Problem-Solving as a Double-Loop Learning System

by Jeff Dooley

Because things don't always work out just right we have a discipline called "problem-solving." This discipline is what we think of to use in order to set things right. A great deal of our problem-solving repertoire is intuitive, drawing heavily on practical, common sense. If our boat springs a leak far from shore, we become extremely creative about how to survive, often without a second thought to our way of inventing a workable solution.

But too often, our problem-solving efforts fall short when we apply them to complex, ambiguous organizational messes. Our attempts to clean up these messes may backfire on us, making them worse, or at best no better, while simultaneously triggering new messes elsewhere in the organization.

For instance, the CEO of a successful international company decided that there was a problem with his senior staff. He felt there was too little authenticity, boldness, risk-taking, and creativity in their strategic conversation with him. He felt that his people were playing it too safe, and were unwilling to produce the kind of radical thinking and action he increasingly wanted from them. So he decided to bring in a consultant who would unilaterally confront his people with the unvarnished "truth" about their small way of thinking, who would "hold up a mirror" to them in order to jolt them into abandoning their self-imposed prisons of thought and action.

This was an instance of organizational problem-solving which backfired in the following ways: (1) It did not make people more authentic and bold, rather, it drove them underground, triggered much unspoken resentment, and increased the level of fear in the workplace. (2) It made mere compliance seem attractive as a strategy for getting along. (3)

It occasioned rifts between the CEO and some of his senior staff which never healed, even after staff members either resigned or were fired. In view of these results, we may assess this instance of problem-solving as incompetent, insofar as it resulted in outcomes directly opposed to what the CEO desired.

This story and others like it have prompted me to present, in this paper, a whole-person, systemic approach to organizational problem-solving and mess management which my colleagues and I have been elaborating and using in organizations over the past ten years.

In Part One I contrast two approaches to dealing with organizational problems and messes, suggest a new importance to conversation within the organization. Also, I propose a set of skill categories for individuals who want to be effective leaders of organizational problem-solving initiatives, and introduce the systems-scientific foundations upon which a general problem-solving model is built.

Part Two is devoted to elaborating a systemic model for organizational problem-solving, and to specifying group analysis, decision, and process tools to use at various places during the problem-solving process.

The focus of Part Three is on the cultural forces that impinge on problem-solving efforts, for either good or ill effect. In this section we will look at the general anatomy of an organization's culture, examine the role of values and beliefs in shaping routine actions, and try out some tools and practices of speaking and listening which can help individuals manage problem-solving conversation within the context of their organization's culture.

Problem-solvers who are more in connection with the energy, balance, and physical center of their bodies are more likely to be able to act in a relaxed, attentive, and effective manner, even under conditions of increasing ambiguity and stress. Part Four is a practice guide for helping us more fully inhabit and be present within our own physical bodies.

Part One: Introduction to systemic problem-solving

The problems with problem-solving.

A problem is a lot like an mushroom: there is usually a great deal more to it than you can see, and the part that gives it its true scope and strength to persist is often out of sight. Moreover, many of the problems we face cannot be "solved" once and for all, but are indistinct messes which we can only hope to "manage over time."[1] For instance, a manufacturing process will always produce some defects, no matter what we do. Therefore, using process improvement techniques like those found in Total Quality Management, we are able to manage the frequency of defects so that they are acceptably infrequent. Or perhaps office morale begins to slip. This is less something to be "fixed" once and for all than it is a condition to be managed over time to within a certain range of worker enthusiasm or contentment.
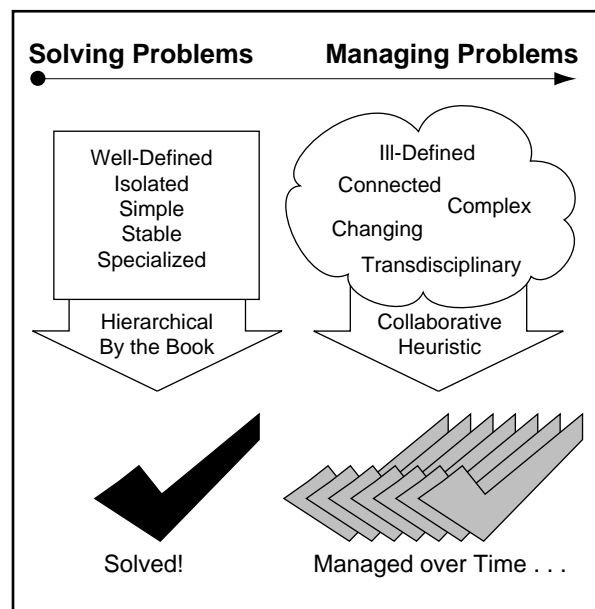
Problem-Solving vs. Mess Management[2]

As industries are driven by innovation, globalization, competition, and technical advance the key strategic issues and problems organizations face have been growing

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[1] Russell Ackoff calls complex, interdependent organizational problems "messes." He advocates resolving or managing them in view of how the parts of these messes interact, and not by solving various parts of them independently. See Russell Ackoff, *Creating the Corporate Future*, New York: John Wiley, 1981, p. 52.

increasingly complex. This has spurred a strategic widening of the range of problem-solving approaches from which we may wish to respond to a particular challenge. We may still wish to use a linear, systematic, analysis tool to optimize, say, resource expenditures within a system or process. But we may also elect to draw upon newer divergent techniques like Bohm's dialogue, the KJ method, or Senge's system archetypes to get at the hidden roots of complex, interconnected difficulties. These are the kind of difficulties which are either not affected by or made worse by applying narrowly-focused, analytical solution techniques. A teacher of mine would often say, "the definition of insanity is to continue doing the same things expecting different results."[3] To continue hopefully to apply linear, analytical problem-solving tools to complex messes of people, processes, and diverse stakeholder interests, where these tools have previously failed, is to fall under the spell of this sort of insanity.

Normal conversation and world-making conversation.

Another key reason why problem-solving is so haphazard in organizations is that problem-solvers often overlook the obvious, seemingly trivial observation that everything that happens does so within a conversation. The organization is like a container within which hums, perpetually like a kind of background radiation, a single, multifaceted conversation for getting things done. It is a conversation for action, both strategic and tactical, unique to the organization. Among employees of the organization, this conversation is the "water we are all swimming in," and this obviousness is one reason why we tend not to notice it.

Recognized or not, the organization's conversation contains fundamental assumptions that members of the organization use, wittingly or not, to shape reality. It is the major vehicle the organization uses to elaborate, communicate, and sustain its culture. Let's say that the organization has been built upon a practice of pitting engineers against one another to drive innovation. This competition may seem healthy and efficient, even though

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[2] This graphic was developed by William Reckmeyer.

at times a little barbaric. But there is a weakness also to this competitiveness for the organization: it drives out collaboration and reduces the likelihood that individuals will risk their views for the sake of potential learning opportunities. This competitive conversation rests upon the values: *unilaterally control the situation* and *win, do not lose*. Key mentoring advice in such an organization might be, "*never show weakness*," or, "*always appear rational*." These values reach out from the heart of the organization's conversation to shape the way we see the world and the ways we deem appropriate to act within it. In cyclic fashion, these beliefs and actions feed back into the conversation to reinforce the very assumptions that gave rise to them in the first place.

Peter Checkland published, a decade or so ago, a picture like the one in Figure 1 to show this feedback system.[4]
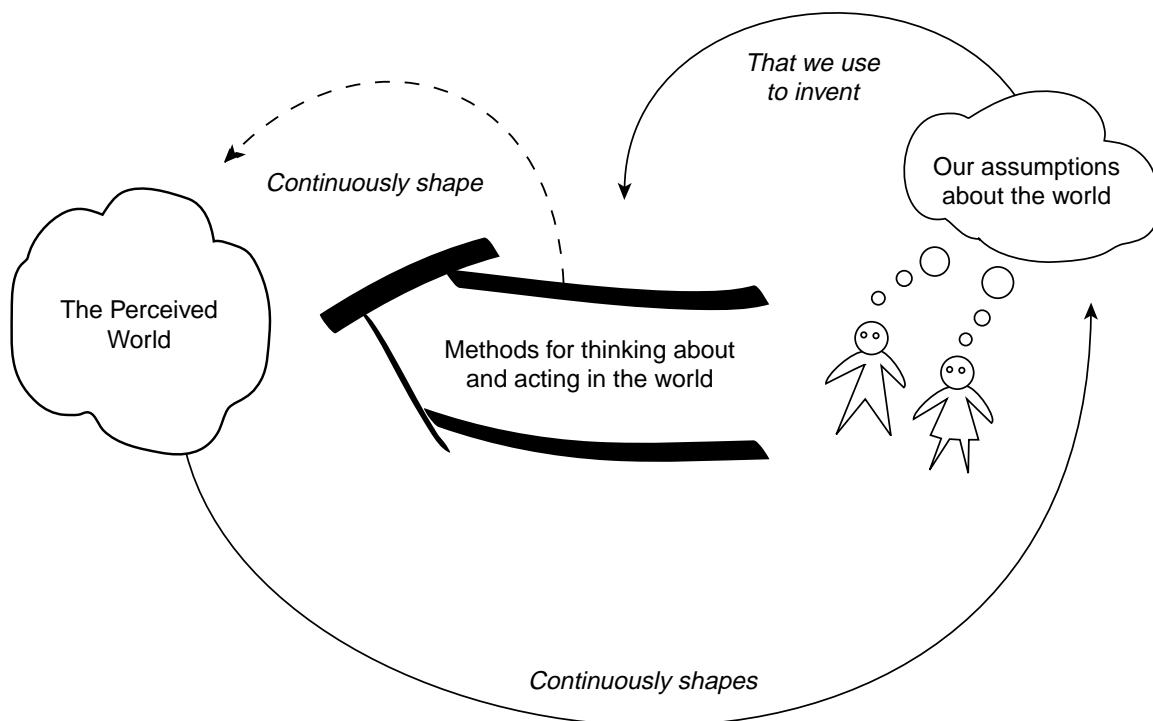

Figure 1: How our ideas both shape and are shaped by the perceived world

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3 Dr. William Reckmeyer, of San Jose State University was the first I heard say this.
4 Peter Checkland and Jim Scholes, *Soft Systems Methodology in Action*, New York: Wiley, 1990, p. 21.

What this suggests is that our perceived world and our conversation about it are constantly, though invisibly, coupled in an interdependent creation dance in which both arise in causal relation to the other. There is a crucial difference between this world-making conversation and the normal, everyday organizational conversation. This difference is in the assumption that, in world-making conversation, the distinctions we make about the world are our *interpretations*, and are not necessarily facts of the matter. In normal conversation we use language to represent alleged truths about the world; in world-making conversation we interpret a world that our own distinctions and language have helped to organize and make sensible to us. Allowing this, it follows that problem-solving within world-making conversation would pivot around our *distinctions and interpretations* about a problematic situation, without further need for these to be certified as "facts." Some of these "interpretations" may be virtually beyond dispute, such as "the Sun is up," but they are still considered interpretations rather than bald facts.

This shift places a vastly increased importance on the condition, or quality, of the conversation in which we are working. Rather than being solely a vehicle for individuals to debate the accuracy of their particular views, conversation expands to become also a shared medium for exploring new meanings. Deep, productive dialogue is more likely to arise within a conversational context of consensual interpretation than it is within a context valuing only convergence on facts Conversation becomes more a vehicle for individual and team exploration and learning, and less of a tool for advocating what we already know.

Many organizational problems require knowledge and tools we do not have, nor do we even recognize that these are missing. In order to deal with organizational problems with high uncertainty, ambiguity, and complexity we will need a kind of conversation for problem-solving which can proceed effectively when interpretation is all we have to go on.

Categories of skill for systemic problem-solvers.

In my experience, what has held back problem-solving efforts most visibly in organizations has been a lack of agreement within a group about what skills are necessary to

do the job. This lack of agreement, in turn, is evidence that the condition of the overall

conversation is so chaotic and unmanageable as to be unable to focus accountability, drive

action, or allow consensus. Moreover, individuals lack the ability to speak and listen in ways

that could enhance the conversation's capacity to benefit from differences and conflict.

Finally, individuals become frustrated at the status quo and react to events and to one

another, often losing touch with the chemical changes, moods, and balance points within

their own bodies.

In order to organize skill sets within these various domains my colleagues and I

have developed a simple picture (Figure 2).[5] This picture shows four domains of skill and

practice, the more foundational the skill is to systemic problem-solving, the closer it is to the

center. Clients have dubbed it "the Onion Model."

Inner mastery and physical
awareness skills for
dealing with conflict
or stress

Conversation skills for effective
speaking and listening

Group process and action tools,
meeting facilitation

Problem-solving methods, diagnosis,
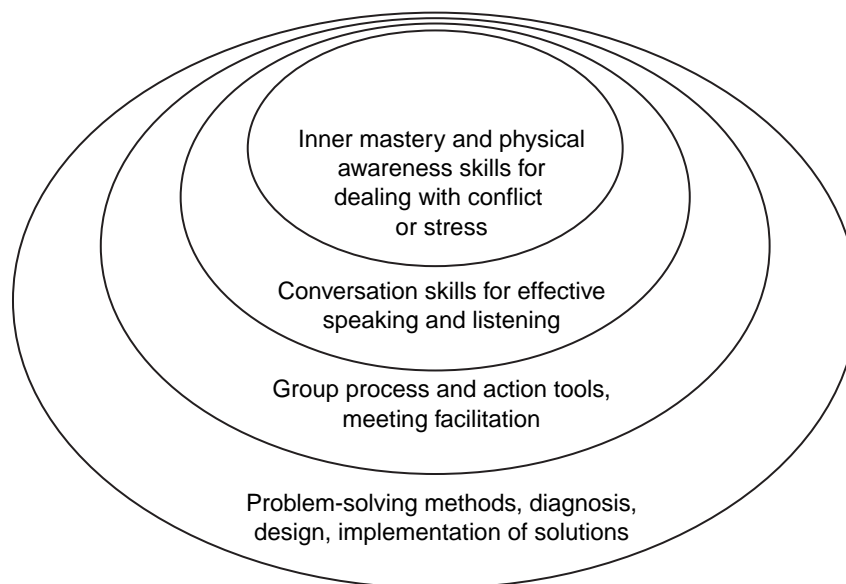design, implementation of solutions

Figure 2: The Onion Model

The first thing people tend to recognize from this picture is that most of their highly

developed skills are all on the outer layer. This is not to belittle these skills; they are

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[5] The structure of the model comes from a colleague, Chris Thorsen, a leadership coach who draws on the
principles of Aikido.

essential for effective, efficient problem-solving, yet they are less helpful, and sometimes even destructive, when the other layers of skill are missing. This model is my attempt to create a map for skill-building to enable individuals to develop and weave together all the skills they will need to solve complex problems strategically, collaboratively, and integratively.

The outer skill layer represents the familiar set of tools for diagnosing, analyzing, designing, implementing, and evaluating systems and processes. Included here are Quality Tools, operations research, project management, process mapping, and dynamic system simulation, to name a few. Among these are analytical tools to systematically design and continuously improve work systems and processes. They are the skill sets we find most often to be highly developed among organizational problem-solvers.

The second layer in represents the skills of managing and facilitating conversation in meetings and other group decision processes. These are not skills for problem-solving; they are skills for running effective problem-solving meetings. They include methods for nurturing creative thinking, prioritizing issues and comparing the impact of potential decisions. They help groups converge upon consensus and organize action commitments. Skilled meeting facilitators are trained in the use of these tools and skills, and most managers and team members have at least been exposed to the skills on this layer.

The third layer in represents skills that are not in use in most organizations. These are skills for effective conversation. By effective conversation I mean that which minimizes inauthenticity and defensive footwork among participants and which maximizes accountability, action, and results. As a conversation for authenticity and action it is based on the commitment of participants to keep their agreements, or promises to do something, with one another. It provides guidelines for participants to practice making requests and promises for action that get results. Additionally, participants in this conversation frequently use tools that promote inquiry and learning, even under stressful conditions.

Among these tools are those of Chris Argyris, including The Ladder of Inference, Advocacy with Inquiry, and The Left-Hand Column.[6]

The innermost layer of skill represents some of the oldest and most reliable personal effectiveness and leadership practices in use among humans since the beginning of recorded history. Ironically, these practices are almost completely unknown, unrepresented, and counter to the prevailing culture in most western organizations. These are skills and practices of physical balance, relaxation, and embodied awareness. These practices bring the mind and body together in a way that allows us to act through our bodies, rather than just from the jumble of ideas that spring from our thinking minds. As a result of these practices, individuals find that they

- are more physically grounded and relaxed in difficult situations

- can recover their composure more easily in case they lose it

- are more aware of changes in their moods and body chemistry

- end up commanding more quality choices and decisions in the heat of action

Many of these practices are based on physical principles of leverage, balance, movement, and connection drawn from martial arts such as Aikido and T'ai Chi.[7] These skills cannot be learned from passively reading about them; they can only be developed through consistent physical practices of bringing the mind into the body.

Experience has suggested to me that problem-solvers in organizations have a greater chance of success if they are skilled in all of the four domains of the Onion Model.

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[6] These tools are described in Part Three with full citations for further reference.

[7] See my article, coauthored with Chris Thorsen, "Aikido for Change Leaders," In *The Dance of Change*, Peter Senge, Art Kleiner, Charlotte Roberts, Rick Ross, and Bryan Smith, New York: Doubleday, 1999.

The scientific foundation of systemic problem solving.

In Part Two of this paper I outline a process for problem-solving which is self-governing and self-correcting. I would like to take a moment here to reveal for inspection the scientific underpinnings of that process.

The basic function of this process is that it continuously monitors its own action, and it takes additional action (or lack of it) based on this monitoring. This simple process, the same one you use when you ride a bicycle, makes the process cybernetic. That is, it steers its current actions in part on the basis of its perception of previous results. For a process to be cybernetic it requires certain components. Among these are a way of monitoring the field of action, a way of remembering what results are desired, a means of comparing what is perceived against what is desired, and a physical set of components for taking action when there is a difference large enough to care about between the two. And it's not enough to have these components; they must be organized, connected up, in a particular fashion for the system to loop continuously, always acting to converge perception closer to the desired state. The simplest particular way I know of organizing these components is offered in Figure 3. (*As an alternate exercise for readers who would rather jump right in and figure out this organizing pattern for themselves, turn to a blank sheet of paper and try to connect these components together in a way that would allow the system to make continuous corrections based on perception of its own previous action, over time. You'll need:*

- *a means of perceiving the field of action*

- *a way of remembering the desired state of the field of action*

- *a way of measuring the amount of deviation of the perceived state from the desired state*

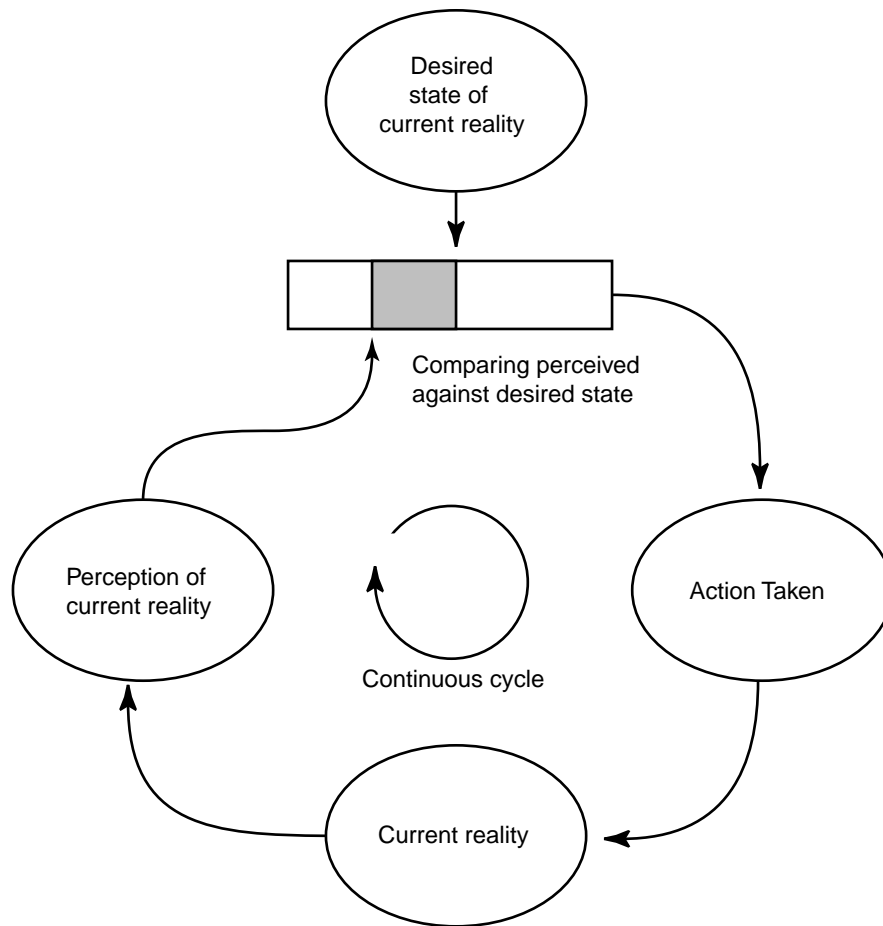- *a physical or mechanical ability to take corrective action*).

Figure 3: How a self-governing (cybernetic) system is organized[8]

This organizing pattern only works over time, as the system acts and responds to changes stemming from its past actions and from random disturbances (not pictured) impinging upon current reality from outside the system. Appendix A contains a fun exercise for making a decision which takes advantage of a system structure just like this.

The general approach to problem-solving outlined in this paper is constructed according to this cybernetic and self-correcting pattern

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[8] The structure of this model arose from my study of the works of Donald McKay and William Powers. See especially: William Powers, *Behavior: The Control of Perception*, Chicago: Aldine, 1973.

Double-loop learning

The kinds of learning we can do have a bearing on how effectively we can anticipate changes, adapt to new situations, and generate novel solutions to the challenges we face. One kind of learning we are already very used to is that which helps us to continuously refine and extend the capabilities of a given tool. This is also the kind of learning we do to make work processes ever more efficient and reliable. But there is another very powerful kind of learning which we use less commonly to solve problems and improve processes. This is the kind of learning through which we recognize the need to reorganize and make wholesale systemic changes in our processes. Managing such changes is a much more complex kind of activity, and it requires a more sophisticated kind of learning. I call this kind of learning "double-loop learning."[9]

Most problem-solving efforts that focus on work processes are aimed at making the processes more efficient and more reliable. This is a kind of single-loop learning in which we are always trying to do the same things right. It is an activity precisely described by the cybernetic loop in the previous section. But what if, due to industry or economic changes, we begin to shift from doing the right things right to doing the wrong things right? For instance, imagine a manufacturer of buggy whips around the turn of the 20th Century. In such a company workers would be cleverly refining their processes to make ever finer, more consistent, and inexpensive buggy whips. Because they are only focused on the existing process, and on trying to improve its performance, they are missing the strategic issue of the impending obsolescence of their product. Clearly they need additionally to be doing another kind of learning.

Double-loop learning is exemplified by the kind of divergent thinking and action that led scenario planning teams at Royal Dutch Shell to anticipate both the fall of oil prices during the mid 1980s and the demise of the Soviet Union well before the rest of the world

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[9] Chris Argyris has used this term to denote a style of conversation which focuses on inquiry rather than advocacy, which creates openings for people to gain fundamental insight into the consequences of their best-

could even imagine them. Shell saved huge amounts of money by shaving the capital

required to develop a large North Sea oil field in order to stay competitive when oil prices

fell, and by waiting until this price drop occurred to go forward with major oil field

acquisitions.[10] This was an example of continuing to do the right things, even though

Shell's business and geopolitical environment in the mid 1980s was highly unstable and

complex.

In order to visualize the structure of double-loop learning we must build an

additional bit of circuitry onto the basic cybernetic loop depicted in Figure 3. The double-

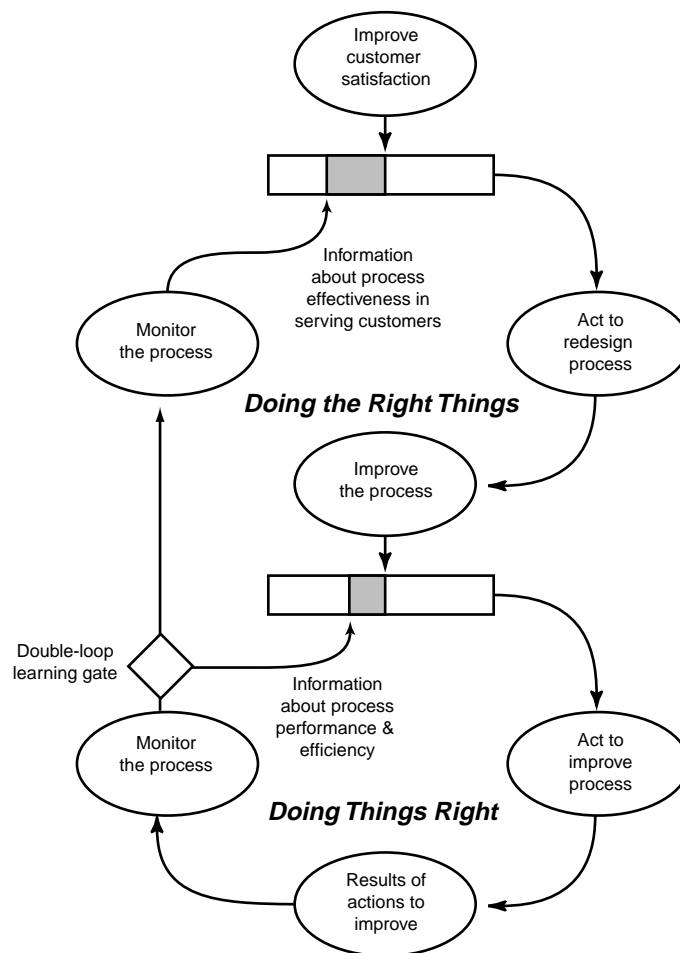loop learning system looks something like Figure 4.

Figure 4: A double-loop learning system

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intentioned actions. I use the term in much the same way, but to denote a schema for creative problem-
solving and process improvement.

[10] Peter Schwartz, *The Art of the Long View*, New York: Doubleday Currency, 1991.

The system diagrammed in Figure 4 has a "double-loop learning gate as a key part of its circuitry. It represents a decision that is made about what information to gather, how to interpret it, and how that information should best be put to use. In the case of the Shell planners, they asked questions like, "what would have to be true for the Soviet Union to begin increasingly to sell its oil in Europe?" One answer was that such an event could occur if a political unknown named Mikhail Gorbachov became Premier. Shell managers noticed the rise of Gorbachov and began to see possibilities further down the road than anyone else. This activated their double-loop learning gate which enabled them to solve problems of how to make extracting expensive oil from the North Sea remain good business even if oil prices were to drop.

In organizational problem-solving double-loop learning is helpful at times when process improvement seems inexplicably to bog down despite increasing effort, when rapidly changing customer needs may require fundamentally different products, or when there is only a vague feeling that something isn't right.

In Part Two we shall explore a loosely structured process for solving problems in a way that supports double-loop learning when that is what's necessary.

Part Two: A Systemic Model for Organizational Problem-Solving

A whole-system approach to problem-solving.

Let's imagine organizational problems as signs of trouble within large, interconnected systems of things, people, technology, conversation, and, other problems. Unfortunately, much of the fabric connecting these diverse elements is hidden from plain sight. This is in part why we see so many problem-solving efforts focused narrowly on the first or loudest symptoms, without much interest in how the problems are connected to anything else. Experience has taught us that hammering away at various parts of the whole problem system usually only makes things worse, wastes precious time and energy, and triggers cynicism when the mess gets worse despite the effort. What's difficult about

widening the scope of the inquiry is that it's not at all clear at first glance, from a local perspective, how far the problem system sprawls.

The best way I have found to determine the scope and reach of a problem system is to go visit and talk with all the people, or stakeholders, who could possibly be connected with it, have an interest in it, or potentially be affected by changes we might implement. People are usually aware of the difficult issues and problems they face, and if you ask, they will reveal what interests they have which may be threatened by the problems you investigate.

This initial activity is done in a spirit of divergence, discovery, and exploration. Ambiguity is high and people are uncertain how far into the organization their difficulties may be connected. The most successful conversation style during this investigation is that of dialogue. In dialogue we are suspending our assumptions about causes and effects, listening very carefully for the experiences and interests of others, and ultimately creating new shared meanings and understandings about problem situations. This process enables problem-solving team members to integrate information from a variety of perspectives and levels within the organization, and it opens the way for a rich picture of the problem situation to be constructed.[11]

In this exploration of the problem situation we are equally interested in identifying both the work processes and systems involved, and the problem's relation to the human system or organizational culture. A map of this exploratory process is given in Figure 5. Ideally, this process, like the larger problem-solving cycle it is a part of, is a continuing activity. It continues for the same reasons that we keep our eyes open the whole time we are riding a bicycle. It's not good enough to just look once, make a correction, and then assuming we'll stay on the road, go back to sleep. Yet, this is precisely how many problem-solving efforts proceed. This is why organizations which invest in double-loop problem-solving also support perpetually-operating continuous improvement teams.

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[11] Peter Checkland, *Soft Systems Methodology*, New York: John Wiley, 1981.

This exploratory sequence is conducted as a part of the double-loop problem-solving model shown in Figure 6. The sequence shown here occurs within the box marked "A" in that model.

Feeling that a situation needs attention or improvement

Call for, create conditions for dialogue on the situation

Consider all the systems and processes that seem connected to the situation

Consider the reaction of the human and social system to the situation

Create a rich picture of the whole situation

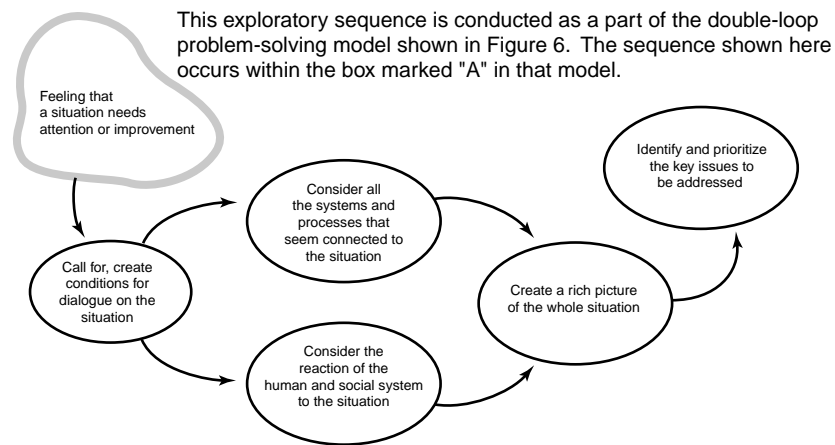Identify and prioritize the key issues to be addressed

Figure 5: Developing a systemic picture of the problem situation

Once a team is on station to investigate the situation, team members can begin several weeks or more of visits and work to examine and appreciate the organizational and cultural factors bearing on the problem situation. The team reconvenes in order to integrate and synthesize the data they have collected into a rich picture of the situation. This activity requires a large expanse of wide-rolled paper affixed to an expanse of wall, an abundance of different colored markers, and a few hours time. The conversation in the room leads team members to mark up the paper, writing or drawing in factors such as people, decisions, trends, procedures, money, feelings, and watershed events as they come up in relation to the problem situation. Connecting arrows, information channels, and material flows are added along with more pictures and words until the paper is filled with a chaotic, colorful representation of the problem situation.

When everyone is satisfied that the problem situation is captured in the rich picture, the team can proceed to identify and prioritize the key issues, problems, and opportunities resolving in the picture. An effective group tool for this work is the Priorities Matrix found In Appendix B.

A model for double-loop problem-solving

The main feature of the double-loop problem-solving model is that it is cycling perpetually, humming along noticing defects and anomalies in processes and taking action to improve them when necessary. Just like the double-loop learning model (Figure 4), its

problem-solving counterpart (Figure 6) has two loops. In the base loop we are constantly

seeking to meet the performance goals, especially efficiency, of the process. We are also

seeking to incrementally improve the process and its documentation and keep it under

control. This is the daily performance loop. In the second or double-loop we are

addressing riddles, anomalies, and mysteries which elude explanation on the single loop

level, yet seem to have an impact on the quality of work and customer satisfaction, usually a

negative one. Often, these riddles are simply marked by vague feelings of unease. These

are issues for the double-loop portion of the model, which as I have observed, is always
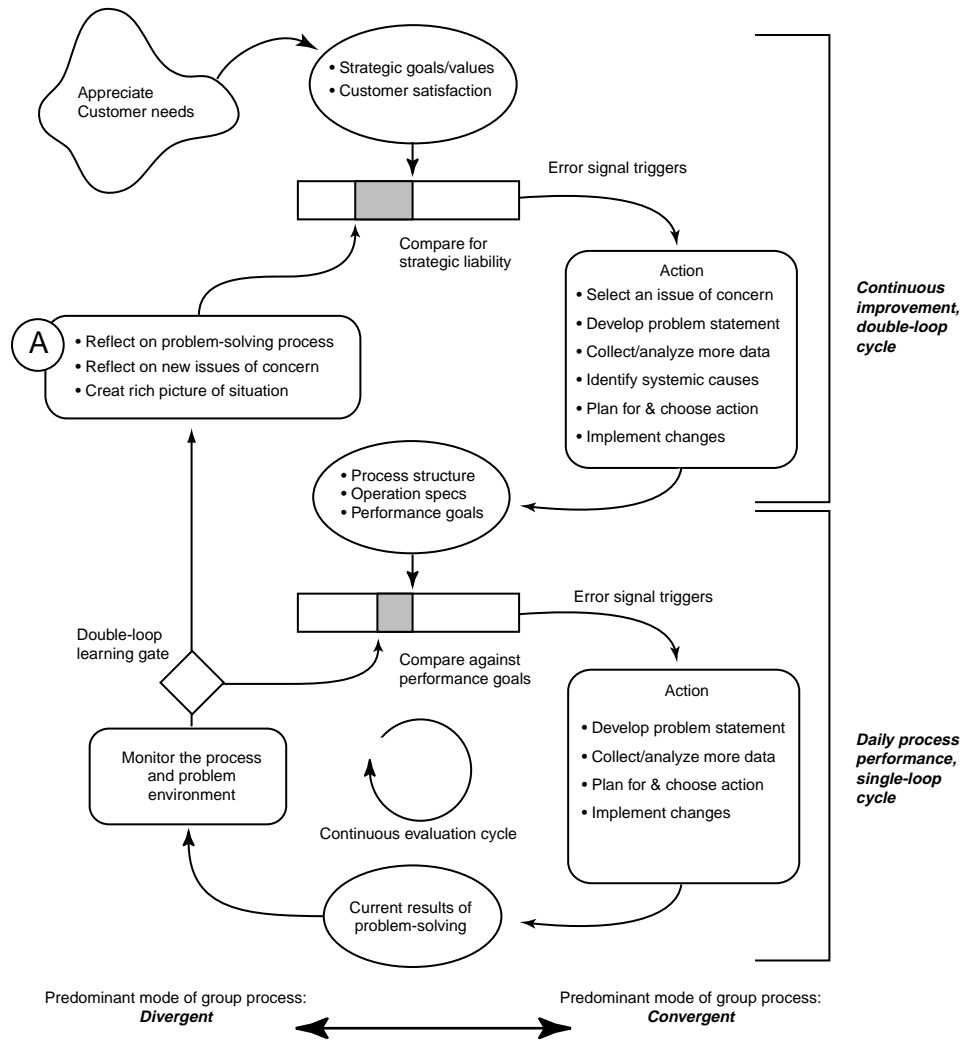
running.

Figure 6: A problem-solving model structured as a double-loop learning system

(For readers who wish to build a double-loop problem-solving model for themselves, simply take your favorite method for problem-solving and convert it into a model structure like the double loop learning model in Figure 4, and don't look too much at Figure 6).

Choosing a suitable mode of group process for the model's various activities is important to a team's success. Notice that the left side of the model in Figure 6 is largely information gathering and exploratory. For instance it is on this side of the loop that we are doing our rich picture analysis, based as it often is on only vague feelings that something's amiss. The predominant mode of group process for these activities is that of divergence. Facilitators will use more divergent techniques such as "Brainstorming, Brainwriting, and so forth during these left-side activities. Conversely, the right side of the structure in Figure 6 predominantly contains activities that drive action through planning, decision-making, and implementation. These are predominantly convergent activities, and they are best facilitated with tools for supporting convergence, such as multi-voting, creating consensus, and action planning, including the liberal use of GANTT charts.

Let's get familiar with the double-loop model in Figure 6 by following it around the circuit. We'll begin by assuming that some riddles and mysteries have surfaced in the course of a work process's operation and moved up through the double-loop learning gate. Let's further assume that a continuous improvement team has taken these riddles through the rich picture phase of inquiry (Figure 5), and is ready to continue through the loop.

The key issues and challenges clarified by the team are measured against the organization's goals and requirements for customer satisfaction. Naturally, these must be clear and up-to-date enough to be useful. This is not always the case. If upon measurement the team determines that strategic liabilities to the process/department/organization have surfaced, then action to correct is required.

The action phase of the double-loop reveals most clearly that the entire model is structured as a fractal: the structure of each sub-activity is identical to that of the whole

problem-solving process. The action phase demonstrates this especially well. This fractal

structure is shown in Figure 7 (I have shown this embedded structure as a basic cybernetic

loop for the sake of simplicity). The reason for structuring individual activities in a way that

mirrors the whole process is so each part can be self-correcting, just like the whole.

Action Phase of Double Loop

Desired
process
improvement

Comparing perceived
against desired state

• Select issue
• Problem statement
• Collect/analyze
  more data

Continuous correction

• Identify causes
• plan for, choose action
• Implement changes

Changes come
on line

Predominant mode of group process:
Divergent

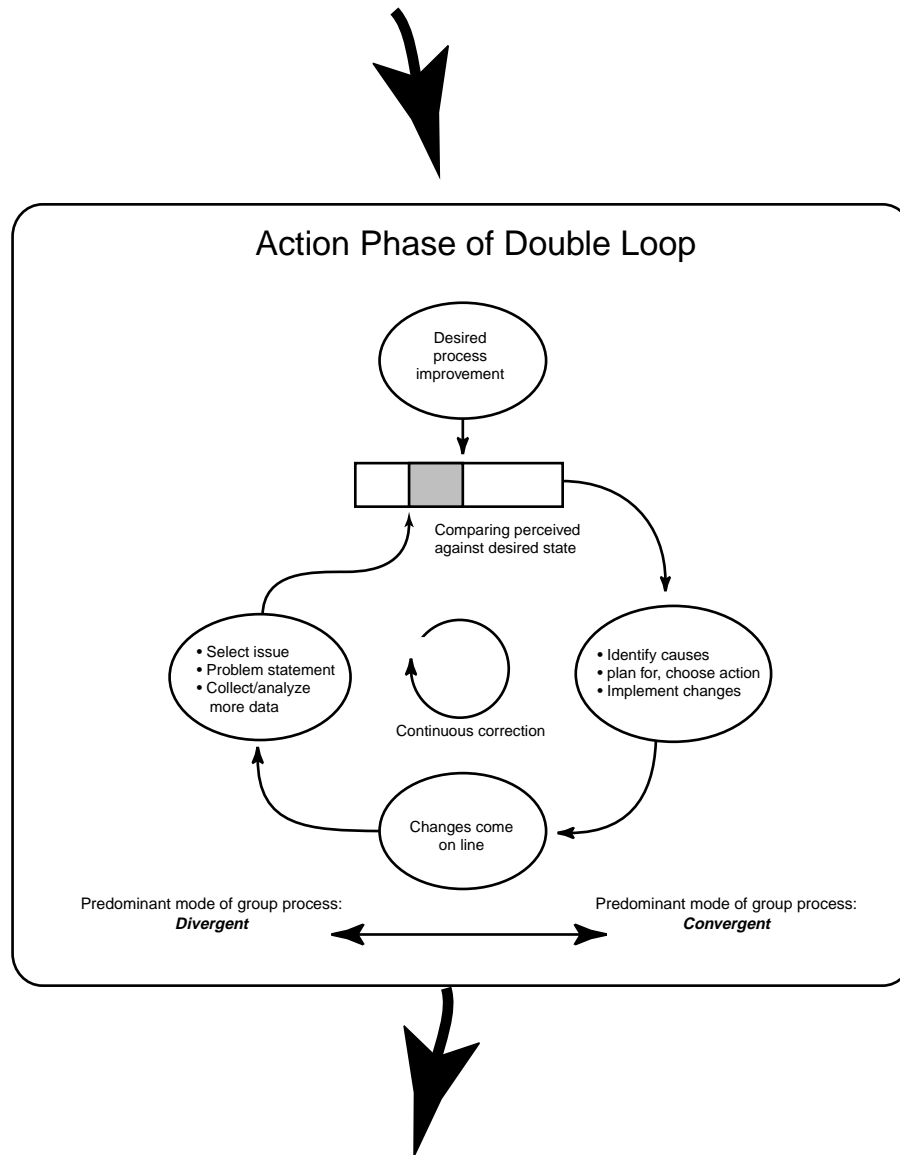Predominant mode of group process:
Convergent

Figure 7: The fractal structure of the action phase of double-loop problem solving

The output of the action phase of the double loop redefines the goal settings for the

single loop system. This is to help insure that we are always doing the right things. These

single-loop goal settings determine the structure of an actual process, how the process

communicates with up-stream and down-stream processes and functions, its operating

specifications, and performance goals, to name a few. These are the actual blueprints for how work is done.

During daily/weekly (single-loop) operation of a process, tools such as statistical process controls, check sheets and so forth produce information that helps keep the process under control. An increase in defects may show that the process needs correction, perhaps by improving documentation or by altering a procedure. This is the kind of refining and polishing that is the hallmark of single-loop problem-solving. It is the most frequent type of action taken in the single-loop action phase. The output of action in the single-loop is a change in either the characteristics of a product or service, or a change in the quality or efficiency of the process that produces them. It's the evidence we are doing things right.

Evaluation of the problem-solving process and its results is accomplished through the cycling of information through the closed, looping structure that is the cybernetic heart of all parts and all levels of the process. Particular solutions will be accompanied by appropriate evaluation tools and instruments. The information these tools provide simply courses through the system and is organized in a way that facilitates the comparison of the perceived situation with what is desired.

The twin control loops in double-loop problem-solving are analogous to the two cycles of process control and process improvement in TQM/Continuous Improvement. These two loops, adapted from Shoji Shiba, Alan Graham, and DaveWalden, are shown in Figure 8.[12]

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[12] Shoji Shiba, Alan Graham, and David Walden. *A New American TQM*. Portland: Productivity Press, 1993.

Structured process
improvement :
PDCA cycle

D Do the work to improve the process
C Check the results of the improvement
P Plan to improve the Process
A Act to standardize or replan

Daily work:
SDCA cycle

A Act to improve the use of the Standard
S Know the Standard
C Check the work against the Standard
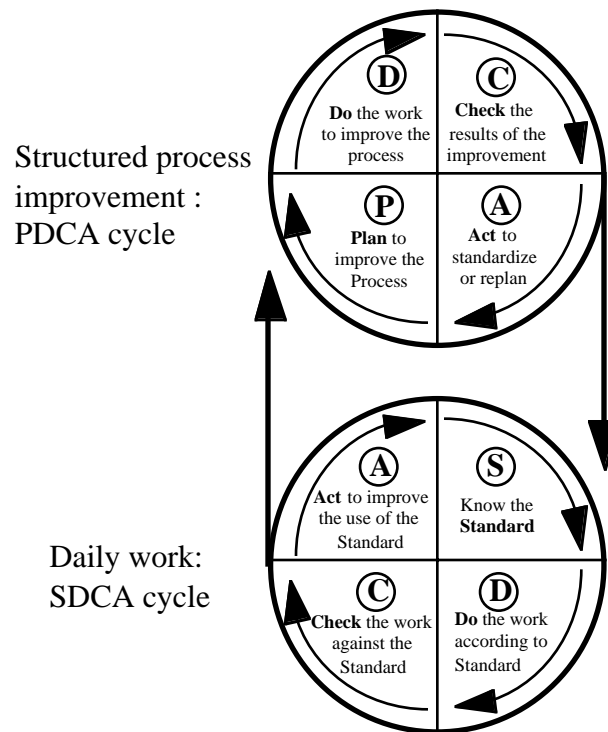**D** Do the work according to Standard

Figure 8. The twin SDCA/PDCA cycles of TQM

Double-loop problem solving is not a separate activity we do in addition to our regular work. It is an integrated part of our everyday regular work. This form of problem-solving does require, however, that teams take regular, perhaps weekly, time off-line for continuous improvement sessions. These are problem-solving sessions certainly, but they are also opportunities for individuals to learn new skills from any domain within the Onion Model.

Pitfalls of double-loop problem-solving

Ironically, the success of double-loop problem-solving may contain the seed of its own marginalization or, at worst, elimination from among organizational practices. Because this discipline involves new ways of thinking, speaking, and listening, problem-solving teams who adopt it may find themselves increasingly isolated from the rest of the organization. Their successes are stunning and gain them great visibility in the organization. But these same successes can lead other managers outside the team to feel threatened. At

the same time, the team's successes, in the form of business results, build the confidence of the team and may lead to arrogance among team members. As criticism from elsewhere reaches their ears they may react defensively and become further isolated and withdrawn. Declining quality of communication between the team and the rest of the organization erodes the team's credibility, which can reverse the momentum of enthusiasm within the organization for the new approach.

Peter Senge and his colleagues have described this difficulty as one of the ten leading challenges that threaten the growth and continued success of organizational learning and change initiatives.[13] Senge illustrates this challenge with a story about the team which developed the original Ford Taurus. Despite their incredible success, he says, within a few years, because of this pitfall, not a single member of the original team remained at Ford.

One way to understand this kind of marginalization is to remember that we live, breathe, and get things done within the organization's existing culture and conversation. The culture is like a living organism, the conversation its life blood. If we begin to adopt sweeping new practices, speaking a new kind of language, the culture is likely to react to us in interesting ways. Following the living-organism metaphor, it may send out antibodies to slow our advance through the organization, or to marginalize us in a way that ensures the protection of the status quo. This kind of reaction is in part what Senge and his colleagues have described in this particular challenge scenario.

Better results can happen when we speak and listen in a way that honors the existing conversation, even though we are adopting new ways of speaking, thinking, and acting within the team. By honoring the conversation I mean that we speak in a way that is in accord with everyday listening around the organization. This means avoiding liberal use of jargon, especially as a way of announcing that we're doing something exciting and different. Sometimes when we find we're onto something new that could really help we

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[13] Peter Senge, Charlotte Roberts, Art Kleiner, Bryan Smith, and Rick Ross, *The Dance of Change*, New York: Doubleday, 1999, p. 322.

lose patience with others not involved who just don't understand what we're saying to them. If they don't understand us it is not necessarily their fault. Giving in to the temptation to patronize those who are straining to understand in good faith will have a disastrous effect on the team's reputation, regardless of its successes.

The double-loop problem-solving system is self-organizing

We can use the double-loop structure to trouble-shoot the problem-solving process itself. That means using the model on activities patterned after itself. For instance, the increasingly marginalized team members in the example above might recognize this anomaly (in the face of their successes), open the double-loop learning gate, and begin working on a rich picture of the situation, perhaps following a scheme like that in Figure 5. This could be double-loop learning about how to do double-loop learning (or problem-solving). It might help them realize that their own well-enough-intentioned enthusiasm for their new learning was actually working against them. This in turn could lead to unexpected learning bonuses for the team and help keep them in the organizational conversation. This kind of inquiry allows the problem-solving process to be structurally flexible and, most importantly, self-organizing in the same way living systems are.

Since the entire double-loop problem-solving model requires a constant flow of valid information about a problem-situation, key decisions, and associated work processes, the model's effectiveness will suffer greatly if key information channels become blocked, or if the information flowing through them becomes severely distorted. It would be as if the visual and other physical information you are using to keep your balance on a bicycle suddenly became jumbled, distorted, or worst of all, ceased altogether.

This kind of information blockage and distortion, Chris Argyris suggests, was a key factor leading to the Challenger Space Shuttle disaster.[14] His research into that tragedy found that the doubts of engineers about the safety of the mission never were communicated up the line of command, even though those engineers were vocal about their misgivings.

What led to this fatal information blockage, Argyris concludes, is that the engineers warnings triggered a defensive response from their superiors, and that the engineers themselves began feeling and acting defensive when their recommendations not to launch were ignored. The result was that the warnings were not sent up the command channel and the launch proceeded with disastrous results.

Another important way in which double-loop problem-solving helps itself is that its practitioners become acutely aware of the quality of their conversation, or their "process." If, during a meeting, there is a sharp exchange between team members, this event is noticed and very likely acknowledged. Often, such an exchange occasions a request by a member for the group to "go off-line" to explore the hidden dynamics, assumptions, hot buttons, or special circumstances that may have led to a sharp exchange. Where it is common practice, such off-line sessions are usually relatively brief, and they result in greater solidarity and trust among members. If off-line work begins to jeopardize an agenda, this is also a valid "process" issue to be raised.

Part Three: The role of organizational culture in problem-solving

Culture: the hidden constraint.

How often have you heard a consultant lament, "Our case for the implementation was bullet proof. We had all the bases covered perfectly, the financial benefit was irresistible, and the client even agreed. Yet, for some reason they decided not to go ahead with it. What happened?" This project, and others like it, may have foundered on a great barrier reef that I have come to call "the hidden constraint": the pervasive human system of values, beliefs, and assumptions that we call the organization's culture.

As the framework for all organizational conversation, the culture can become a powerful, even irresistible force either moving projects along, slowing them down, or stopping them dead. All this is done in a mysterious way that seems hidden from most

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[14] Chris Argyris, *Overcoming Organizational Defenses*, Boston: Allyn and Bacon, 1990, pp. 37-44.

observers within and without the organization. A project running afoul against the hidden constraint suddenly seems to be going nowhere for no apparent reason. There seems to be a kind of physical force within the organization pushing back on the momentum of the project, until it is shelved or quietly abandoned altogether. People sense this force when they argue against a project saying something like, "that'll never happen around here." Rarely is there any dialogue to explore the thinking that leads to such an assessment, which would be a dialogue into the very value-ridden depths of the culture.

Since problem-solving is a discipline which generates significant organization change initiatives, it makes sense to examine how the forces of culture can impact initiatives and how problem-solvers and change agents might deal with cultural forces more openly and effectively.

Problem-solving efforts expanding into cultural inquiry tend to benefit when practitioners adopt a set of fundamental assumptions to guide this inquiry. Among these are:

- Reality is an interpreted perception; there may be multiple interpretations, thus multiple realities.

- Our perceptions are filtered, organized, and given meaning automatically by our particular frame, or problem-solving perspective.

- Mental models are programmed sets of rules for action that we develop and store in our physical repertoire.

- Whatever values we may hold within our mental models, we will seek to realize these values as consequences of our behavior.

An example of the force of culture as a constraint surfaced as a sample case in the systems thinking literature a decade or so ago.[15] The problem exhibited in the case is that critically-timed projects are increasingly late or in jeopardy of being late, at great cost to the organization. As a project would fall into jeopardy, a manager would often single-handedly rescue the project, usually at great personal sacrifice of time, energy, and other commitments. This unselfish-seeming individual rapidly earns a reputation around the organization as a "crisis hero" who has repeatedly pulled whole teams out of the shadow of disastrous failure. Yet, there is another, more subtle consequence of this seemingly heroic pattern of action. After a period of time, project team members begin to anticipate their salvation, do increasingly slipshod work, and feel diminishing ownership of the final product, since they are sure the "crisis hero" will rescue the project at the last minute anyway. This, in turn, creates a need for greater crisis heroics, and the vicious circle is closed.

Repeated calls are made for increased training in project management skills for teams in trouble. Yet, inexplicably, it takes a long time for such training to be developed, and when it is available few take advantage of it.

Under further examination of the situation it comes to light that being a "crisis hero" is viewed by many managers as an effective way of getting visibility in the organization. Crisis Heros feel that their growing reputation helps them to advance faster in the organization. As this belief comes to light it suddenly makes sense why there is so little interest among managers to support project management training among task teams. With the prospect of fewer jeopardized projects there are fewer opportunities to perform in a way that gets the attention of the senior managers. A diagram of the systemic structure of such a system is shown in Figure 9.

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[15] This case reflects a basic systems archetype named "Shifting the Burden." This archetype structure is detailed in Daniel Kim and Virginia Anderson, *Systems Archetypes Basics: From Story to Structure*, Waltham, MA: Pegasus, 1998.
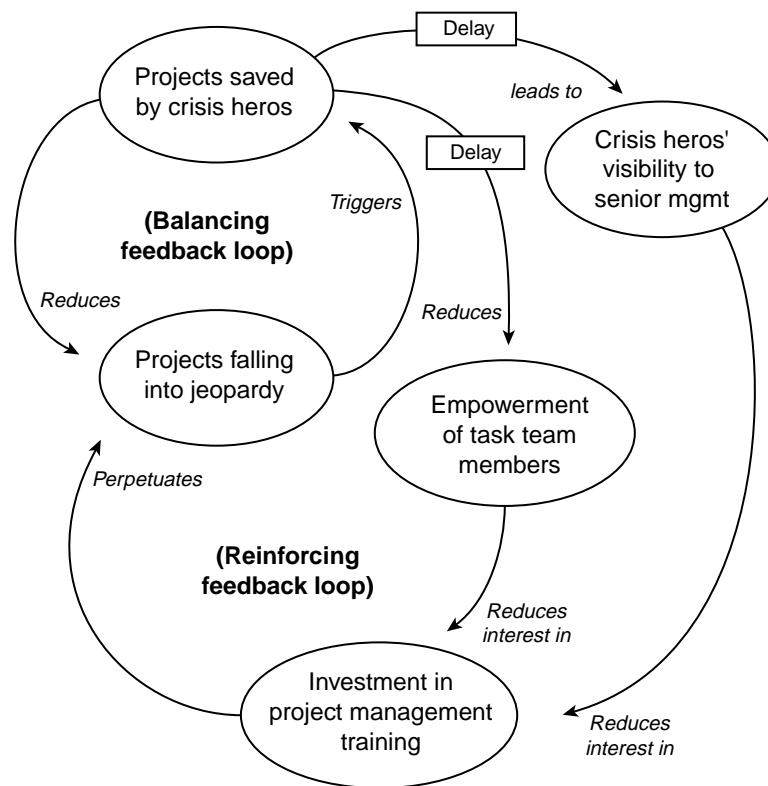
Figure 9: a system to ensure a continuing need for crisis heros

Let us consider the guiding principle that drives action in this system. For example, in a poker game we will take action to realize the value, "win, do not lose." All our poker-playing behavior may be rationally explained in terms of this value. Now let's look at the culture of this sample organization to see if we can identify values, beliefs, or assumptions that drive or shape behavior which helps maintain this dysfunctional equilibrium. A key value actually driving behavior, thus shaping this culture is: "unilaterally own and control the task." You can tell that someone is enacting this value when you hear them say, "if you want something done right, you have to do it yourself." Another value shaping behavior within this culture is, "win at all costs, and do not lose," which could explain why individuals sacrifice so much to avoid failure. Beliefs and assumptions are widespread that people who make these sacrifices succeed in the organization, and conversely that those who do not will fail to advance.

The difficulty for the change agent, consultant, or researcher is that these values, beliefs, and assumptions are not only hidden out of sight, they are often in direct contradiction to the espoused values of the organization, which may ironically include the values of supporting empowerment of workers and team accountability.

In order to understand the relation of these various values, both actually in use and espoused, to organizational behavior let's examine Edgar Schein's three-layered general model of an organization's culture.[16]

1 *Artifacts:* What is observable to anyone: architecture, office layouts, jargon, art, choice of technology, clothing styles, manners of address, emotional display, myths and stories, rituals and ceremonies, sense of humor.

2 *Espoused Values:* The organization's set of publicly known values. What the organization stands for.

3 *Basic assumptions and values:* The core assumptions and beliefs about reality and about how to get things done, the nature of people and basic human tendencies, how to think..

Values in actual use, often hidden from direct awareness, these values usually govern behaviors we select in episodes of stress, anxiety, and defensiveness.
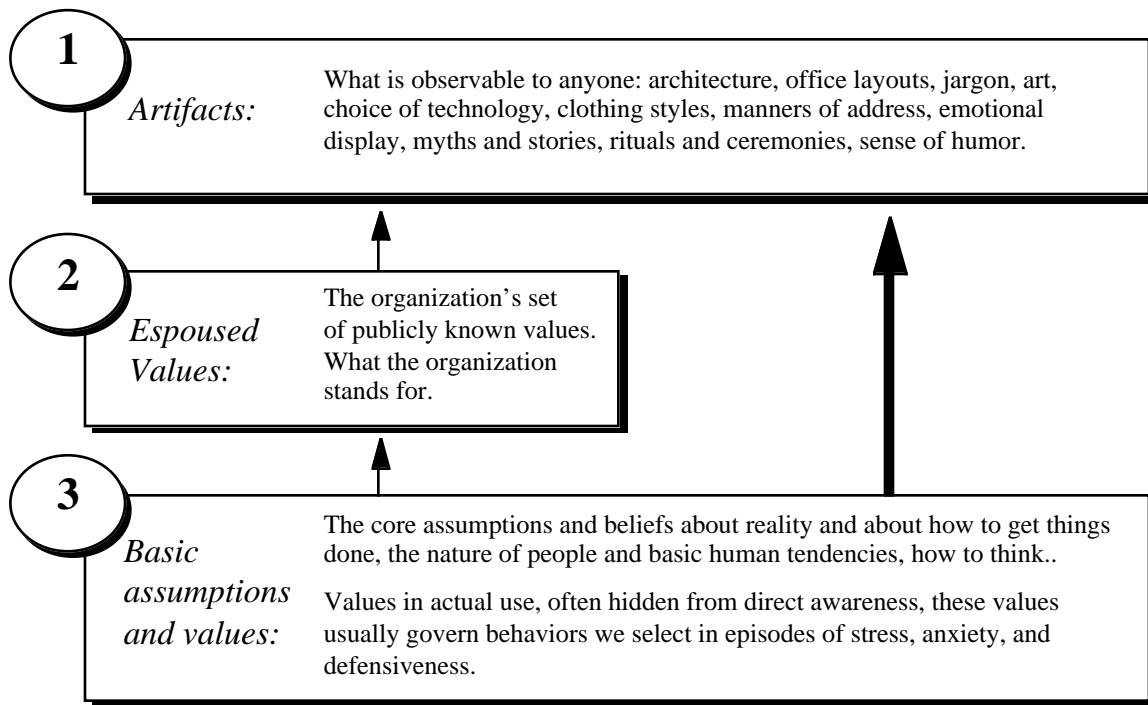
Figure 10. Schein's model of organizational culture

The top layer of the culture is what anyone walking through the organization's facilities would see, hear, etc. Schein calls these objects of experience "artifacts" of the culture.

The second layer of the culture contains the organization's publicly declared set of guiding principles, aspirations, or core values espoused by the organization. These may include values such as, "respect the dignity of all employees," or, "we are committed to the

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[16] Edgar Schein, *Organizational Culture and Leadership*, San Francisco: Jossey Bass, 1992.

satisfaction of all our customers, both internal and external." The normal belief is that these values drive action in the organization, and that acting in congruence with these values is relatively straightforward effort.

But Chris Argyris was puzzled to notice that people tended, especially in stressful situations, to act in ways that seemed to contradict their espoused values. Argyris and Donald Schon guessed that there must exist another set of values hidden deep within individuals' automatic action responses, a set of hidden values which actually determined most organizational behavior.[17] This hypothesis became the basis of Schein's third layer of culture. It was a layer of culture which, though directly driving and shaping most organizational behavior, was largely hidden from view, even beneath the consciousness of most earnest and well-intentioned employees.

In organizational problem-solving, a high-stress pursuit, it is likely that we will observe and enact much behavior driven by the general set of values Argyris and Schon have distilled out of their research into this deep layer of culture. A recent listing of these values is:[18]

- Unilaterally control the field of action
- Win, do not lose
- Suppress negative feelings
- Always appear rational

Organizational problem-solving initiatives in which individuals draw largely for their behavior upon these values are handicapped in their capacity to promote individual and group learning. Conversation which inhibits learning is not well suited to problem-solving efforts in which creative, collaborative solutions must be found to complex, multi-layered problems.

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[17] Chris Argyris and Donald Schon, *Theory in Practice*, San Francisco: Jossey Bass, 1974.
[18] Chris Argyris, "Teaching Smart People how to Learn,"in *On Organizatioanl Learning*, Cambridge: Blackwell, 1992.

A detailed account of the method, "action science," which Argyris and his colleagues have developed to help individuals gradually behave more consistently with their espoused values is beyond the scope of this paper.[19] But a guide to using some of the tools they and others have elaborated to help support constructive conversation and team learning could be very useful to any problem-solving process.

Among these tools are the Ladder of Inference, Balancing Advocacy with Inquiry, Values Comparison Table, and the Left-hand Column.

The Ladder of Inference

The Ladder of Inference, developed by Chris Argyris, is a tool for understanding a reflexive habit of thinking and action that we all have and which often gets us into trouble. This habit is a means, for instance, by which we leap to conclusions about the world and other people from our experience of the world and of what others say and do. Many of the conclusions we draw serve to reinforce our beliefs, built up over past experience, about other people and the world in general. Rick Ross has provided a list of fundamental assumptions we tend to hold which support this habit.[20]

- Our beliefs are *the* truth.
- The truth is obvious.
- Our beliefs are based on real data.
- The data we select are the real data.

To illustrate, imagine that your boss asked you to call her at the office at 6 o'clock this morning. Dutifully, you arise earlier than usual, brief yourself on what you think she'll want to talk about, and you call precisely at 6 a.m. You get voice mail. You call back in 5 minute intervals until about 6:20 and then give up. You decide that she wasn't in the office yet, since she neither picked up the phone nor called you back. Immediately, you are angrily thinking that she forgot about the appointment, making you arise early for nothing.

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[19] Chris Argyris, Diana Smith, and Bob Putnam, *Action Science*, San Francisco: Jossey-Bass, 1985.
[20] Rick Ross, "The Ladder of Inference," In *The Fifth Discipline Fieldbook*, by Peter Senge, Art Kleiner, Charlotte Roberts, Rick Ross, and Bryan Smith, New York: Doubleday, 1994.

This conclusion leads you to draw lightning-fast conclusions about your boss: (1) that she is irresponsible, (2) that she is thoughtless and inconsiderate of her people, (3) that she cannot be trusted, and finally, (4) that this instance must be part of a subtle campaign she is waging to get you to quit or ask for a transfer. By 6:25 a.m. you are thinking of how you'll avenge this episode along with others which you are reinterpreting as evidence that she is out to get you.

As these thoughts follow, one after the other, you are climbing "the Ladder of Inference," a pathway of untested reasoning by which we rapidly lead ourselves to general conclusions about the world, including people, their motives, and their fundamental natures. Often, as we climb the ladder we construct an elaborate framework in light of which events fit together and make sense. We then take these conclusions for established, even self-evident facts. Much of our reflexive problem-solving action is based on this kind of increasingly abstract chain of private, untested reasoning. Moreover, once our abstract beliefs and conclusions are reinforced, these tend to become more influential in determining what experiences we will select as meaningful enough to notice. This final consequence closes the feedback loop and further insulates the basic interplay between our beliefs and our experience which we examined in Figure 1. Often we move from the bottom to the top of the Ladder of Inference so rapidly and adroitly that we don't even notice it happening.

The practical result for a group of people who habitually leap high on the Ladder of Inference to make sense of the world is that this group will be less likely to sustain the kind of reflective, collaborative conversation required for appreciating and resolving complex, interdependent problems.

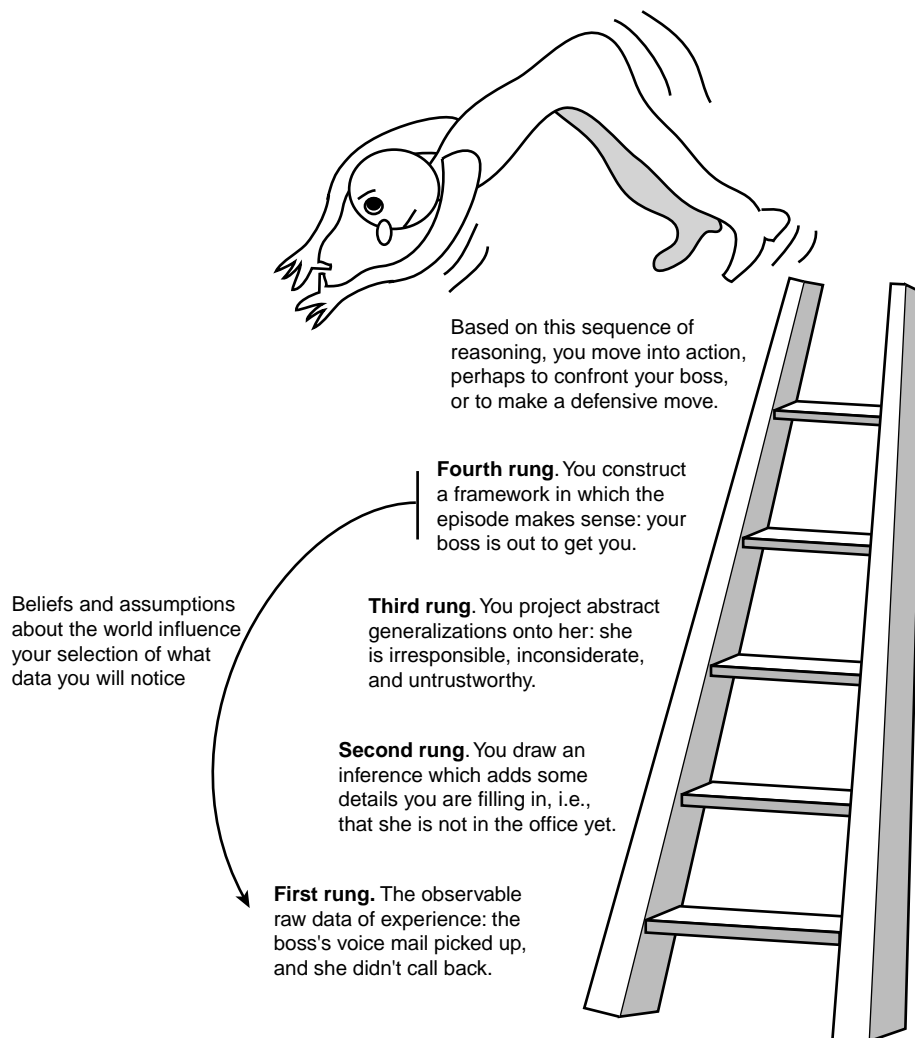A picture of the Ladder of Inference is shown in Figure 11.

Based on this sequence of
reasoning, you move into action,
perhaps to confront your boss,
or to make a defensive move.

Fourth rung. You construct
a framework in which the
episode makes sense: your
boss is out to get you.

Beliefs and assumptions
about the world influence
your selection of what
data you will notice

Third rung. You project abstract
generalizations onto her: she
is irresponsible, inconsiderate,
and untrustworthy.

Second rung. You draw an
inference which adds some
details you are filling in, i.e.,
that she is not in the office yet.

First rung. The observable
raw data of experience: the
boss's voice mail picked up,
and she didn't call back.

Figure 11: climbing the Ladder of Inference

It's unrealistic to imagine going through life without inferring meanings and
drawing conclusions on the fly. It's this very ability which, properly managed, allows us to
anticipate patterns and solve problems. But it also can lead us into trouble when we are
trying to communicate about a complex situation with others who may interpret the data in
ways that lead to conclusions different from our own.

With the Ladder of Inference we can build a powerful tool for slowing ourselves
down, testing our reasoning out in the open before we act, and for engaging people in
conversation with data lower on the ladder. Such conversation is more effective since it
gives people observable data to go on, and reveals the reasoning you have followed based on

the observable data. In this mode of conversation the other person feels room to both understand your reasoning and to offer additional details which could give the whole situation new meaning. In the case given, your boss might have suffered a breakdown or mishap on her way to the office and been unable to keep the appointment.

To use the Ladder of Inference in conversation we follow a set of simple guidelines:

1. State that you have a concern, perhaps involving the behavior or decision-making of another, then resist making insightful generalizations and go instead to the bottom rung of the ladder. Begin communicating about your concern in terms of what you actually saw, heard, etc.

2. Check with the other to see if you agree about what actually happened.

3. Explain the meanings you attach to the observable data.

4. Check with the other to see if there may be alternate meanings from their perspective.

5. Explain the conclusions you feel your reasoning leads you to draw.

6. Invite the other to demonstrate different reasoning, leading to different conclusions.

7. If the conversation breaks down, go back to a point on the ladder at which you and the other could agree. Try to surface openly the assumptions you are making that may be leading your reasoning in a different direction. Invite the other to share his or her similar assumptions.

In the case given such an exchange with your boss later in the day might go something like this:

You: I'm angry and frustrated that I couldn't reach you by phone at your desk this morning. I can't help drawing conclusions from this, but since I may not know the whole story let me start with what happened. I did call this

morning, there was no answer, and your voicemail picked up. I received no call back by 6:20 and then left for the office. Was it this morning at 6 a.m. that you asked me to call you? (*Giving as close to the raw data as possible, inquiring about whether you correctly interpreted the original spoken request*)

Boss: Yes, I did ask you to call this morning, and I am very sorry that I wasn't available. I understand that preparing yourself at that hour and then not finding me available me must have been frustrating.

You: I want to share with you that I began to think, after not being able to reach you, that you weren't in the office yet. Based on this, I began to wonder whether you had either forgotten our appointment or had just decided to ignore it. These thoughts led me further to doubts about whether I can trust you. Am I making sense? [She nods] Can you fill me in on your view of this situation and what you were thinking this morning? (*Giving your reasoning as it gradually creeps up the ladder. Checking that she follows your reasoning. Inquiring whether she has a different explanation*)

Boss: Yes. This morning has been a complete disaster. I got here at 5:45, and just before you must have called I received a call from our VP of International operations in London. He was frantic about not being able to find a presentation that we prepared for him and left on the network server for him to pick up today. I had to go find one of the graveyard IT people and she searched the network while I rummaged around the office for a hard copy. By 6:30 we'd found it and he got it in time. Then I came back to my office, got your voicemail, and called you back but got your machine. You'll hear my apology again when you listen to your messages this evening.

Slowing down enough to have a conversation like this in a difficult situation, with high emotions, is not easy. It is especially difficult when the meanings and conclusions you are drawing seem self-evident. As Rick Ross cautions, if you manner suggests that your interpretation must be equally self-evident to all reasonable observers, you may cut off opportunities to independently test your conclusions. You conclusions may be safe, yet you may have missed an opportunity to learn.

With practice in group problem-solving conversations, the ladder can be a powerful tool for slowing the conversation and testing conclusions against what data is closest to observable. Others may not always agree with your conclusions, but they will understand how you arrived at them. At the same time you will also have a clearer view of their reasoning. Surfacing reasoning this way, putting your meanings to a public test, slows the conversation enough so that people are for once able to reflect on their thinking process. This leads to heightened trust among team members, and it can help teams to keep conversation about difficult issues on track.

Balancing Advocacy with Inquiry

Most problem-solving efforts are driven by a conversation for rapid, effective action. The complexity of organizational problems, time pressure, and the penalties for making the wrong move, often lead individuals to spur this conversation by advocating their views strongly and forcefully. Moreover, many problem-solvers have achieved a great deal of success in their organizations by cultivating the ability to forcefully present and argue their cases. But the scope, complexity, and team-focus of many systemic problem-solving initiatives, may require a new kind of conversation for action, one in which we slow the pace and seek a balanced exchange in which we

- advocate our positions in a way that also reveals the reasoning and interests that lead us to those positions

- test our positions by inviting others to challenge them or provide alternate views.

It's important to seek this balance, since pure advocacy (my way or the highway!) is damaging to the team's ability to learn, and since pure inquiry neither accommodates your viewpoint nor leads readily to action. As I suggested in Section Two, most effective team problem-solving involves both convergent and divergent modes of conversation. Finding the right mixture of the two for the phase of problem-solving or conversation you are in is the art of balancing advocacy with inquiry. Drawing on the work of Diana McLain Smith and her colleagues at Action Design, I have constructed a grid to represent the conversation-scape within which advocacy and inquiry are blended. As you can see in Figure 12, the ratio of the two varies as a function of the complexity of the conversation and the kind of outcomes which are desired.[21]
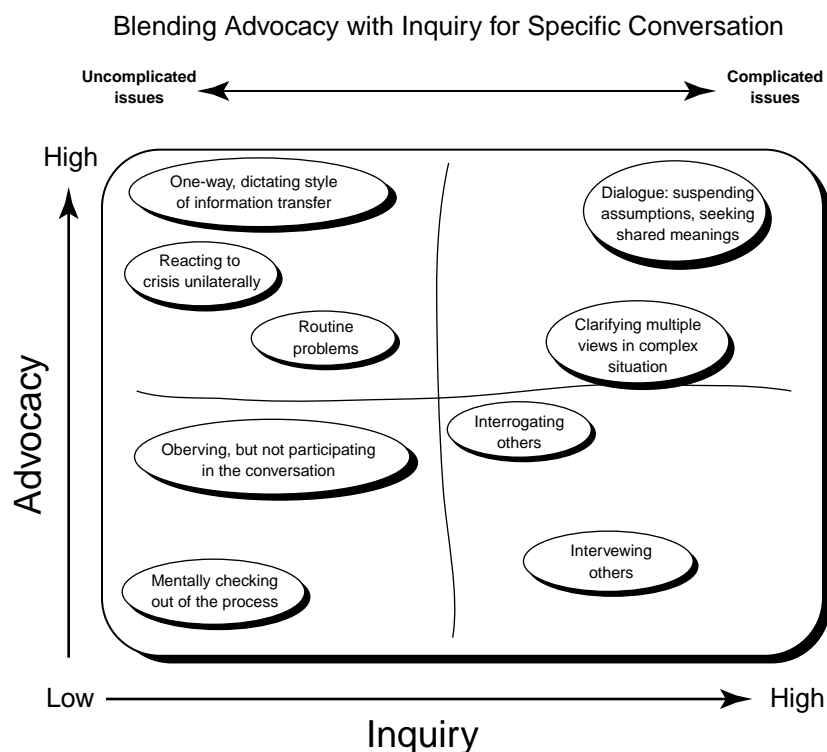
Blending Advocacy with Inquiry for Specific Conversation

Figure 12: a conversation scape for blending advocacy with inquiry

[21] Additional detail for this grid came from Rick Ross and Charlotte Roberts, "Balancing Inquiry and Advocacy," In *The Fifth Discipline Fieldbook*, by Peter Senge, Art Kleiner, Charlotte Roberts, Rick Ross, and Bryan Smith, New York: Doubleday, 1994. Ross and Roberts also provide some "recipes" for experimenting with advocacy and inquiry in everyday conversation.

From this diagram is seems clear that advocacy and inquiry can be used to both promote learning and creative problem-solving and also to limit these. Diana McLain Smith and her colleagues have developed an additional tool to help contrast effective with ineffective advocacy and inquiry. This tool, the Learning Grid, separates a variety of common action strategies for both advocacy and inquiry into groups which either support learning or limit it. This grid is given in Figure 13.

The Learning Grid

	Advocacy	Inquiry
Promotes Learning	Explains steps in thinking Gives specific examples	Seeks alternative views Probes view of others Encourages Challenge
Limits Learning	Doesn't explain steps in thinking Doesn't give specific examples	Seeks confirming views Asks leading questions Doesn't encourage challenge

Figure 13: The Learning Grid[22]

To speak and listen in a way that balances advocacy with inquiry seems straightforward and simple. The most rudimentary (though highly effective) form of this balance is to simply follow your stated viewpoint or position on an issue with a short sentence such as: "am I making sense?" Then be sure to stop talking and wait for a response. Though adding this small sentence to our opinion statements may seem simple

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[22] Source: Action Design.

and easy to execute, it is actually quit difficult. As an experiment, next time you are in an advocacy situation with others who have differing viewpoints, make the intention to add inquiry, in the form of a small sentence like the one above, to your advocacy statement. See how well you are able to actually do it. If you do not do it, keep trying in similar situations. The more you practice, the more you are likely to be able to succeed. If you are able to add this sentence, notice any changes in the tone, direction, and effectiveness of the conversation.

Building skill in balancing advocacy with inquiry can have a dramatic effect on your ability to use the Ladder of Inference. This is because the steps in which you are checking with the other to compare interpretations and meanings of observations is a way of bringing inquiry to the conversation.

Values Comparison Table

Often organizational learning disabilities stem from routine problem-solving or other practices which are out of sync with the espoused values of the organization. As a member of the organization you may recognize actions, even your own at times, which seem to conflict with fundamental organizational values. For example, you may notice that a manager who makes a vocal commitment to the "empowerment" of his reports tends to pre-empt their decision on the fly. On the face of it, this behavior seems out of sync with the value of supporting empowerment. This manager is likely not aware of this seeming mismatch between his behavior and the organizational value he espouses.

An important consequence of the kind of double-message this represents is that employees may lose trust in this manager and begin to second guess their own judgment. They tend to produce what they think the manager wants, rather than what they might create on their own. At the extremes, this leads to withdrawal, mere compliance, and groupthink, none of which fosters creative, effective problem-solving.

Members of a problem-solving team may find themselves handicapped by what they feel are double message practices embedded in the organizational culture. If so, there is a tool they may use as a group to explore the apparent gap between the organization's actual

values-in-use and its espoused values. This tool, called the Values Comparison Table, is the

centerpiece of a group exercise which surfaces and clarifies, to the group's satisfaction, both

sets of values on a single sheet of flipchart paper. As shown in Figure 14, the facilitator

draws a line down the center of the page and helps the group list the core values of the

organization down the right side. This may be as easy as reading a list printed on the back

of everyone's business card. Then, the facilitator leads the group in brainstorming the

actual values driving most routine actions within the organization. While, in some

organizations, this practice may be unsafe in the presence of senior management, it is

usually reasonably safe among members of a task group.

Once the group has singled out the perceived gaps between espoused and actual

values-in-use, members turn to identifying those perceived gaps which seem to pose the

greatest handicap to effective problem-solving.

Values actually in use   **Espoused values**

- Build it and they will come

- Hold public floggings as
  punishment for mistakes

- Unilaterally reassign tasks
  which get bogged down

- If the truth makes you look
  bad, put a spin on it

- Demonstrate little patience
  for diverse vewpoints

- Cover your 6 o'Clock

- Listen to and care for
  the needs of the customer

- Respect the dignity of all
  employees

- Support empowerment

- Always demonstrate the
  highest integrity

- Be tolerant of differences

- Be accountable

Figure 14: Values Comparison Table

For instance, the group members may feel that in order to be sufficiently creative they must practice being tolerant of each other's differences of opinion. Yet, they may recognize within their own conversation a tendency for members to be intolerant of viewpoints in opposition to their own. Recognizing this tendency as a generalized practice within the culture can help the group to reflect and at times suspend this tendency when it gets in the way of their process.

While this tool is powerful and can lead to great leaps of learning within problem-solving teams, it can also be abused. Some organizations foster a culture which views as disloyal and dangerous any open discussion of the kind of mismatches the table illustrates. This cultural disposition is deeply embedded within the organization, and a single task group, despite any successes it may have, is not likely to successfully evangelize the legitimacy of such conversation on its own. Instead, attempts to use the table as a wedge to create new kinds of learning elsewhere in the organization can backfire dangerously.

The Left-Hand Column

Conflict, disagreement, and resentment arise from time to time in all problem-solving groups. Often these conflicts are dealt with by driving them underground in order to preserve calm. But this calm comes at the price of an increasing store of undiscussable issues, which can destroy a problem-solving team's effectiveness. Strategic conversation in such a group is like walking through a mine field, never knowing when something you may say will trigger a sudden, paralyzing chill.

Because all teams experience misunderstandings and conflict it would be helpful to have a diagnostic tool to help recover the way people are thinking and acting in specific problem situations, in a way that leads to mutual learning. Such a tool is the Left-Hand Column, developed by Chris Argyris.[23]

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[23] Chris Argyris, Robert Putnam, and Diana McLain Smith, Action Science, San Francisco: Jossey-Bass, 1985, p. 340.

This tool is useful within groups whose members have already made a commitment to managing their conflicts in a way that supports learning. It is a way of openly examining and repairing the inevitable rips and tears that occur in the group conversation. But the usefulness of the Left-Hand Column is limited by the abilities of team members to coach each other in a way that promotes trust and that minimizes defensive responses.[24]

To use the Left-Hand Column, team members identify a specific exchange of words which triggered anger, resentment, or unspoken frustration. Either alone or together, you and others involved write an account of what happened. Then, down the right-hand side of a sheet of paper divided by a vertical line down the center, you write a script of what you remember to be the actual words said in the exchange by the key players. (Many computer word processors allow two-column tables, which are handy for this exercise.) When you have finished filling the right-hand side of the paper go back to the beginning and on the left-hand side fill in what you were thinking or feeling but, for whatever reason, not saying.

Left-Hand Column	*Right-Hand Column*
What I think but don't say	**What is actually said**
– The project is late and I don't think Joe cares!	– *Me*: Hey Joe, are we still on schedule?
– He's already getting defensive; not a good sign	– *Joe*: Don't worry, this project's running itself!
– Maybe if I set the other divisions against us both. . .	– *Me*: We're on the spot, the other divisions are pressing me
– Is he already making excuses for late delivery?!	– *Joe*: Tell 'em everything's fine unless they make changes
– I've lost confidence in him, but I don't know what to do. Maybe I'll give him some more rope	– *Me*: OK, I'm counting on you, I know you'll deliver

Figure 15: The Left-Hand Column format

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[24] Robert Putnam, "Risks and Opportunities with 'The Left-Hand Column'," In *The Fifth Discipline Fieldbook*, by Peter Senge, Art Kleiner, Charlotte Roberts, Rick Ross, and Bryan Smith, New York: Doubleday, 1994.

Upon completion of the two columns, you and your partner in the exchange meet to explore the assumptions, history, and intentions that may have led you both to decide to think and speak as you did. Skillfully enacted, this conversation can bring to light misunderstandings which would otherwise not surface, and which could continue to handicap the team's effectiveness. Among the questions you and your partner may explore are:

- What were you trying to achieve in the conversation?

- What results actually occurred, and how could your actions have contributed to those results?

- What were you afraid would happen if you had said what was in your Left-Hand Column?

- What did it cost you, your partner, your team, or the organization to think and speak this way?

- What was your payoff?

- How well can each of you guess the contents of the other's left-hand column?

Robert Putnam suggests that groups may wish to begin using this tool with the help of a trained facilitator, but he also offers some guidelines a team can use to test itself to see if there is enough skill in place to go ahead on its own. He writes:

> Bring together some core members of the team, and ask yourselves: imagine what we think is really on the other team members' left-hand columns. Now imagine if everybody actually said those things in a room together. Could we handle it? Would it lead to good things, or would it just be a recipe for people blowing up at each other, or getting entrenched in their own positions?[25]

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[25] *Ibid.*, p. 252.

Argyris has identified two key traits that tend to help team members to develop skill in the use of this tool and the kind of inquiry it fosters. These are (1) being able to reflect openly upon how your own behavior may contribute to the problems that concern you, and (2) being able to hang in with conversation when you feel yourself increasingly on the hot seat.

Postscript on tools

Systemic, double-loop problem-solving requires a kind of conversation based on self-reflection, commitment to others and the task, and to individual and group learning. Because we don't always behave in ways consistent with these values, it helps if we develop skill in the use of the four tools (and others) described above. These tools are successful in strengthening our skill in organizational learning precisely because they help us focus on the constant process of unlearning. In this process we are unlearning to rely blindly upon our deep, untested assumptions about how the world works and how to get along in it. It is in this sense that systemic problem-solving is equally a practice of conversation for both organizational learning and unlearning.

Part Four: Principles of Inner Mastery for Effective Problem-Solving

"Mr. Duffy lived a short distance from his body," wrote James Joyce. But Mr. Duffy wasn't unique. Most of us live our lives apart from our bodies. We are constantly caught up in the realm of thoughts and ideas, not living through our bodies but in spite of them. At any given moment, our muscles are tense and knotted, and chemical-induced moods sweep our bodies, profoundly affecting our thoughts and actions. Our breathing is usually shallow and constricted within our upper chest. Often when we walk we are lurching forward, driven by some thought or idea, unbalanced and in a perpetual state of semi-falling. We are easily distracted, finding ourselves buffeted by thoughts and desires like an autumn leaf at the mercy of the October wind.

The consequences of living apart from our bodies are difficult to imagine, since we've hardly had any experience living any other way. But there are consequences, especially for individuals who aspire to become effective leaders of organizational problem-solving efforts. The consequences are largely in lost opportunities for productive conversation. In Part Three we reviewed some tools for skillful speaking and listening. These tools are helpful so long as we can remain mindful enough to use them. But experience shows that even the keenest practitioner occasionally feels a threat so severe, or has a button pushed so directly, that he or she loses the capacity to speak and listen skillfully. These lapses are painful and dispiriting, but they are also fresh markers on our pathways toward personal mastery. What if we had a set of practices which could help us keep or gracefully regain command of our skills in difficult conversation, instead of losing our balance and effectiveness once and for all? What if we could extend our perimeter of effectiveness by cultivating through our bodies a balanced, relaxed, attentive way of being?

The Inner Art of Organizational Problem-Solving

Though we have grown to accept the assumption that we accumulate knowledge through rational operations of our minds, most of us are experienced in through-the-body learning. Could you have learned to ride a bicycle, play billiards, do karate, waltz, or do a cartwheel by reading an instruction manual that only described these activities? Probably not; these are physical skills requiring physical practice. In this section we'll explore physical practices for extending our ability to speak and listen under increasing stress. These are practices of inner mastery drawn from centuries-old physical traditions of the martial and contemplative arts. They represent the skills contained in the inner-most circle of the Onion Model introduced in Part One. For the most part, the skills in this domain are not only missing from most organizational coaching, it is missing that they are missing.

Often when we consider physical activities with others our mental models are based on strength and competition. To test this assumption let's do a short thought experiment. Imagine that you and a partner are given the instruction to join hands in arm-wrestling

position and "win as many times as possible in the next thirty seconds." Take a few moments to play a mental movie of this activity. Watch yourself and your partner and count the number of times you were able to win over a 30 second period.

What did you see? Possibly, the images were of you and your partner struggling to overcome one another. Perhaps you were able to win three to five times. Now imagine what it would look like if each of you coordinated your energy to allow you to sweep back and forth together, both alternately winning and losing in rapid succession. Using this strategy you could easily have "won" thirty or more times in the given time.

Many problem-solving processes become ineffective when we try to use strength to force our interpretations on the group, or to compete with others. A more effective approach, under increasing stress, might be simply to shift within our bodies to a stable, grounded, balance point from which to take action. From this embodied vantage point we are more likely to command more choices, and to produce actions which neither rely on force nor promote competition.

To cultivate the ability to make this shift, and then to move into action with mind, body, and spirit on-line together we'll first explore practices for locating awareness within our bodies. Then we'll turn to a partner practice which reveals a physical pathway for dealing with conflict in a way that allows you to safely appreciate the concerns of others without losing touch with your own.

Reinhabiting our bodies

Along this biological pathway to personal mastery what is required first is to become acquainted with the interior of our bodies. This is a process of exploring our inner space, untying knotted muscles and releasing tensions, and locating our awareness at our

physical center. A particular way of breathing and positioning our bodies, adapted from the Chinese healing art of Chi Gung, will aid us in this exploration.

Exercise 1 (solo) exploring your center. To begin, find a place to stand and adopt a posture like that shown in Figure 16.

Figure 16: Standing posture

Place your feet almost parallel about a shoulder width apart and bend your knees slightly. Let your shoulders droop and gently straighten your lower back so that your hips rotate up, following the bend in your knees. Sink into this position, slightly bend your elbows as your shoulders drop, and let the backs of your hands face forward. Your stomach should protrude a bit as your chest sinks into this posture. Now shake out your body for a moment and resume the standing posture, this time sinking deeper into it.

As you stand, focus on your breathing. Breathe in through your nose and exhale through your mouth. Breathe into your stomach instead of your chest. Let your breath come and go in long, deep cycles. As you breathe imagine all the tension in your body

departing as you exhale. Breathe and continue to quiet your body until you begin to feel light, supple, and completely relaxed.

Now direct your awareness to a spot in the center of your lower torso, about two inches below your navel. This is where you'll look for your center. As you draw your awareness to this point let it wander about your lower body until you are satisfied that you have found *your* center. From this point of awareness imagine you are perceiving the world from this spot, rather than from the sense organs in your head. Breathe into this spot for a few moments. Now let your body sink more deeply into this spot, breathing as before.

Once you are familiar with your center, and feel comfortable there, let your body wobble around off your center until you feel yourself near its edge, then return to center.

Exercise 2 (partner) moving to the edge of center. This exercise, which I learned from Richard Strozzi Heckler, requires you to sink into your center as before. Then, your partner, standing just in front of you, reaches out with one hand to move you very slowly backward off your center until you feel yourself right at the edge. You'll know you're there when your toes begin to raise. It is your partner's responsibility not to push you off center, but just to bring you to the edge. For your partner this requires a great deal of attention, since she or he must also attune to your center and recognize when you are about to lose it.

Aikido principles for inner mastery

The embattled CEO walked into the meeting knowing he was going to be on the hot seat. Some of his VPs were in open revolt. His management style had been to overpower his opponents in aggressive debate, but by now his detractors had grown numerous and had organized themselves. The purpose of the meeting was to determine the extent to which his own staff retained any confidence in him as a leader. Some weeks earlier, this CEO had enlisted the help of a consultant whose leadership coaching was based on the principles of the martial art of Aikido. In coaching sessions, the CEO had begun to practice locating and

breathing into his center when he felt threatened. He had begun experimenting in conversation with the key principles of

- stepping off the line of attack,

- blending with the energy of the attacker,

- guiding toward a harmonious resolution.

As the meeting got under way a senior VP stood and aggressively attacked the CEO. Instead of responding with a fierce counterattack, the CEO imperceptibly shifted his body out of the line of fire, focused on breathing into his center, and was able to listen quietly and attentively as one after another of his staff criticized him. By the end of the meeting his relationship with his staff had begun a transformation. Because of his new strategy of listening to their interests and concerns he received a vote of confidence from his staff. The firm went on that year to enjoy record performance, and within the next two years this CEO was picked to lead a $3 billion company.[26]

The CEO embodied principles of Aikido in the following ways. He resisted the impulse to fight back and instead moved off the direct line of attack, shifting awareness to his center when he felt threatened. He blended with his adversaries by first listening to them without interruption, and then by repeating their concerns to them to check for understanding. He guided the meeting to a harmonious resolution by modeling new actions which more effectively supported the strategic conversation he needed with his staff.

The *concepts* of deep or active listening are not new. But the ways in which individuals, like this executive, are programming their bodies to bring these skills on-line are revolutionary in business settings. A set of simple partner exercises can help you program your body with patterns of physical movement and energy blending which can open up new possibilities for you to act effectively in difficult, threatening situations.

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[26] I am indebted to Chris Thorsen for giving me permission to use this story.

Figure 17: Beginning postures, exercise 3.

Exercise 3 (partner) stepping off-line, blending, and guiding to resolution. This exercise, based on a fundamental technique of Aikido, allows you and your partner to enter into a physical experience reflecting the three key principles listed above. First, position yourself with your partner as shown in Figure 17. Your partner will be facing you and, with palm outstretched, will begin moving directly toward you. As your partner approaches, take a step to his or her outside as a matador might. As your partner passes, pivot with your hips and move alongside him or her, facing his or her direction (see Figure 18).

Figure 18:

Once alongside, cradle your partner's outstretched arm with one hand and move your other hand gently to the center of your partner's back. Using the energy of motion your partner has brought to you, gently experiment with leading his or her force safely past you. Cultivate the feeling that you are connected somehow with your partner as you move together. Allow the aggressive energy to dissipate as the paired movement comes to a natural conclusion. Talk with your partner about how this movement differs from responding to an adversary with reciprocal force, or with giving in.

With some practice, you and your partner will cultivate the skill to increasingly translate these movements to speaking and listening, as the CEO in the example was able to. For problem-solving conversation, in which the issues are complex and ambiguous, and the price of error high, these practices of embodied presence and action can lead to breakthrough results.

Mini-practices of inner mastery

When your thoughts run away with you: In any centering, grounding, or reflective exercise, as you keep your awareness focused on your breathing, you will notice that thoughts, desires, pains, and apprehensions arise in your mind. Take note of them as they arise, then let them float away or evaporate, while you remain attentive to your breathing. You will find, sometimes, that you become occupied with a thought and lose awareness of your breathing. When you notice this happening, release the thought and gently bring your awareness back to your breathing. Morihei Ueshiba, the founder of Aikido, was fond of saying, "My students think I never lose my center. This is not so; I simply notice it sooner and get back faster."

When the telephone rings: Resist answering the phone on the first ring. Instead of "always rushing to answer the phone," get in the habit of using the time between the first ring and the end of the third ring to practice breathing your awareness to your center. People who acquire this habit find they can deal with interruptions with a renewed sense of balance and equilibrium.

Conclusion

The complexity, ambiguity, team focus, and high stakes of organizational problem-solving has required us to expand our set of problem-solving tools and skills and our approach to using them. I have suggested that the most effective use of tools and skills is first, to support the fabric of conversation within which you and your teammates get things done. This shift away from the stark problems themselves and onto your conversation mirrors the idea that we have only our interpretations of the world to work with, interpretations which are not necessarily facts.

Problem-solving teams are better equipped for difficult and vaguely defined problems when members develop skills in the four domains described in the Onion Model (Figure 2, p. 7). Examples of these skills, progressing from the outer layers inward are:

- analytical tools for process control and improvement,

- meeting facilitation and other group decision process tools,

- skills in effective speaking, listening and conflict management, and

- skills of personal, inner mastery to allow us to remain longer in command of the other skills we have learned for effective problem-solving.

Drawing upon the science of self-governing systems, or cybernetics, we constructed a self-correcting model for problem-solving which allows for either refinement of existing solutions (single-loop learning), or the reorganization of processes for brand new solutions (double-loop learning). A key component of the double-loop problem-solving model is the "double-loop learning gate." It is at this location in the cycle that problem-solvers detect data which may lead to the reorganization of their process, to adjust to changing customer or other stakeholder needs. This model is roughly analogous to TQM's SDCA/PDCA model for process improvement, though that model fails to make explicit the mechanisms of self-correction.

We explored three layers of organizational culture, and addressed the riddle of why well-intentioned employees sometimes act in ways that seem out of sync with espoused organizational values. We explained most organizational behavior in terms of long-programmed, often unconscious, values of unilaterally controlling tasks, winning, suppressing negative feelings, and appearing rational at all times.

In order to enhance the effectiveness of problem-solving conversation and minimize actions driven by these values, we examined four tools: The Ladder of Inference, Advocacy with Inquiry, The Values comparison Table, and the Left-Hand Column.

Drawing on principles of contemplative and martial arts, we opened a door to increased effectiveness through practices of reinhabiting our bodies and moving into action from our physical center. Regular practice with these principles, using exercises like those offered, provide problem-solvers with the ability to use tools effectively under increasing stress, and to perceive an increasing number of quality opportunities in difficult situations. Additionally, by programming our bodies with movements that neither meet force with force nor back down, we may more readily find ways of speaking and listening which mirror these physical movements.

Mini-practices given can help us find opportunities during the day to practice directing our awareness within our bodies.

In presenting this expansion and reorganization of a systemic problem-solving methodology, I am attempting to do double-loop learning with the problem-solving process itself. The models and skill sets I've presented have been proven helpful in organizational training and use, some in the hands of researchers such as Edgar Schein and Chris Argyris, for over forty years. Writing this paper has been for me more of a quilting exercise, weaving together elements and patches of useful tools and skills into a coherent whole. I intend to continue to do double-loop learning with the problem-solving process, in order to further build, tear down, rebuild and make relevant the process of problem solving for organizations now and in the future.

Appendix A

An Exercise in Systems Thinking

- You must stay in a large room with a locked window to the outside that cannot be opened.
- It is winter and cold outside.
- There is a small output, portable space heater nearby, unplugged but near a working wall socket.
- A thermostat, fixed at a setting of 80 degrees, controls a furnace. The setting cannot be changed.
- There is a brick on a table.
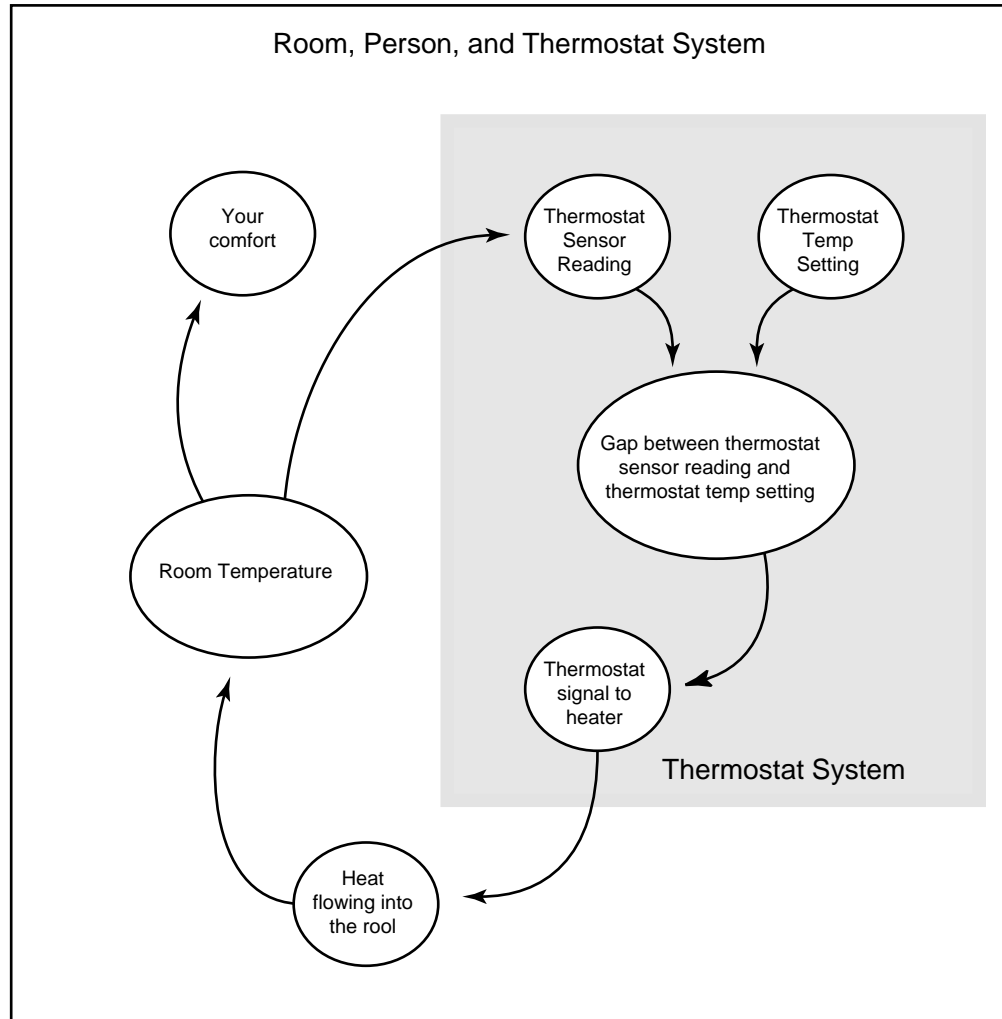- On the wall is a furnace vent, which cannot be closed.
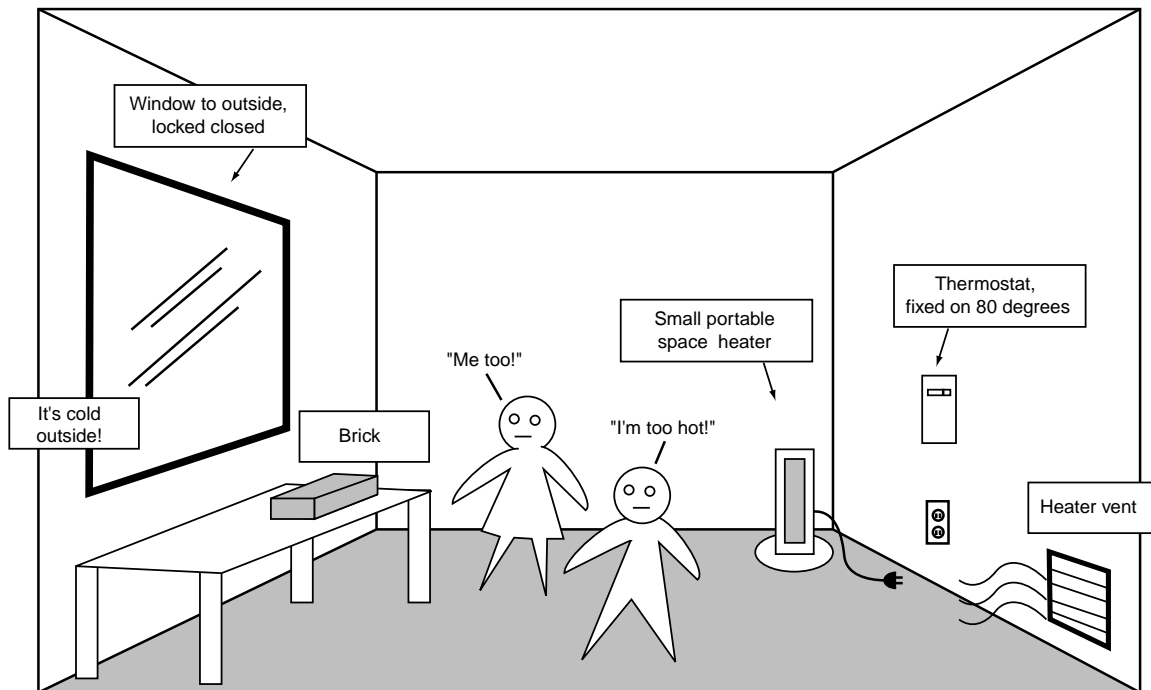
The room is too hot! What would you do to make it more comfortable?

Take a few moments with some friends or perhaps suggest this as a team exercise in one of your work groups. See if you can come up with a solution to the problem which solves your personal discomfort in a way that uses up as little resource as possible and that creates the least disturbance possible. In other words: find an elegant solution. This exercise was adapted from a similar riddle published by Draper Kauffman.[27]

A structural map of the system you may choose to manipulate to create this solution is found on the next page. (Don't look until you've found a solution, it's too good a hint!)

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[27] Draper Kauffmann, Jr., *Systems1: An Introduction to Systems Thinking*, Minneapolis: Future Systems, 1980.

A map of the structure of the system you are part of

Room, Person, and Thermostat System

Your comfort

Thermostat Sensor Reading

Thermostat Temp Setting

Gap between thermostat sensor reading and thermostat temp setting

Room Temperature

Thermostat signal to heater

Thermostat System

Heat flowing into the rool

If you are satisfied that your solution is elegant, you probably have found a way to manipulate the system shown above. Follow the feedback loops and find the location or component you manipulated. Feel free to alter this map in any way that suits you.

Appendix B: Priorities Matrix

Issues to prioritize

r   Issue 1

r   Issue 2

r   Issue 3

r   Issue 4

r   Issue 5
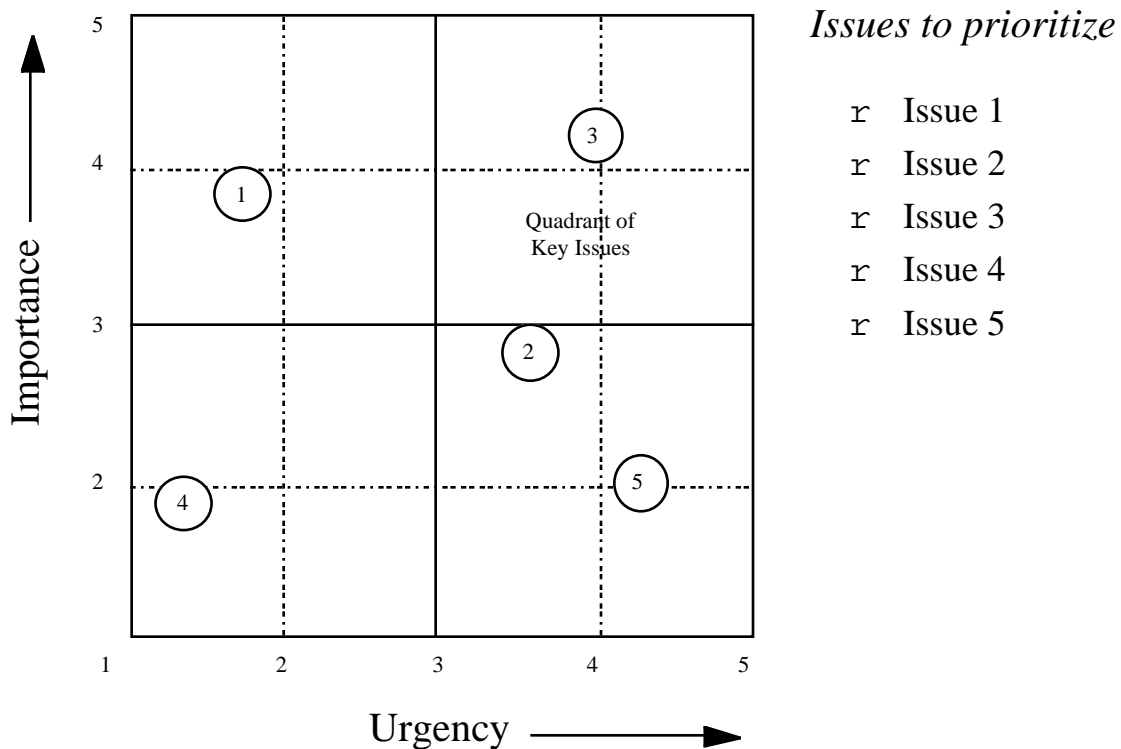
This is a group tool, located within the second layer of the Onion Model, which allows a problem-solving team to determine which are the critical issues or problems to be addressed. It is especially useful when there are more issues to be dealt with than there is time, resource, or people to deal with them, and consensus on where to start is difficult to establish within the group.

To use the matrix, the facilitator instructs team members to write down critical issues or problems, one at a time on sticky notes. Then each participant posts his numerous sticky notes on the matrix according to where in the coordinate space they see the issue or problem falling. Issues which are both important to the future of the organization and also of extreme urgency get posted in the upper right hand quadrant.

Once all the sticky notes are up, someone counts their frequency in all four quadrants and lists these numbers next to the issue or problem names. Usually, a consensus follows that the issues or problems with the highest frequencies in the upper right hand quadrant are the most important issues or problems to be working on with greatest resource right away. Other issues can be scheduled for attention later according to their ratios of importance to urgency.

Bibliography

Ackoff, Russell. *Creating the Corporate Future*. New York: Wiley. 1981.

Argyris, Chris. *Overcoming Organizational Defenses*. Boston: Allyn and Bacon. (1990).

_____. *Knowledge for Action*. San Francisco: Jossey Bass. 1993.

_____. "Teaching Smart People how to Learn,"in *On Organizatioanl Learning*, Cambridge: Blackwell, 1992.

Argyris, Chris, and Donald Schön. *Theory in Practice*. San Francisco: Jossey Bass. 1974.

Argyris, Chris, Robert Putnam, and Diana McLain Smith. *Action Science*. San Francisco: Jossey Bass. 1985.

Ashby, Ross. *An Introduction to Cybernetics*. London: Methuen. 1956.

Bryner, Andy and Dawna Markova. *An Unused Intelligence*. Berkeley: Conari Press, 1996.

Checkland, Peter. *Systems Thinking, Systems Practice*. New York: Wiley. 1981.

Checkland, Peter, and Jim Scholes. *Soft Systems Methodology in Action*. New York: Wiley. 1990.

Dooley, Jeff, and Chris Thorsen. "Aikido for Change Leaders," In *TheDance of Change*. by Peter Senge, Art Kleiner, Charlotte Roberts, Rick Ross, and Bryan Smith. New York: Doubleday. 1999.

Doyle, Michael, and David Straus. *How to Make Meetings Work*. New York: Jove. 1982.

Flood, Robert, and Ewart Carson. *Dealing with Complexity: An Introduction to the Theory and Application of Systems Science*. New York: Plenum. 1988.

Flood, Robert, and Michael Jackson. *Creative Problem Solving: Total Systems Intervention*. New York: Wiley. 1991.

Forrester, Jay. *Principles of Systems*. Portland, OR: Productivity Press. 1968.

Goodman, Michael. *Study Notes in System Dynamics*. Portland, OR: Productivity Press. 1974.

Katz, Daniel, and Robert Kahn. *The Social Psychology of Organizations, 2nd Ed*. New York: Wiley. 1978

Kauffmann, Draper. *Systems1: An Introduction to Systems Thinking*, Minneapolis: Future Systems, 1980.

Kim, Daniel, and Virginia Anderson. *Systems Archetypes Basics: From Story to Structure*, Waltham, MA: Pegasus, 1998.

Moore, Carl. *Group Techniques for Idea Building*. Newbury Park, CA: Sage. 1987.

Morecroft, John and John Sterman. *Modeling for Learning Organizations*. Portland, OR: Productivity Press. 1994.

Powers, William. See especially: William Powers, *Behavior: The Control of Perception*, Chicago: Aldine, 1973.

_____. *Living Control Systems*. Gravel Switch, KY: Control Systems Group. 1989.

Putnam, Robert. "Putting Concepts to Use: Re-educating Professionals for Organizational Learning." Ph.D. diss., Harvard University. 1990.

_____. "Risks and Opportunities with 'The Left-Hand Column'," In *The Fifth Discipline Fieldbook*, by Peter Senge, Art Kleiner, Charlotte Roberts, Rick Ross, and Bryan Smith, New York: Doubleday, 1994.

Randers, Jørgen. *Elements of the System Dynamics Method*. Cambridge: Productivity Press. 1980.

Reckmeyer, William. "Organizational Health in the Systems Age: A Renaissance Systems Perspective." in *Cybernetics and Systems*, ed. R. Trappl. Dordrecht: Reidel. 1986.

Richardson, George, and Alexander Pugh III. *Introduction to System Dynamics Modeling with DYNAMO*. Cambridge: MIT Press. 1981.

Roberts,Nancy and D. Anderson, R Deal, M. Garet, W. Shaffer. *Introduction to Computer Simulation: A System Dynamics Approach*. Portland, OR: Productivity Press. 1971.

Ross, Rick, "The Ladder of Inference," In *The Fifth Discipline Fieldbook*, by Peter Senge, Art Kleiner, Charlotte Roberts, Rick Ross, and Bryan Smith, New York: Doubleday, 1994.

Ross, Rick and Charlotte Roberts, "Balancing Inquiry and Advocacy," In *The Fifth Discipline Fieldbook*, by Peter Senge, Art Kleiner, Charlotte Roberts, Rick Ross, and Bryan Smith, New York: Doubleday, 1994.

Schein, Edgar. *Organizational Culture and Leadership*, 2nd Ed. San Francisco: Jossey Bass. 1992.

_____. *Process Consultation*, Vol 1 & 2. Reading MA.: Addison Wesley. 1988.

Schwarz, Roger. *The Skilled Facilitator*. San Francisco: Jossey-Bass. 1994.

Senge, Peter. *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York: Doubleday. 1990.

Senge, Peter, and Art Kleiner, Charlotte Roberts, Richard Ross, and Bryan Smith. *The Fifth Discipline Fieldbook*. New York: Doubleday. 1994.

_____. *TheDance of Change*. New York: Doubleday. 1999.

Shiba, Shoji, Alan Graham, and David Walden. *A New American TQM*. Portland, OR: Productivity Press, 1993.