



# Applied Systems Thinking

*Use the Power of Structure to Create Lasting Change*

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Leveraging Change Article 1

“Leveraging Change: The Power of Systems Thinking In Action”

by David Peter Stroh

This article demonstrates why Systems Thinking is so useful in facilitating change and describes how to apply it towards that end.

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## LEVERAGING CHANGE: THE POWER OF SYSTEMS THINKING IN ACTION

DAVID PETER STROH

Many years ago, Digital's telecom director asked a colleague and me to improve the effectiveness of his worldwide organisation that consisted of a corporate group and field personnel of approximately 800 people. He indicated that the corporate and field staffs were not working well together and asked us first to assess the situation.

We knew that the managers who sponsor such assessments typically face several challenges in applying the findings. The first is to make sense of the frequently bewildering amount of data produced. The second is to develop a focused, effective action plan. The third is to motivate people to implement the plan.

Most assessments are presented as themes, clusters of strengths and weaknesses, or models that explain *what* is going on in the organisation without really explaining *why*. Recommendations are typically lists of actions that are neither prioritised nor sequenced. As a result, managers often assume that the different issues represent separate, equally important problems and sponsor several independent improvement projects to solve them. This tends to create confusion, diminish required coordination and slow down implementation. Consequently, the motivation to change often erodes as well.

To help managers in this case to better understand the data and develop a targeted action plan, we organised our findings differently. I had begun teaching systems thinking at the time and was impressed by the ability of "causal loop diagrams" to translate complex data into simple yet compelling explanations of not only what was happening, but also why.<sup>1</sup> The "why" that systems thinking explains is typically a set of non-obvious interdependencies between factors such as:

- different units in the organisation;
- corresponding actions taken by the organisation and its customers or competitors;
- quantitative variables (such as revenue growth) and qualitative ones (such as burn-out or how people think); and
- short- and long-term consequences of managerial decisions.

Once managers understand these interdependencies, they can use the principle of leverage to target a few critical relationships to change in sequence so the whole system can perform more effectively. Focusing on these few key areas reduces the number of changes they must direct at any one time and provides a compelling rationale for making them. It also reduces confusion and the dispersal of limited resources.

We decided to organise the telecom function's data into a collection of themes and a few causal loop diagrams that showed the connections between the themes. We offered the diagrams to

explain why several particularly frustrating problems persisted despite people's best efforts to solve them. The diagrams illuminated such questions as follows.

- Why does field effectiveness keep declining despite so many corporate-sponsored improvement projects?
- Why do we keep putting out individual fires and never feel that performance is really improving?
- Why do we have to keep justifying our unit's value-added even after we respond to management's requests to make certain changes?
- Why does our workload keep increasing despite our best efforts to delegate more work to subordinates?

When people saw the findings this way, the results were astonishing. As we anticipated, the diagrams made sense of people's frustrating experiences and indicated a few high-leverage changes they could make. *What we didn't expect were the deep feelings of acceptance and readiness for change that people expressed after our explanation.*

For example, when we presented the diagram of the relationships between corporate staff and field staff, the senior managers of both groups said, "This is us!" And it was not a pretty picture. Each group had acted to improve field effectiveness in a way that made it more difficult for both itself and the other group to be successful. Moreover, both groups had conveniently found ways to blame their failures on each other.

Each group now acknowledged its own responsibility for the situation. Specifically, in seeking to be helpful by initiating many improvement projects, the corporate staff had made it more difficult for the field staff to shape and then implement any of the projects. The field staff in turn had reacted to corporate staff's ineffectiveness by using limited resources to create its own solutions, each isolated from the others, which then required the corporate staff to develop yet another project to integrate them.

It was as if we held up a mirror that communicated a clear, undeniable picture of reality. People saw their own roles in producing the problem and how the whole system operated. Each group understood the words of Pogo, "We have met the enemy, and it is [all of] us." Because all parties could see how their actions were inextricably linked, each could acknowledge the futility of simply blaming others for their frustration and recognise how they (and others) needed to change to improve performance. We discovered that systems thinking not only increased understanding and focused problem-solving, but it also generated *motivation* for people to change and stimulated *collaboration* instead of blame.

The outcome in this case was that both the corporate and field groups made several changes. The corporate staff agreed to shift some of its own resources from project development to helping field groups with project implementation. This decreased the number of projects under development at one time and increased the likelihood that the projects under way would be implemented. It also reduced the delay in getting new improvements from corporate staff to the field staff. The field groups in turn agreed to wait out the shortened delay. Moreover, both groups decided on development standards that field groups could adopt in more urgent cases. This ensured that short-term solutions to meet a particular customer need were implemented so that they did not undermine the overall integrity of the company's telecom architecture.

Since this experience, my colleagues and I have used systems thinking to help managers make sense of complex data, make better decisions, and create sustainable change in a variety of situations. We have learned these.

1. There are not only common problems but also *common ineffective solutions* to these problems that show up in a wide variety of organisations. Understanding both accelerates sound decision-making and sustainable problem-solving.
2. Systems thinking helps managers meet the four challenges to achieving effective change: motivating people to change, generating collaboration among groups that blame each other for the current situation, focusing limited change resources, and ensuring continuous learning once the decision to change is made.
3. A reliable, repeatable process for applying systems thinking can benefit organisations in the short run to achieve breakthroughs on particular intractable issues. It can also become a competence that produces long-term competitive advantage for those who master it.

## DEVELOPING EFFECTIVE RESPONSES TO COMMON PROBLEMS

In *The Fifth Discipline*, Peter Senge describes several system archetypes—typical structures that recur in both organisational and personal lives.<sup>2</sup> These structures depict different ways that people act to improve performance or reduce pressure in the short run, only to create long-term stagnation or decline. This occurs because:

- we are not aware that the same action can produce opposite results over time;
- there are many ways to make things better in the short run that seduce us into thinking that we are making sustainable progress;
- negative consequences of our actions are often manifested first in another part of the organisation and we are aware neither of their impact nor of our own role in producing them; and
- even patterns of successful growth will eventually reach a limit and have to be regenerated.

Understanding these archetypes enables managers to develop more effective solutions to typical organisational problems. Each archetype has a recognisable story line, is manifested as a series of recurring problems, and suggests ways to deal with the situation once it appears. An even more powerful benefit of familiarity with the archetypes is that managers can use them to anticipate and avoid a wide range of problems.

I will elaborate on one archetype, *Fixes That Backfire*, because it occurs frequently. This archetype describes people's tendency to apply a quick fix to a problem that is effective in the short run but produces unintended consequences that make the problem worse in the long run. Some ways in which this plays out in organisations are:

- making many separate changes at once temporarily improves performance in a few areas but only creates more confusion and slows down system-wide performance improvement over time;
- increasing the number of product variations or SKUs reverses declining profits in the short run but only leads to both increased costs and reduced revenues in the long run; and
- consolidating suppliers to improve bargaining terms works initially but only leads to increased supplier leverage and a weaker bargaining position later.

Let us look at the first two examples in more detail. Several years ago, a consumer products company asked me to help make sense of its business process reengineering effort. The company had initiated reengineering to increase both cost competitiveness and the success of new product introductions. The consulting firm it worked with had organised seven reengineering teams to redesign seven major business processes simultaneously. Overwhelmed by details, the participants in these design teams were concerned that they were losing sight of the forest for the trees. They did not understand which steps were most important to change in any one process, much less how the changes across multiple business processes would then be integrated.

Several members of the management team thought that systems thinking might help design team members to prioritise their work and ensure more coordinated solutions across the seven processes. They convened the supply chain redesign team because the company's supply chain costs were especially high, according to industry benchmarks. At the same time, they brought in representatives from the other six teams to work with the supply chain team to ensure that its recommendations would be integrated in all seven major processes.

After introducing the principles of systems thinking and some basic archetypes, including Fixes That Backfire, I asked the participants to identify the most frequent recurring problems they faced in managing the supply chain. Members of the supply chain team talked about high inventories and order management costs. Attendees from the sales and marketing teams referred to the growing unreliability of shipments. It was difficult for them to make timely and complete deliveries to all their customers. The customer service representative noted that shipment problems had led to increasing customer complaints. All three units—sales, marketing and customer service—assumed that the shipment problems stemmed from breakdowns in the supply chain. In addition, the information systems representative said that it had become more difficult to forecast sales accurately, a problem that the sales and manufacturing people affirmed and were expecting the information systems redesign team to fix.

*How* people thought about the problems was as revealing as *what* they described. This thinking is very typical in organisations and can be characterised as:

- we have many different problems to address;
- the sources of these problems are obvious;
- certain units, other than my own, need to make changes in how they operate in order to solve them;
- we have tried to solve these problems before and have been unsuccessful, either because we have not been able to influence the offending units or because they are somehow not capable of changing.

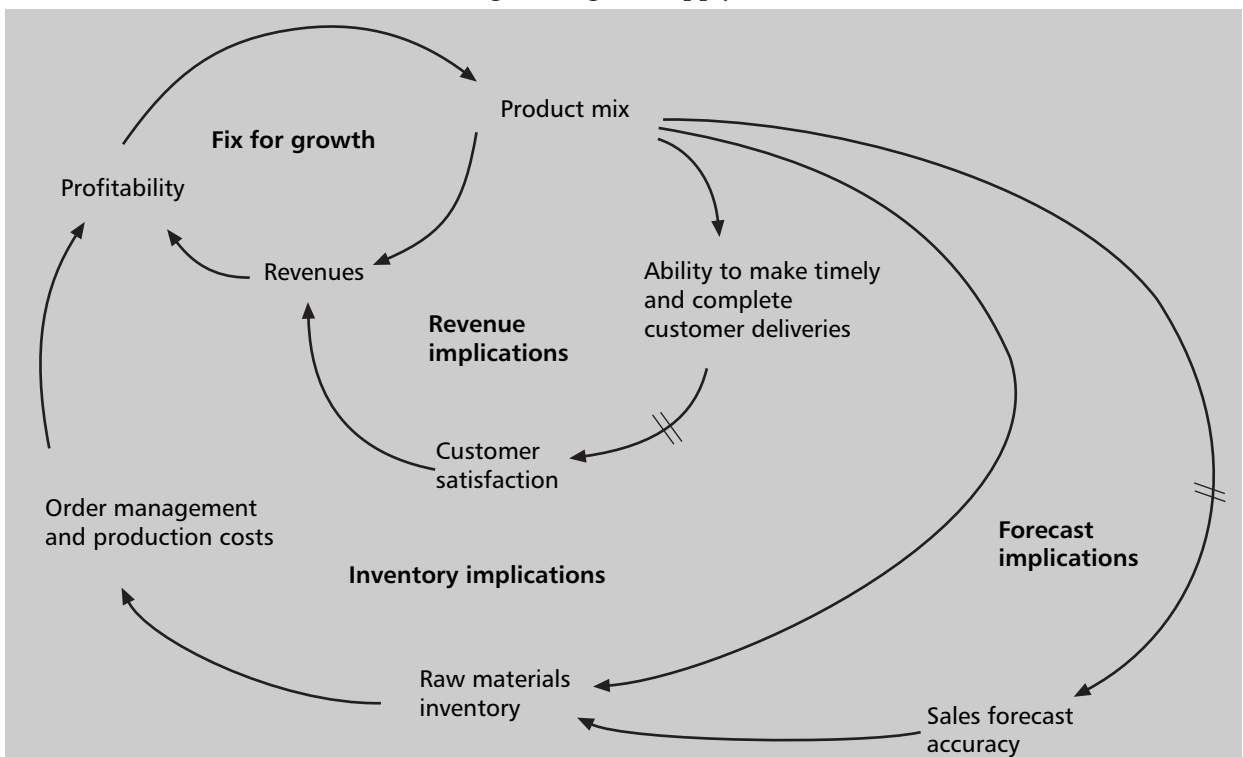
I encouraged them to consider different assumptions.

1. The problems they experience might be connected.
2. The relationship between problems and their causes is often indirect and not obvious. Furthermore, everyone is likely to see part of the situation clearly and no one is likely to see how the whole system operates to produce the behaviour they describe.
3. We unwittingly create many of our own problems.
4. Effective solutions usually lie in improving relationships among different parts of the organisation.
5. Only a few key coordinated changes sustained over time will produce large systems change.

I then asked the participants to break into small groups to address the problems they saw as most important. Despite their assumptions about where the problems occurred and what should be done about them, they all acknowledged their lack of success in solving them. So I challenged them to experiment with the new assumptions and spend 90% of their time understanding why the problem occurred. I asked them to tell the story of the issue from their respective viewpoints, listen for a few key variables embedded in all their stories, and then trace how these variables changed over time. This served to both legitimise each participant's experience and begin to draw out commonalities. I then asked them to probe for cause-effect relationships between the variables that could produce the behaviour they described and to bring these together in a causal loop diagram, using one of the basic archetypes as a starting point if it made sense. The small groups then presented their findings to each other.

*They discovered not only that their "independent" problems were related but also that problems in the supply chain were symptomatic of decisions made in other parts of the organisation. Actions that sales and marketing took to improve their performance, actions that made perfect sense given their perspective, had created problems elsewhere. Over time, those same actions had even made life more difficult for sales and marketing. When we put the small groups' diagrams together, we saw an example of Fixes That Backfire (Figure 1).*

**Figure 1**  
Reengineering the Supply Chain



While increasing the product mix boosts short-term revenues, it produces a number of negative consequences that undermine long-term revenues and increases order management and production costs. Reengineering the supply chain without reducing the product mix does not significantly improve profitability.

In order to reverse declining profits and increase revenues, the sales and marketing groups had developed a policy of “selling everything to everybody”. The increased product mix had in fact increased revenues and profits in the short run (Fix for Growth in Figure 1). However, it had also produced several unintended consequences that undermined other parts of the company and ultimately the performance of the sales and marketing organisations.

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One unintended result of a high product mix was that it led directly to higher raw materials inventory and subsequently greater order management and production

costs (inventory implications). Another consequence was that it became difficult to forecast demand accurately, a problem that the sales, marketing and information system groups had commented on. The decline in sales forecast accuracy led manufacturing to pad inventories even higher (forecast implications). Finally, the expanded product mix reduced the ability of the distribution organisation to make timely and complete deliveries to all customers. The shipping problem, raised initially by the sales and marketing and customer service groups, eroded both customer satisfaction and revenues over time and put renewed pressure on profits (revenue implications). The ultimate irony, typical of a fix that backfires, is that the sales and marketing groups responded to the long-term decline in profits by increasing the product mix further, thereby starting the same ineffective cycles again.

The meeting had three major benefits. First, from a business perspective, it became clear that redesigning the supply chain made little sense without first addressing the sales and marketing commitment to a wide product mix. As a result of these insights, senior management rationalised the company’s product portfolio and was able simultaneously to address problem symptoms associated with high supply chain costs, inaccurate sales forecasts and declining customer satisfaction. Second, from both business and organisational perspectives, the ability to focus on high-leverage actions and link the seven redesign initiatives meant that the company’s limited resources could be reallocated to focus on the most influential changes. Third, from an organisational perspective, relationships among all the participating units improved because each could see that they and others had good intentions, but had limited awareness and understanding of the full impact of their actions.

Becoming familiar with Fixes That Backfire and the other system archetypes enables managers to identify more effective solutions to a range of common business and organisational problems and prevent them. Combining the archetypes with other tools such as engaging diverse stakeholders, encouraging a viewpoint of personal responsibility, shared visioning and facilitating productive conversations also helps people manage complex change more effectively.<sup>3</sup>

## MEETING THE CHALLENGES OF COMPLEX CHANGE

Consider the example of RetailCo, a major retailer that needed to develop and implement a new strategy to be competitive. The company’s chairman brought in a new managing director (MD) with strong strategic credentials to change a culture that historically was driven by operations. In addition, there was extensive mistrust among the management team, in part because the MD’s

predecessors had managed team members one-on-one and discouraged collaboration. RetailCo was managed by a subset of senior executives, supported by some of their direct reports, who used their informal ties and power as department heads to get things done. The dominance of a few key executives led others to spend extensive time lobbying for support, suppressed potentially constructive conflict, made cross-functional work impossible and prompted the departure of many good people. Moreover, an intense focus on weekly operational results produced a fire-fighting mentality that displaced time spent on strategic initiatives.

The company had hired a well-known consulting firm to identify strategic options but the MD was concerned that his team would be unable to agree on the new strategy or implement it. He asked us to work along with the other firm and “breathe life” into the strategic planning process. He wanted us to align his team around a new vision and mission so that they could agree on a sound strategy and then to assist with implementation.

We have learned that aligning people around a shared vision and mission is not enough to make the alignment stick. People also need to have a shared picture of reality and to understand their contribution to the existing situation. Without this picture, people cannot agree on how to get where they want to go because they cannot agree on where they are. Furthermore, they resist acting differently because they do not feel responsible for their current circumstances. They tend to blame others or forces beyond their control and believe that others must change first.

Therefore, before the first retreat with the management team, we assessed how the organisation was functioning. The goal was to learn about existing opportunities and challenges and to sketch a picture of current reality that might integrate the perspectives of all members of the management team. We first used a tool called “Unwritten Rules of the Game” to identify the motivators, enablers and incentives that guided the current behaviour of the team and their direct reports.<sup>4</sup> We then developed a causal loop diagram that described how people currently worked and how those same behaviours would undermine their ability to implement any new direction and strategy.

We presented this assessment at the beginning of the retreat to ground the visionary and strategic development. We showed the relationship between how they worked now and the strategic approach RetailCo’s chairman and the new MD expected. We stated that developing a vision and strategy without also addressing how they currently worked would be a waste of time. Some team members—those who were not part of the inner network—readily understood this message. The few dominant executives held back, understandably reluctant to give up their power. It was important to affirm their contribution and we showed how their strengths in making informal deals and managing crises had kept the company going until now. However, we also pointed out that the same approach would not produce the step-level performance improvement that was expected and would block any strategic path they chose.

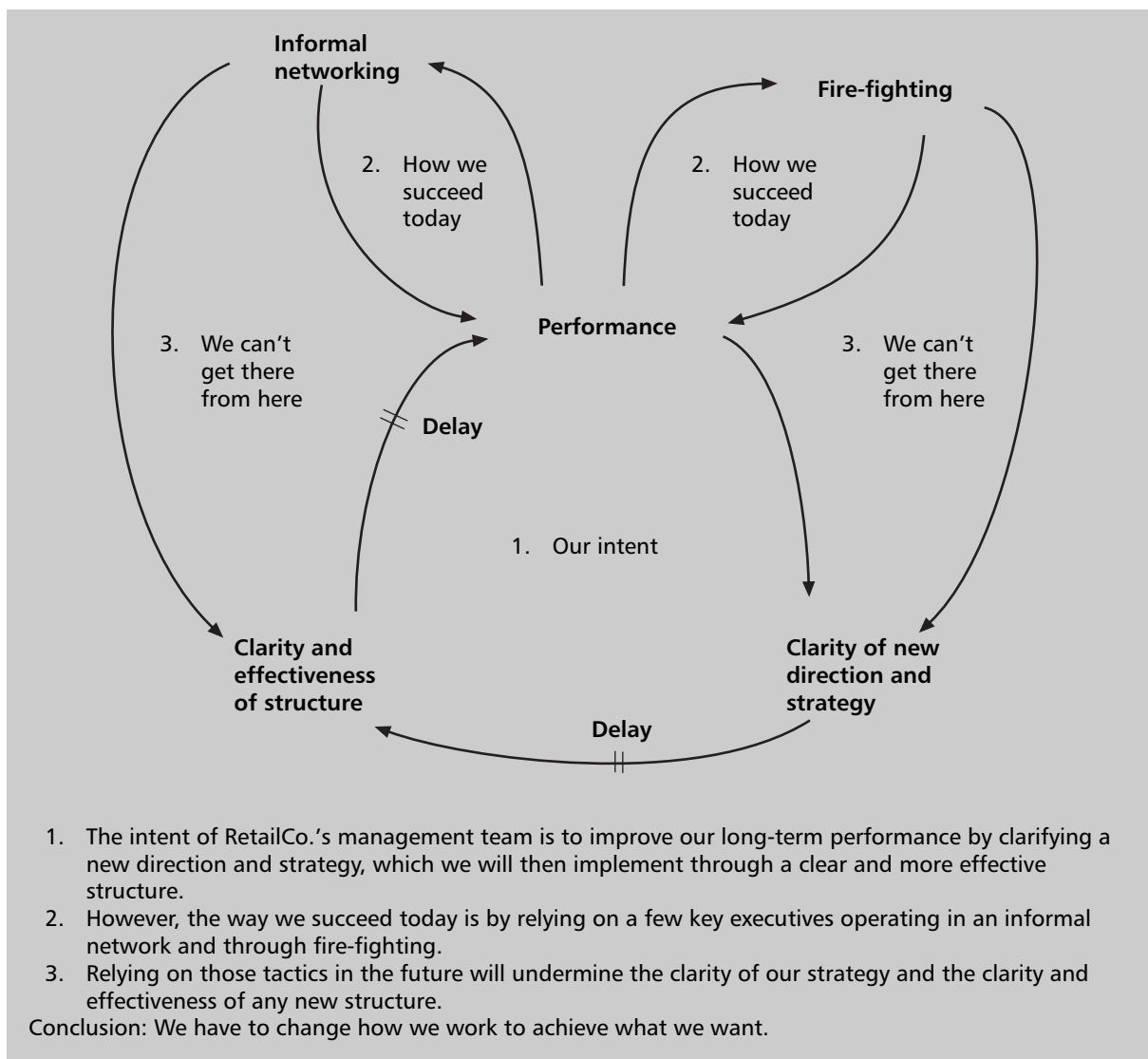
In fact, everyone acknowledged that the few strategic initiatives they had attempted in the past had failed and that they had little confidence of being successful in implementing new ones. Competition was growing. Members of the inner network were overwhelmed by their indispensability and the other management team members were frustrated at being under-utilised. The MD seemed to be more team-oriented and the potential for collaboration was at least worth considering. The team members began to accept that, if they were going to become



more competitive, they would have to make different choices, learn new skills and support others to do the same. A causal loop diagram became an anchor point for the team's move forward (Figure 2).

The strong initial emphasis on current reality, including subjects that had been undiscussible, signalled that whatever followed would be equally candid. We worked extensively during this first retreat to clarify a vision and mission for the company to which all management team members could commit. It took the team members three attempts to develop consensus on a mission statement, in part because they had never tried to make decisions by consensus before and in part because they had trouble identifying what they could genuinely commit to. Having

**Figure 2**  
An Anchor Point for Change



set a precedent of being authentic, we challenged them to speak from their hearts and come back to the mission until it had meaning for all. The mission statement that finally emerged was powerful: it focused on being at the heart of the communities where they operated and making every day special for their customers. It went well beyond a focus on financial performance, and this too was essential.

The combination of a meaningful shared vision and mission with a deep, shared understanding of current reality established the creative tension that propelled the team forward. Supported by the new managing director, the team agreed to a new way of working. In keeping with the idea of leverage, they worked intensively on three areas:

1. valuing and engaging each other fully to break the dependence on informal networking among a few members;
2. focusing on long-term direction as well as operations to shift the balance from fire-fighting to an increased focus on strategic initiatives; and
3. involving others in the organisation to reinforce the executives' commitments to cross-functional strategic work at lower levels.

These three foci led to several actions. In order to value and engage each other more fully, the team members learned to give each other feedback, mostly positive and only selectively negative, to begin to dissolve the mistrust between them. They established and monitored ground rules to shape their behaviour. Sparked by the bridges they were building and without facilitation advice or support, they took time during subsequent retreats to have personal conversations, sharing, for example, photographs and pieces of music that evoked particularly meaningful times in their lives. In so doing, they further broke down the status, class and cultural differences that had kept them apart. They moved from blaming each other to holding each other accountable and raised disagreements with each other in team meetings so that they could effectively resolve problems together.

In order to focus on long-term direction and operations, they established five strategic initiatives and committed cross-functional teams to achieving them. They had their direct reports and those below them focus significant time to flesh out and achieve the initiatives and supported them to work in teams within and across their respective functions. They also had regular reviews of the initiatives as a way to stop micromanaging. Finally, they involved all 30,000 employees in small group sessions to reflect on what the new company mission meant to each individual.

The change did not always proceed smoothly. An ambitious plan to bring the leaders and members of the five strategic initiative teams together regularly was shelved because of the time required. Furthermore, despite an agreement to focus on a few strategic initiatives, other initiatives were not dropped and new ones continued to be introduced as the year unfolded. Efforts to prioritise these additional projects failed. In the middle of the year, the market turned downward and the company had to focus more attention on delivering operational results. To the senior management team's credit, it insisted that the strategic work would continue simultaneously but this created additional stress.

Despite some good progress, people began to burn out by the end of the year. Some key staff left and there was serious doubt about how long every one could continue at the same pace. The senior management team requested an end-of-year audit to explore how they and their

direct reports had changed the way they were working. They particularly wanted to understand why people were so overworked and why new initiatives kept proliferating despite their own well-intended efforts to establish and maintain priorities.

Using systems thinking, we uncovered the root cause of these problems. Despite their complaints about workload and lack of time, people at all levels consistently chose to create new initiatives because this gave them visibility and importance. Finishing projects, by contrast, was less valued. People were faced with a choice: continue to experience high levels of stress or create alternate ways to feel challenged and respected. Understanding the negative consequences of their own actions more fully, they determined to satisfy their motivations differently. As a result, the company finally prioritised all existing initiatives and has begun to reward people for focusing on and meeting those commitments.

A year after the initial retreat, RetailCo had its best year. It had developed a new mission and strategy, made significant progress on five strategic initiatives and engaged all 30,000 employees in reflection on the meaning of the mission. One person remarked, “The mission has had a huge impact on people. You can rally around it and it has given us clear understanding.” The senior management team members continued to become closer to each other and more effective. Another person noted, “The executive team has shown enormous leadership in working more collaboratively.” The direct reports acknowledged the shifts they had to make in their own behaviour as a result. One observed, “There is more honesty, encouragement to challenge, more acceptance of challenge.” The result was significant improvement in the quality of cross-

**Table 1**  
Using Systems Thinking to Meet Four Challenges of Change

| The Challenge                                      | Typical Response   | Benefits of Systems Thinking   |
|--|--|--|
| <i>Motivation:</i> Why should we change?           | Appeal to aspiration or fear   | Show responsibility for current reality  |
| <i>Collaboration:</i> Why should we work together? | Tell people they should  | Demonstrate how their current way of interaction undermines both their individual and collective performance |
| <i>Focus:</i> What should we do?                   | Tackle many issues independently and simultaneously; attack symptoms | Use leverage to change the few things that change everything else  |
| <i>Learning:</i> Why bother?                       | Assume others are at fault and must learn                            | Recognise our actions matter, and we need to learn from the consequences of our actions                      |

functional teamwork. A fourth employee noted, “The ‘Way We Work’ team has tackled some big issues. I can see some deliverables: the mission, rules, organisation structure, new roles and responsibilities.” Furthermore, the company accomplished all this while still improving its operational performance. It outpaced competitors and achieved its highest revenues and profits ever in a depressed market. An audit at the end of the year and subsequent decisions to act on the findings prepared the company to achieve its goals more easily the following year.

In conclusion, we have found that systems thinking is a powerful way to stimulate a change process because it makes the consequences of people’s current choices very real. More specifically, systems thinking:

1. respects why people do not believe they need to change (they are usually able to achieve their goals in the short run);
2. demonstrates why change might be in their best interest (their behaviour is making their own lives more difficult over time, and it is undermining the effectiveness of others and the organisation as a whole);
3. explains how people’s thinking and behaviour interact with those of others to produce the dynamics they all experience (it does not make sense to blame each other because we are all in the same boat); and
4. suggests what each party can do differently to improve his or her own performance, that of others and of the entire organisation (we have alternatives).

This case further demonstrates how systems thinking helps organisations meet the four challenges of managing complex change over time. Table 1 summarises the challenges, typical responses and the particular benefits of using systems thinking to leverage change.

## WHAT YOU CAN DO TO PUT IT ALL TOGETHER

How can you take advantage of systems thinking in strengthening your own problem-solving and change-management skills? I have found seven steps to follow.

### **Look for Opportunities**

Consider applying systems thinking when you want to make sense of a messy or confusing situation, solve a chronic problem about which people have very different views, or increase the motivation, collaboration and focus required to manage effective change.

### **Align People Around the End Result**

Determine who appears to contribute to the current situation or is affected by it. Engage them in the process as soon as possible, get their viewpoints on what is happening and align them around a shared vision of the desired outcome.

### **Generate Data**

Data about the current situation is crucial because people often have strong assumptions about what is wrong, who else needs to change and how to fix it. Because of the inherent complexity of systems as well as people’s natural biases, these assumptions are usually incomplete and inaccurate. Careful data gathering helps everyone involved alter their assumptions. Consider

that each stakeholder correctly sees part of the system, and that no one stakeholder sees how the whole system functions.

### **Make Systemic Sense of the Data**

A systemic assessment legitimises and integrates multiple perspectives. A portfolio of techniques can make sense of complex, often contradictory data, ranging from certain basic questions and simple causal loops to more complex loop diagrams and computer models. Whatever technique or techniques you choose, verify the analysis by ensuring it validates people's good intentions and unexplained frustrations.

### **Building Understanding and Commitment**

Seeing a confusing and often contradictory reality reflected in a way that reveals its underlying coherence usually leads people to new, more productive conversations. They can recognise their responsibility for the problem and accept that others are also acting in well-intended but self-defeating ways. It is also effective to use such facilitation approaches as dialogue and skilful discussion to support people's increased openness and help them adopt different assumptions.<sup>5</sup> Finally, have people consider the benefits of the existing system, not just its costs, before they commit to redesigning it.

### **Identify Interventions**

Actual systems change occurs at multiple levels, beginning with people's initial intent to address a complex problem systemically and by clarifying the end result around which they are aligned. It continues when you engage people in contributing to, understanding and building commitment to the systemic analysis. The next step is to identify and sequence the few ways in which the current systems structure can be "rewired" or redesigned to create a new chain of cause-and-effect relationships.

### **Follow-through**

Follow-through involves engaging additional key stakeholders in the problem-solving process; building short-term momentum by implementing a few key changes in organisational policies, processes, procedures, and/or perceptions; and continuing to deepen people's understanding about the system as changes are made. Whenever possible, involve additional stakeholders by first helping them develop their own insights about why the system functions as it does, and encouraging them to clarify what they want to create.

## **SUMMARY AND CONCLUSIONS**

Systems thinking can catalyse new change efforts and increase the leverage of existing ones. It can be used to change how managers think about their business, improve organisation effectiveness, or both. Systems thinking strengthens people's abilities to make sense of complex data, identify more effective solutions to chronic problems and make decisions that prevent potential problems from occurring. Because organisations have a growing need to establish more effective connections both within and across their boundaries, developing capacity in systems thinking can ensure that the whole is greater than the sum of its parts.

## NOTES

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1. While there are many approaches to systems thinking, this article uses the one made popular by Peter Senge. See: P. Senge. *The Fifth Discipline* (New York: Doubleday, 1990). A causal loop diagram shows the cause-and-effect feedback relationships between two or more variables. Two examples of these diagrams are included later in this essay.
2. System archetypes explain non-obvious interdependencies between what Kurt Lewin described as the forces pushing for and against change. See: K. Lewin. "Frontiers in Group Dynamics, Part 1" in *Human Relations*, 1947a, 1, 5–41. While this section focuses on systems archetypes as a way of identifying ineffective solutions to common organisational problems, there are many other useful approaches. For example, Barry Oshry describes the pitfalls experienced by people at different organisational levels: top, middle and bottom. See: B. Oshry. *Seeing Systems* (San Francisco: Berrett-Koehler, 1996). Stafford Beer identifies how an overemphasis on operations at the expense of development and control at the expense of coordination reduce the viability of an entire system. See: S. Beer. *The Heart of the Enterprise* (New York: JohnWiley, 1995). Bill Isaacs, building on the work of David Kantor, has written about common "structural traps" that organisations fall into. See: W. Isaacs. *Dialogue and the Art of Thinking Together* (New York: Doubleday, 1999). Perhaps the most challenging trap is when the traps themselves are undiscussible, a problem addressed by Chris Argyris in his ground-breaking work on how to surface and resolve this bind. See: C. Argyris. *Overcoming Organizational Defenses* (Boston: Allyn & Bacon, 1990).
3. The art and tools of managing complex change, including the importance of clearly distinguishing the present and desired states of the system, were strongly influenced by the pioneering work of Richard Beckhard. See: R. Beckhard and R. Harris. *Organizational Transitions* (Reading, MA: Addison-Wesley, 1977).
4. This approach is described by Peter Scott-Morgan. See: P. Scott-Morgan. *The Unwritten Rules of the Game* (New York: McGraw-Hill, 1994).
5. For these and other productive conversation tools, see P. Senge et al. *The Fifth Discipline Fieldbook* (New York: Doubleday, 1994).