can't react rapidly and that can't make a profit in many circumstances.

musical component to the show, a suitable theater for the audience, good crew work, good marketing, and so forth. Peter Drucker's book Management: *Tasks, Responsibilities and Practices* describes the totality of areas a CEO must be concerned with.

Indeed, it's hard to imagine a management system that does not include some integration of methods from before. While occasionally the proponent of a single good idea will view it as the panacea for all problems, more often a proponent will put forth an idea with the (perhaps implicit) assumption that it will be integrated into the rest of a company's management system. Case studies inevitably describe situations in which many management methods are integrated or point out how systems of management need to be changed for practical application. Some examples:

- Deming's 14 points combine ideas derived from statistical process control with ideas on human motivation.

- Peter Senge's five disciplines combine his own ideas on system archetypes (abstractions of patterns found in more detailed System Dynamics models, such as, Jay W. Forrester originally proposed) with four other ideas: mastery of one's own life, that is, alignment between one's job and personal life or values (from Robert Fritz); explicit communication of mental models (from Chris Argyris); attainment of a shared vision; and team learning (from David Bohm).

- In *In Search of Excellence*, Tom Peters and Robert Waterman identified 8 characteristics of "excellent companies." Later, in *Thriving on Chaos*, Peter's list of good management methods included 45 topics. (In *The Renewal Factor* Waterman still had a list of 8 elements, but a different 8.)

Selection and integration of methods into theoretical or practical systems, then, is completely common. Unfortunately, this does not seem to be well understood by much of the US press, by many senior managers, or by many employees in companies.

2. The Mechanical, Biological, and Social Models of Management

With so many management methods and techniques to choose from and so much change over time, an organizing principle will be useful to guide our discussion. The organizing principle we suggest—following the insight of Russell Ackoff and Jamshid Gharajedaghi[3]—is the evolution from the mechanical to the biological to the social model of management. Table 1b, the second column of Table 1 above, reconsiders each method listed in the first column in its relation to these three management models.

In presenting the three models, we do not intend to suggest that they are mutually exclusive. In the real world things are not as distinct as the pure models suggest. In fact, as the evolution from mechanical to biological to

social model has occurred, the later models have often maintained some aspects of the prior models.

The mechanical model. The mechanical model draws an analogy between an organization and a machine. In the model, the workers in the organization are the parts of the machine. The business situation is analyzed, and procedures are developed to turn inputs into outputs. Each worker is assigned a particular—typically independent—procedure and taught to follow it rigorously. As long as the workers follow their procedures correctly and the inputs are as expected, the machine will keep turning out the expected outputs. The top manager's jobs, therefore, consist of designing the appropriate machine and controlling the workers and inputs to minimize variation. The mechanical model assumes a static environment for which one can build a machine that does the same things over and over. In this model, as in a machine, the people in the organization have no purpose other than to function in the way the owner or boss directs.

Organizations based on variations of this model were common around 1900 and are still frequently seen today. We are all familiar, from literature or from movies or from personal experience, with companies operated according to the mechanical model. We have all heard some version of the "I don't pay you to think; I pay you to do what I tell you to do." The story is told of Henry Ford—definitely a controlling

manager—going on a trip to Europe. After he left, some of his employees thought it was an opportunity to make some design improvements that they couldn't make while Ford was there. When Ford returned, the employees showed him their improved design. Ford jumped on the redesigned car, smashing it, saying, "your job is not to make improvements; your job is to do what I tell you to do."

The biological model. The biological model draws parallels between an organization and a biological organism. In this model, the workers are the arms, legs, and sensory and other organs, ultimately serving the needs of the organism as a whole. Unlike the mechanical model, the biological model assumes that the parts of the organism do their jobs according to their own program (including communication among themselves) much of the time rather than according to a program provided by the intellectual center. For instance, without conscious instructions from the head, the heart adapts on its own to calls from other parts of the body for blood to be pumped more or less rapidly. In the biological model, top management's job is to decide what the organism as a whole is supposed to accomplish, observe the functioning of the parts, and give feedback to the parts where their outputs aren't satisfactory. This monitoring of the outputs of the parts is necessary because the parts have the capability to operate

to some extent without direct control of the top management.

Unlike the mechanical model, which assumed a static situation that could be handled by a machine, the biological model can be appropriate for situations where change needs to be dealt with, provided the change is either slow or predictable. If change is slow enough, an organism can gradually evolve to cope with it. If change is predictable (and if adapting is within the ultimate capabilities of the organism), top management can condition and train the parts to be able to handle the new situations. But, if the change exceeds the capabilities of the species to adjust, the species will become extinct, and its ecological niche will be taken by another species better adapted to the new environment; in some cases this may be a species that evolved from the original species.

For much of the 20th century, there has been an assumption that growth was the way to ensure survival of a company. Thus, an explicit purpose of the biological model has been business growth. And management methods consistent with the biological model (with some continuation of the mechanical model) have been what most companies in America have used for much of this century; see Table 1.

The social model. The social model uses an analogy between an organization and a society of individual beings, where each

individual has the ability to think and learn for himself or herself. In this model there is much interaction among the individuals in the society, and the individuals depend on each other for their mutual adaptation and survival. This model is well suited to situations in which change is unpredictable—and to situations in which it is possible for the society to create its own future. In other words, the social model is the basis of a learning system: it is well suited to situations that require the continual development of new capabilities. The job of top management in the social model is to create a learning organization—to design a desirable future and to find ways to achieve it, particularly by managing the interactions among the individuals and organizational components in the society[4].

Because there are many mutually dependent individuals in a social-model organization, there can be many different purposes; for example, the purposes of the employees, those of the company, and those of the larger society that contains the company. Sometimes these multiple purposes are in conflict with each other. The social model, however, makes possible a level of collective action that can offset problems caused by multiplicity of purposes.

One way to mentally contrast these three models is to imagine the following:

- machine built to do a limited set of tasks in an unchanging way

- A living organism that deals with its environment in a variety of ways, limited by the innate abilities of its species and by the speed of evolution the species is capable of

- A human society, with its ability of cultural evolution, which can adapt rapidly, learn new skills, and "remember" and pass on knowledge by means other than the built-in "wiring" of the species.

Change and complexity in the 1990s. From the preceding descriptions of the three management models, it is clear why the mechanical model no longer works and why there is increasing pressure for organizations to move from the biological to social model. Mechanical models can't work for long in any situation where there is significant uncertainty generated from outside, especially if the situation involves more complexity than the management can master alone. The biological model ceases to work well when things begin to change faster or more radically than the organism can adapt, especially in situations of great complexity.

But today change is occurring at an unprecedented pace, and complexity is exploding. Why?

First, change is always trying to happen. Someone somewhere is always trying to think of better

alternatives to existing products or methods. Some of these "improvements" become more attractive than the old ways and in time replace the old ways. "Improvements" always try to make things better or faster or cheaper. Achieving these goals often requires more complexity.

Second, better, faster, and/or cheaper communications and transportation are catalysts for better, faster, cheaper ways in other elements of a national economy, affecting both customer demand and producer capability. In the United States, railroads, telegraph, and steamships were developed and supported westward expansion. They also increased possibilities for national and international markets. Bigger markets permitted and demanded greater industrial effectiveness and efficiency. Increased competition also resulted, leading to pressure for diversification, which in turn was supported by the communications and transportation infrastructure.

Communications and transportation continue to catalyze the development of enterprises, of technologies, and of management techniques. Over time, however, communications has become more and more important. An increasingly large proportion of products being sold are services and information, which do not need transportation in the same sense as manufactured goods. Also, transportation has become less important as communications has permitted

manufacturing companies to coordinate with plants that build many components in the region of sale.

Communications, meanwhile, helps fuel the pace of change and the rise of complexity by letting people everywhere see and hear what is happening and available everywhere else. Communications also provides an infrastructure that helps companies meet the demand for change.

There is one dimension in which transportation remains important: the ease with which people can move from one country to another. The United States is increasingly culturally diverse, and Jamshid Gharajedaghi points out that multiculturalism in our workforce leads to management complexity and heightens the need for an improved management system. In *Management: Tasks, Responsibilities, and Practices*, Peter Drucker supports Gharajedaghi's assessment.

During the agricultural millennia, the speed of business change was limited by the speed at which handmade products made from plants and animals could devised. In the industrial era, the speed of change was limited by the speed at which people could develop new technology and new manufacturing lines. Now, in the era of information, the speed of change is limited by the speed at which we can get new ideas to be accepted by customers and employees.

3. TQM and the Shift From the Biological Toward the Social Model

In this new environment of rapid change and growing complexity, the social model of management is needed. But what are the detailed management techniques that will support this model—replacing, or at least augmenting, the methods listed in Table 1a?

Over the past 40 or 50 years the set of management tools called Total Quality Management (TQM) has developed. TQM first evolved in Japan as an outgrowth of US management methods taught by W. Edwards Deming. At the Center for Quality of Management we think of TQM methods as constituting four major "revolutions": continuous improvement, customer focus, total participation, and societal networking.

Continuous improvement. Continuous improvement is in contrast to the traditional approach of "if it ain't broke, don't fix it." Continuous improvement says we should keep looking for ways to do things better all the time, even when the existing ways work pretty well. This approach is necessary for survival in a rapidly changing and highly competitive world. However, continuous improvement says something even more important: Organizations should use the scientific method to find out what management methods really work in a given situation.

The scientific method includes several key principles. One is that we must utilize both theory and practice; neither alone is sufficient. Another is that there is no final answer; each answer builds on both prior and new understanding. Finally, the scientific method requires tangible processes and testable hypotheses; without the latter, we are in the world of faith rather than the world of science. The continuous-improvement approach subsumes the ideas of statistical process control, reactive improvement of products and processes, and proactive improvement of new products and processes. Continuous improvement can be thought of as the route through which the value of each of the following "revolutions" was discovered.

Customer focus. Customer focus contrasts with the traditional approach that the company knows better than the customer what the customer wants. Today a company must keep its eye on the customer constantly in order to respond fast enough to new customer needs and to make sure that finite resources are deployed as effectively as possible to provide customer satisfaction. As part of customer focus, an organization typically analyzes its entire customer value chain and redesigns it as needed.

Total participation. Total participation is in contrast to the traditional approach that some people do the work (daily work) while different people plan how the work is done (improvement work). That traditional model does not adapt fast enough; today, organizations need everyone to be involved in both daily work and improvement work. We have all seen situations, for instance, where customers demand a new level of service, and the company's customer representatives must tell the customers that it is against company policy to provide this level of service. Also, separation of daily work and improvement work prevents certain types of advances entirely. For instance, much of today's business emphasis is on new knowledge creation, which often depends on integration of insights and skills from people throughout the company (and from people outside the company, such as customers). Total participation allows for this kind of integration. Total participation embraces the ideas of quality circles, teamwork, cross-functional teams, and so forth. We also think of total participation as covering infrastructures for phasing in and developing new management and quality methods—including methods of orientation to the need for change (e.g., top management vision and leadership); methods for developing necessary new skills (e.g., importance of training, rewards and incentives); and methods for aligning key activities to attain ultimate goals (e.g., Hoshin Management).

Societal networking. Societal networking is in contrast to the prior assumption that companies must be secretive with their management and quality methods because these methods afford a competitive advantage. No organization today has sufficient resources or insight to develop by itself all the new methods it needs to remain competitive. Rather, the most productive course is for organizations to participate in a quality culture, sharing quality methods and encouraging each other to improve quality and management methods-in other words, to participate in a mutual learning system. Two keys to societal networking are (a) exchange of real case studies and (b) an explicit infrastructure for societal networking; for example, publications, national quality awards and certificates, quality societies, reports on experiments with new methods, and so on. Developing mutual learning organizations is a major purpose of societal networking.

Taken together, the four revolutions of TQM and the components of each area of revolution form a rather comprehensive system of management. The methods of TQM make a major break with many of the methods typically used in the mechanical and biological models of management (refer to Table 1). For instance, TQM's total-participation principle, having everyone involved in improvement work and daily work all the time, is definitely a break with the concept of management by exception. TQM's Hoshin Management,

with its emphasis on planning the means of accomplishing goals, is a break with the practice of management by objectives. TQM has brought an emphasis on crossfunctional activities, a break from the concept of the functional organization. TQM has introduced just-in-time activities in contrast to long production runs. And so forth.

We see TQM as the first explicit major management system that tries to move management practice substantially toward the social model of management. TQM's continuous improvement and customer focus have completed the move away from the mechanical model and begun the move to the social model, and TQM's total participation and societal networking are moving away from some aspects of the biological model and toward the social model.

We can look at how TQM's concepts of continuous improvement, customer focus, total participation and societal networking help with the transition to the social model of management in another way:

- Continuous improvement provides the basis for a learning system.

- Customer focus provides the source of feedback for the learning system.

- Total participation enables the learning system to function in the organization; for example, through

voluntary quality circles, cross functional teams, and so on.

- Societal networking supports the learning system from outside the organization.

TQM tools and the social model. Some more detailed examples follow of how various TQM methodologies are consistent with the social model.

Quality Control Circles (QC Circles) were a relatively early innovation in TQM. In QC Circles all members of a small work team work together to minimize variation in products and services and to improve the quality of products and services. QC Circles are based on two principles. First, they embody appropriate process improvement methods, which team members learn and apply. Second, QC Circle activities are voluntary—an indication of compatibility with the social model.[5]

The Language Processing Method® (LP™ Method) is another TQM tool that facilitates the social model of management.[6] It consists of three phases. In the first phase each participant states his or her own views about a situation. In the second phase each participant is asked to clarify his or her views until each view is clear to the other participants, without anyone taking exception to the person's initial views; this is a phase of explanation and clarification, not argument. In the third phase the participants work together to group similar views and to state what is

common about them[7]. Thus, the LP Method helps people investigating complex situations together bring to bear the insights of all, preventing conclusions from being based on comparative positions in the organization's power hierarchy.

Concept Engineering® (CE™) is a quite comprehensive system for discovering the tacit knowledge within one's organization and the marketplace it serves. The CE process starts with team members asking open-ended questions and observing technology use in the marketplace. With this information in hand, the team develops a picture of potential marketplace needs based on what people are saying and doing. Then the potential marketplace needs are organized and stated in objective terms about which there cannot be differing interpretations. Next the team tests these tentative market needs through market surveys. Finally, with validated needs in hand, the team develops a variety of product concepts and selects from these the best available product solution concept (or hybrid concept).[8] Noteworthy is the way CE attempts to preclude the use of the organizational power of members of the development team and instead leads the team to reveal, analyze, and draw conclusions based on the tacit knowledge that is spread across the organization and the marketplace.

We are not saying that the ideas of TQM alone are sufficient. Indeed, we listed the four

revolutions of TQM earlier in order of their extent of development and effectiveness. Continuous improvement is quite well developed; customer focus is somewhat developed; total participation is under-developed; and many people still haven't accepted societal networking at all.

Additionally, when one looks at TQM and the management needs of today's organizations, TQM as we know it doesn't seem to go far enough toward the social model. For instance, TQM has not provided a strong alternative to the traditional strategic planning model, where planners try to predict the future and then create a plan that addresses that future. TQM has not been strong in the area of complex, interlocking causes and effects. Also, while TQM promotes the involvement of every person in an organization, TQM has not provided strong, flexible methods for day-to-day coordination of interactions among people in the organization.

Thus, there is a need to integrate TQM tools with other management methodologies to strengthen the move toward the social model that is necessary today. Fortunately, as we have mentioned, there are numerous other interesting management systems and methods to choose from. Consider the TQM weaknesses enumerated in the previous paragraph, for example. Russ Ackoff's Interactive Management provides a planning method for creating the future rather than predicting it. Peter Senge's Systems Thinking addresses situations involving complex, interlinked cause and effect. The Language/Action Perspective of Fernando Flores provides a way to improve the day-to-day coordination of interactions among people. And the Action Science ideas of Chris Argyris provide a way to deal with the individual and organizational defensive routines that prevent beneficial change. All of these form a base for the fundamental management functions that all business must be concerned with—planning, operations, and change management; see Figure 1.

Figure 1: Basic Management Functions and Their Enablers
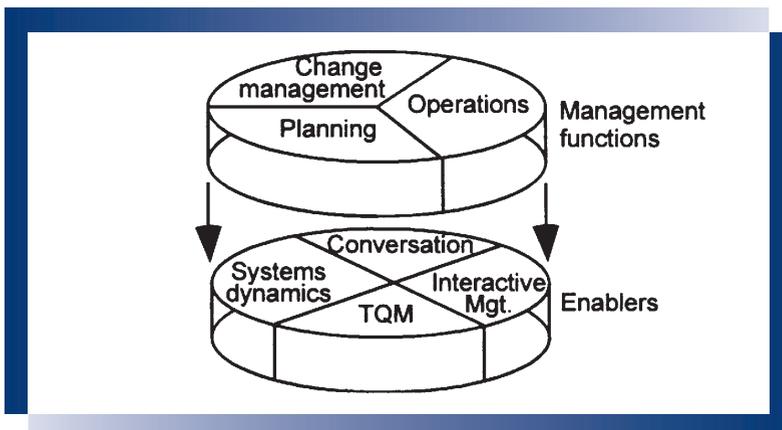
4. The Problem of How to Actually Make the Necessary Changes

While there is lots of agreement on the necessity for a move toward the social model of management, and while we can recommend management methods with which to implement the social model, many-if not most-organizations that try to adopt these methods meet with difficulty. We won't go into all the reasons. Suffice it to say that people typically resist change, and any manager or worker can stop change from happening effectively.

We can divide the methods that are part of any system into two categories: those relating to human or behavioral issues, and those less focused on human issues, such as accounting, process analysis, statistical analysis, marketing methods, and so on. Both categories are needed. As Don Oakes of L.L. Bean puts it,[9] management has to do with processes and people. Until recently, however, most of the emphasis in TQM has been on nonhuman issues (despite recognition of the necessity of everyone participating in improvement methods). There is increasing awareness today that there needs to be much more emphasis on the human issues-to the extent that this topic is now regularly being written about in the business press.[10] Dr. Tom Melone, president of Milliken, says, "The hard stuff is easy, the soft stuff is hard, and the soft stuff is more important than the hard stuff." The quantitative research of Professor Thomas

Powell of Bryant College shows[11] that successful results of TQM are most correlated with human behavior intangibles such as executive commitment, an open, trusting culture, and employee empowerment. All these are beneficial in their own right and enable quality procedures to have effect.

There are two reasons for this increasing emphasis on human issues. First, some of the basic methods require more involvement of people; for instance, knowledge-creation activities require insights from people throughout the organization.

Second, human issues determine whether the rest of the methods (human or otherwise) get used effectively or rejected. The rest of this section will explore practical ways to deal with the second aspect of human issues—ways to ensure that quality procedures actually become accepted and followed throughout an organization.

A desired organizational change must be motivated or enforced until the benefits of the change can be seen and it becomes habitual. The basic idea is illustrated in the causal loop of behavior and culture. Culture may be defined as the ways we habitually think and do things. People behave in ways that are consistent with the culture of whatever society or community they are a part of. In turn, by continuing to behave in the same way, people perpetuate their culture. If we want to change the culture, we need to start by changing behavior.

For this we need both a design of the management system that we want to implement and a strategy for phasing it in. The design of a management system, like the design of any system, requires alternation between what needs to be done and how to do it.[12] Like the football coach in our earlier analogy, the job of the top manager must include design of the organization's management system and thus decisions about what needs to be done and how to do it. One size does not fit all, and it is not useful only to follow a recipe book. The system designer must tailor the management system design to the particular organization and its environment, including making sure a set of management components has been chosen that fit well together.

It may be helpful for the designer to think of there being different levels of abstraction in the design. At the highest level of abstraction, for today's world we think the social model of management is mostly necessary, although there may be some functions within the organization where the biological model may still be useful. At the lowest level of abstraction, every organization is likely to have its own idiosyncratic ways of implementing its management system. At the middle levels of abstraction, there are many common principles, such as the importance of time as an independent variable, planning, and issues of human behavior and organizational structure.

One of the most difficult issues facing the designer of an organization's management system will be how to phase in the system. Many people inside the company and outside the company will try to create an all-or-nothing situation: For a variety of reasons, they will assume that the only two choices are making no changes or making comprehensive changes from which there can be no deviance. Experts in various management system components may reinforce this assumption; and even if the experts don't encourage this attitude, people in the company at all levels may adopt it. For instance, Shoji Shiba taught the LP Method to several companies, including certain disciplines that would be useful for each step. In many cases, those he taught concluded that the LP Method must be followed exactly, and the insistence on perfect discipline was overwhelming to those who were trying to learn the method. Also, some people concluded that if the method was followed exactly, then good results would automatically follow; but that if it wasn't followed exactly, good results would be impossible. Yet, many people who have used the LP Method have come to understand the possibility of using the method flexibly. In another case, Jamshid Gharajedaghi emphasized the benefits of using Idealized Design to redo an entire organization. He stated the benefits and need of overall application so eloquently that he scared off potential users who were afraid to embark on a total organization redesign. CEOs

are now coming to understand that Idealized Design can be used in limited situations; for instance, within one division or department or as the first step in a product design.

A distinction we need to be sensitive to is the distinction between strong and weak interactions among the components of a system. In some sense, all of the components of a system interact. Depending on how we want to change a system, however, interactions among some components may be strong while interactions among other components may be weak. It is often adequate to treat components among which there are only weak interactions as if they are independent, and thus work on them independently of other components. On the other hand, when there are strong interactions among components, we cannot change one component without taking into account the other components. For instance, every company needs to consider its business strategy, product and market mix, processes, and organization. Typically there are strong interactions between business strategy and product and market mix, and the interactions between those two and processes or organization are weaker.

A first step to phase-in is to boost commitment by finding a way to produce quick results that are representative of the benefits of the method while also giving a flavor of the effort involved in implementing the

method. One trick is to find submethods that are representative of the larger system or method. Another trick is to find a balance between the degree of challenge that is given to employees and their ability or energy to deal with the challenge. Employees quickly get turned off when they are directed to work on trivial tasks. However, the challenge should not be so aggressive that employees feel they have no chance of success, because this will also be a turn-off.

Let's look at an example. As the 7-Steps Method is often taught, people learning the method are guided to attack an important but tractable problem that will allow them to gain skill with the method before they attack crucial but less tractable problems. In particular, they are advised to avoid problems rooted in behavioral issues until after they have gained some initial skill with the method. Similarly, the 7-Steps Method is usually first applied in situations where there is an assumption of weak interactions among many parts of the system, and thus Ishikawa tree diagrams are recommended for analysis of cause and effect. However, since it is merely an outline of a good problem-solving approach, the 7-Steps Method can also be applied to situations where there are strong interactions among parts of the system. In this case, it may well be better to use relations diagrams or causal loop diagrams to analyze networks of cause and effect.

5. The CQM: An Ongoing Experiment in Designing Integrated Management Systems

The Center for Quality of Management, a nonprofit collaborative, was formed on the premise that high benefit accrues when organizations share their experiences with management and quality methods. There is a parallel with the Western scientific tradition of publication. There are two issues. First, it's hard for anyone to develop new methods alone; someone who attempts to work alone will take a long time and fall behind others who share results. Second, new scientific theories and methods are published so that others can judge for themselves the quality of the science that was done and can attempt to replicate the results.

The CQM member companies learned TQM first because it is arguably the most complete management system aimed at addressing the need for rapid change in the modern world and the consequent need for organizations to move from the biological model to the social model of management. From this initial study of TQM, the CQM learned TQM's important "weakness orientation," a focus on gaining overall skill and strength by detecting and eliminating areas of relative weakness.

Thus, from the time of its founding, the CQM has regularly asked what the weaknesses of TQM itself are. For instance, noticing an absence of explicit methods for creating new concepts for products and services (that is, for addressing the part of the development process that comes before an organization undertakes a development project), Gary Burchill (then an MIT Ph.D. candidate) and the CQM developed the method known as Concept Engineering (CE). This effort involved use of the proposed method by development teams at several CQM companies, training of people from member companies to be facilitators of the method, and creation of a CE users group where experiences with the method could be shared.

A major area of weakness that the CQM has attacked is the absence of strategic planning methods in TQM. Even the Japanese admit that TQM is weak in this area. Therefore, in 1992 the CQM formed a strategic alliance with Russell Ackoff and his colleagues, who have developed the management system known as Interactive Management.[13] A key aspect of Interactive Management is the planning technique known as Idealized Design, which makes explicit all of the weaknesses of the existing management system, including the concerns of all the participants. (Ackoff emphasizes that a primary benefit of Idealized Design is participation in the design process itself; participation generates broad knowledge of the state of the organization and fosters a feeling of ownership of both the problems and the new plans.) The method then enables the organization to design a completely new management system that is consistent with the principles of Interactive Management. A unique twist of Ackoff's planning ideas is that Idealized Design envisions the ideal system to deal with today's environment rather than attempting to predict and plan for the future environment.

The CQM's effort with this method included a detailed exchange of methods with the Interactive Management people and multiple experiments with use of Idealized Design in companies already implementing TQM. As a result of this exchange and these experiments, Idealized Design has been sufficiently operationalized that it can be readily used for planning by a company that is also using TQM. The Idealized Design process is typically carried out in a company under the guidance of an experienced outside facilitator/coach. To operationalize Idealized Design we have adapted some steps of the process to use various well-known TQM tools. For instance, the LP Method and MPM[14] tool have proved to be useful in the Idealized Design step of "mess formulation"; LP also helps with stakeholder analysis; the Image LP tool has proved very effective in creating a joint vision and mission; and tree diagrams are useful for the operational planning stage of Idealized Design. In return, Idealized Design has provided a multidimensional approach to organizational design that was not part of TQM.

Still another weakness of the CQM syllabus of methods crops up in situations where improvement of independent parts is not as effective as looking at the system as a whole. Thus, the CQM is now studying the methods of Systems Dynamics to see how Systems Dynamics fits with TQM and Idealized Design. We have already found a way to introduce causal loops from System Dynamics into the "mess formulation" part of the Idealized Design process.[15] The combination of TQM, Idealized Design, and Systems Dynamics has proved to be so interesting that the Japanese Technological Economic Society (JATES) has invited representatives of the CQM to visit Japan and present our results. Thus, the cycle of Japan borrowing management ideas from the United States and synthesizing them with their own methods into an improved overall system and the United States borrowing back from Japan and continuing the synthesis is taking another turn.

Another weakness the CQM addressed was the perception that TQM addresses the needs of manufacturing companies but not the needs of service companies. A CQM study team analyzed ways in which processes are perceived to be different in operational (e.g., manufacturing), creative (e.g., development), and service (so-called "moment of truth") activities.[16] Different sorts of activities are involved in these different types of processes, and typically different sorts of people are also involved. Then the team found ways to emphasize aspects of all three kinds of processes in the presentation and teaching of TQM—overcoming the it-doesn't-apply-to-me perception.

The CQM has also been looking at TQM's lack of methods for dealing with issues of human behavior, particularly those that get in the way of people using the manifestly effective methods of TQM. One of the most basic issues of human behavior (some would say the most basic issue) is the way we talk with each other, so the CQM initiated an effort to integrate methods to improve the way people converse and use language. TQM already includes great emphasis on analysis of language data. The CQM has found it possible to create a synthesis among various methods that is compatible with TQM and Interactive Management. The synthesis includes techniques from Action Science (Chris Argyris), the Language/Action Perspective (Fernando Flores) and others. Both the Argyris and Flores schools put emphasis on language or conversation as a way of generating action-not just as a way of describing things. In our view the Argyris group has done a more complete job of analyzing and suggesting how to correct the organizational routines and defenses that prevent people from working together effectively, and the Flores group has done a better job of operationalizing coordination of the actions of individuals. The CQM has been able to bring together people from the two schools with each other and with TQM. We have developed a combined method that is now being applied generally in the way people work together, both in product development and as a new basis for leadership and management. We are just beginning the journey of learning how the various management systems fit together and how to design integrated management systems for organizations. We seek others who will join us in understanding the ways management systems must change to meet the needs of business today and tomorrow and in sharing experiences with management system designs tailored to particular organizations.

Acknowledgments

Endnotes

1. See, for instance, chapters 1 and 2 of *A New American TQM*, Shoji Shiba et al., Productivity Press, Portland, Oregon, 1993.

2. Cambridge, Massachusetts, Harvard Business School Press, 1995.

3. Jamshid Gharajedaghi and Russell L. Ackoff, "Mechanisms, Organisms and Social Systems," *Strategic Management Journa*l, Vol. 5, 1984, pp. 289–300.

4. When they first think about the social model, many people think it means managers abandoning leadership in favor of empowering others. While absence of explicit leadership may work in some instances, such as in a small professional partnership, a complex organization trying to move quickly and successfully tends to require both strong leadership and great empowerment.

5. A good example of how QC Circles empower and develop the skill of workers is provided in the Ladybug case study. See Yoshiko Fujino, "QC Circle Activities Which Were Put Up by the Iron Will of Part-Time Oba-Chan (Aged Ladies) and Kimiko Kimura," FQC No. 265 (Tokyo: JUSE, 1984). The case was presented in English at the IC QCC Convention, Tokyo, 1985; also described in Shiba et al., *A New American TQM*, Productivity Press, Portland, Oregon, 1993, pp. 272–275.

6. *The Language Processing Method*, Center for Quality of Management, Cambridge, MA, 1995.

7. "Understanding Unclear Situations and Each Other Using the Language Processing Method," Ted Walls and David Walden, *Center for Quality of Management Journa*l, Vol. 4, No. 4, Winter 1995, pp. 29–37.

8. *Concept Engineering*, Center for Quality of Management, Cambridge, MA, 1995.

9. CQM Seminar, 1996.

10. See, for example, Stratford Sherman, "How Tomorrow's Best Leaders Are Learning Their Stuff," *Fortune*, November 27, 1995, pp. 90–102.

11. "When Lemmings Learn to Sail: Turning TQM to Competitive Advantage," Thomas C. Powell, *1995 Handbook of Business Strategy,* B. Voss and D. Willey, eds., Faulkner & Gray, pp. 42–54.

12. In his 839 page *Management: Tasks, Responsibilities, and Practices*, Peter Drucker offers a comprehensive and in its time prescient description of what needs to be done as part of a modern management system-particularly planning, operations, and change management. However, Drucker does not say how. Drucker has recently begun to put increased emphasis on a systematic approach; that is, on recognition of the interactions among various parts of a system. For instance, in his article "The Information Executives Truly Need," *Harvard Business Review*, January-February 1995, pp. 54–62, Drucker recommends:

   a. Replacing traditional cost accounting (which emphasizes the costs of individual items and steps and the distinction between fixed and variable costs) with activity-based accounting (which emphasizes the cost of the entire activity).

b. Knowing the economics of the entire economic chain (e.g., including suppliers and distributors), not just the economics of the legally defined company.

c. Having more than just basic accounting information such as cash flow, liquidity, and sales (which Drucker equates to weight, pulses and blood pressure in a human patient). Also having productivity information (e.g., measures of value added over all costs including cost of capital, and benchmarking to provide productivity comparisons); competence information, including innovation competence; and resource-allocation information (e.g., capital and performing people).

d. Improved information on what's going on outside the company, such as "information about markets, customers and noncustomers; technology in one's own industry and others; about worldwide finance; and about the changing world economy."

13. *Creating the Corporate Future*, Russell Ackoff, John Wiley & Sons, 1981.

14. *Method for Priority Marking*, Center for Quality of Management, Cambridge, MA, 1995.

15. "Idealized Design and TQM: Planning by Practitioners," Toby Woll, *Center for Quality of Management Journal*, Vol. 5, No. 1, Spring 1996, pp.4–21; "Structure Process Improvement at the Naval Inventory Control Point," Gary Burchill, *Center for Quality of Management Journal*, Vol. 5, No. 1, Spring 1996, pp. 22–31.

16. "TQM in Service: A Report by the CQM Study Group," Victor S. Aramati and Toby Woll, *Center for Quality of Management Journal,* Vol. 6, No. 2, Fall 1997, pp. 5–27.