



International Association of Facilitators  
**The Art and Mastery of Facilitation – Worlds of Change**  
Toronto, Ontario, Canada  
April 27 – 30, 2000



World of Social Change

FACILITATION USING THE SYSTEMS THINKING TOOLS FROM *THE FIFTH*

*DISCIPLINE TOOLBOOK*

Jim Spee  
Assistant Professor  
Whitehead College  
University of Redlands  
1200 E. Colton Ave.  
Redlands, CA 92374 USA  
909-748-6265  
Fax 909-335-5125  
[spee@uor.edu](mailto:spee@uor.edu)

### **Abstract**

Participants will learn how to facilitate use of the Systems Thinking Tools from *The Fifth Discipline Toolbook* (Senge, Kleiner, Roberts, Ross and Smith, 1994) to help groups analyze themselves, teams, and organizations as systems that demonstrate identifiable patterns of behavior not just a linear sequence of events. To use the tools, groups must learn the building blocks of systems thinking by applying them to their own setting.

Participants will work on applying Senge's system archetypes to a recurring personal or organizational situation that they would like to resolve. The learning objectives of the session are as follows:



1. Participants will understand the system archetypes that are the building blocks of systems thinking in Senge's approach.
2. Participants will help each other discover how the archetypes can be used in facilitation practice.
3. Participants will discover new insights into a personal or an organizational issue using systems thinking.

### **Using the Systems Thinking Tools from *The Fifth Discipline Fieldbook***

The Systems Thinking section of the *Fifth Discipline Fieldbook* (Senge, et al 1994) describes a problem solving method that takes readers through a five step process. In this paper, Senge's work will be adapted to group process rather than assuming an individual analyst.

In the first step, Starting with Storytelling, the group describes events that are occurring. In the second step, Thinking in Links and Loops, the group looks for simple connections that could explain what could be driving events regardless of who the individuals in the system might be. In the third step, System Archetypes, the group looks for additional systemic explanations for the same problem based on some common patterns found in many systems. In the final step, the Archetype Family Tree, the group connects the other archetypes and searches for leverage points that will have the greatest effect on changing the system. Systems thinking tools are especially useful for facilitator working with groups that cannot get unfrozen from their current behavior patterns.

#### **Step 1: Starting with Storytelling (Senge, et al, 1994, p. 97)**

According to Senge, systems thinking requires us to see four simultaneously operating levels within a system. These levels include events, patterns, systems, and mental models. Events are directly observable actions and behaviors. Patterns emerge as actions and behaviors are

repeated over time. Systemic structures show the relationships between the patterns. Mental models are the deep seated beliefs and values that hold the systemic structures in place.

The purpose of exploring the group's story is to lay the groundwork for a systems understanding of their situation. It helps the group to discern a coherent story from the interrelationships of seemingly random events. (Senge, et al, 1994, p. 103).

The problem is...

Here are the instructions for the group to follow as the members begin to tell their story:

1. Begin by asking the group to choose a problem to describe.
2. Ask them to choose:
  - an issue that is important to them, something they genuinely care about and want to understand.
  - a chronic problem that continues to recur.
  - a limited problem that can be stated in one or two sentences.
  - a problem that has a known history within the organization.
  - a problem that has been tackled before with little or no success.
3. Ask them to make their description as accurate as possible, but don't let them jump to conclusions or suggest solutions yet.
4. Don't be judgmental by blaming anyone or any particular policy. (Senge, et al, 1994, p. 104).

The key to systems thinking is the understanding that systemic problems will cause the same outcome regardless of which particular individuals are in the system. (Senge, 1990). It may be helpful to use roles or job titles rather than names when telling the story to emphasize this aspect of systems.



### Tell the story

To begin understanding the problem at a deeper level, systems thinking requires the group to bring the story or stories that underlie the problem to the surface. Group members should not generate any solutions. Instead, they should begin to formulate hypotheses about what could explain why the system functions the way it does. The story will not be linear chronologically. Instead it will identify key themes and recurring patterns that describe a series of events. The key question to ask the group is this:

How did we; through our internal thinking, our processes, and our procedures; contribute to or create the circumstances, good and bad, that we face now? (Senge, et al, 1994, p. 105).

To answer the question ask the group to make the following lists:

1. Key stakeholders
2. Assumptions and hypotheses
3. Boundaries to problem

Ask the group, “How does each item on the lists contribute to keeping the pattern in place?”

Draw a picture that charts out the pattern of behavior along various axes.

### The Five Whys

The Five Whys is an alternative method to telling the story by hunting backward to root causes. It is usually conducted as a group exercise within a defined team, so it is ideal for a facilitated group session.

The first why is, "Why does this event (the problem) take place?"

In response to the answer, the facilitator asks, "Why didn't that happen?"

The group responds, "Because..." The facilitator asks again, "Why did that occur?" and so on until the group has run out of reasons. By examining multiple symptoms using the Five Whys, recurring themes will begin to emerge and common systemic sources of problems will become apparent.

**Step 2: The Language of Systems Thinking: "Links" and "Loops" (Goodman, Kemeny and Roberts, 1994, pp. 113-120)**

Once the group has told the story and discerned the underlying patterns, group members must begin describing the patterns in systemic terms. Two of the building blocks are links, how one event leads to another; and loops, how events recur over time. The third building block, delays, slow the response to an event and make the system appear to be static. To tell a story from a loop, Goodman, Kemeny and Roberts (1994) suggest the following steps:

- Choose the element of immediate concern.
- Describe whether that element is increasing or decreasing in magnitude.
- Describe the impact of this element on the next element.
- Continue the story back to the starting place.
- Add illustrations and anecdotes that liven up the story.
- If the linkages add up to a system where the starting element is growing or shrinking out of control, then they have identified a reinforcing loop. Draw a snowball rolling downhill in the middle of the loop.
- If the linkages add up to a system that meets resistance and finds an equilibrium, then they have identified a balancing loop. Draw a seesaw in the middle of the loop.





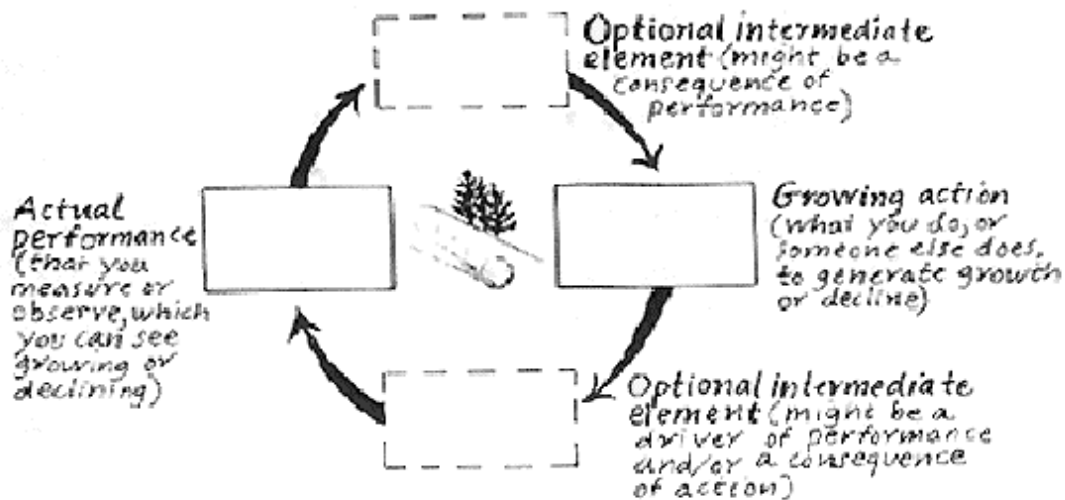
- Go on to the next element of the story until all of them have been described using links and loops.

### Reinforcing Loops

In a reinforcing loop, change occurs at an ever increasing rate. In reinforcing loops, small changes feed on themselves. Growth appears small and incremental at first but expands exponentially with no restraint. "How much more can the system produce?" people ask, and yet things continue to get worse (or better).

To draw a picture of the reinforcing loop, begin by asking group members to describe an observable event. Next ask them to look for an action that causes it to grow or decline. If necessary, have them look for intermediate elements that may drive or result from the observable event. Put the actions and events in boxes and connect them with arrows that describe how they are linked.

### **REINFORCING LOOP TEMPLATE (FOR PLOTTING YOUR OWN SITUATION):**



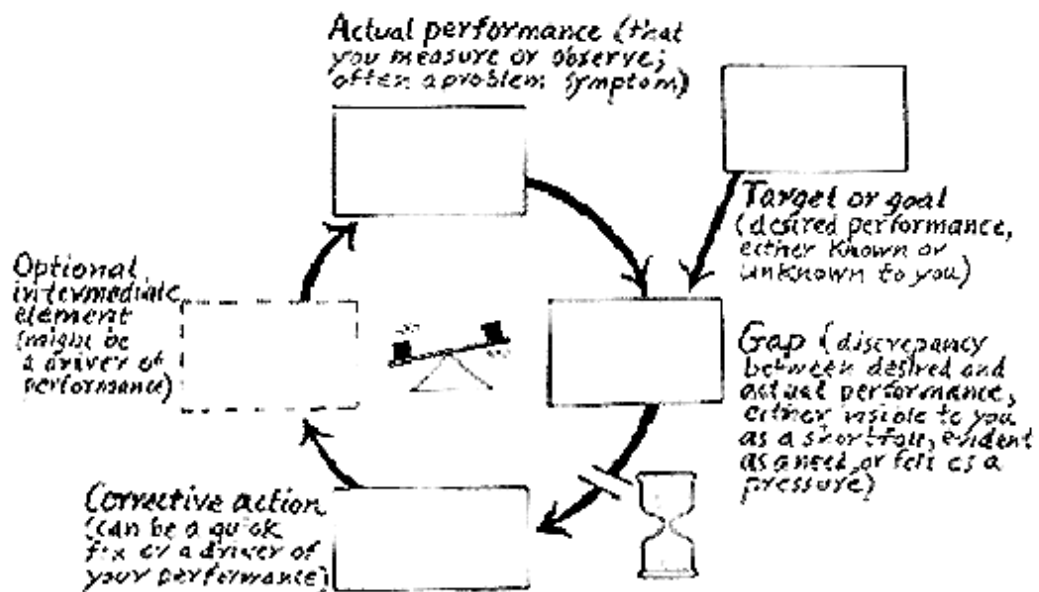
Senge, Kleiner, Roberts, Ross, and Smith (1994) p. 116

## Balancing Loops

In balancing loops, the system finds a "natural operating range" that keeps it self-correcting and self-regulating. Balancing processes bind themselves to a target, constraint, or goal that keeps the system from spiraling out of control. When the system identifies a gap between the desired state and the actual state, it exerts pressure to bring the system back into equilibrium.

To draw a picture of the balancing loop, first ask group members to describe the actual event in measurable terms. Next ask them to look for the constraint or target. Finally, have them identify the corrective action that keeps the event measure from growing or shrinking non-stop. Once again, put the actions and events in boxes and connect them with arrows that describe how they are linked.

### BALANCING LOOP TEMPLATE



Senge, Kleiner, Roberts, Ross, and Smith (1994) p. 120



## Delays

The third building block for describing systems is the delay that can occur in both reinforcing loops and balancing loops. Delays can make other affects have a greater impact because nothing seems to happen at first, then suddenly the reaction seems like overkill. Because links sometimes take a long time to show their effects, events that are closely related may seem to be isolated from each other. Describing delays in the system helps to show why strong oscillations can occur. Participants often overreact to events during a delay causing the situation to get worse instead of better.

To draw a delay in the group's reinforcing or balancing loops, break a linking arrow and insert two parallel lines perpendicular to the arrow. Add an hourglass to identify the delay. Next to the break, describe how long the delay lasts.



### **Step 3: System Archetypes**

The next step is to build a framework of interconnected balancing and reinforcing loops that describe the system in greater depth. The *Fifth Discipline* (Senge, 1990) and the *Fieldbook* (Senge, et al, 1994) describe five examples of archetypes: Fixes that backfire, Limits to growth, Shifting the burden, Tragedy of the commons, and Accidental Adversaries. Each archetype is made up of a combination of reinforcing loops, balancing loops, and delays. Before your group draws its system diagram, the members should be familiar with these commonly occurring system archetypes.

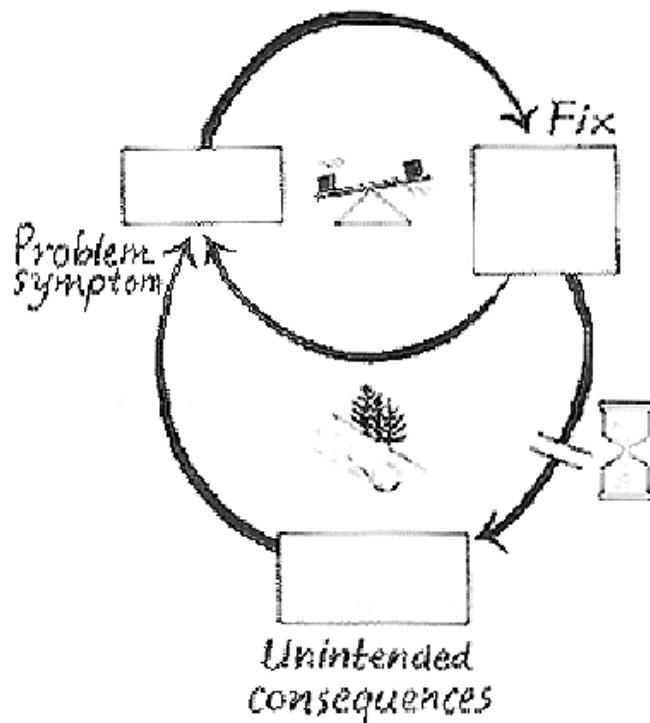
#### Fixes that backfire

This archetype is an expansion of the reinforcing loop archetype. In it, the system responds to a symptom with a "quick fix." The quick fix may cause a short term improvement in the symptom, but it also causes unintended consequences in the long term. After a delay, the

unintended consequences come back and make the symptom worse than it was before. This archetype summarizes the belief most of us have that it is better to take action immediately in response to an urgent situation, even though the long term effects of the decision are unknown. Some examples of fixes that backfire include downsizing and expediting customer orders. Downsizing improves profits in the short term but can lead to inefficiency in the long run because all of the experienced workers are gone. Expediting customer orders can disrupt production to help a single customer, resulting in delays for every other customer.

Organizations have several strategies available to deal with "Fixes that backfire." These include increasing awareness of unintended consequences, applying the fix less frequently, minimizing the undesirable consequences, or addressing the root cause of the problem instead of the symptom.

### "FIXES THAT BACKFIRE" TEMPLATE

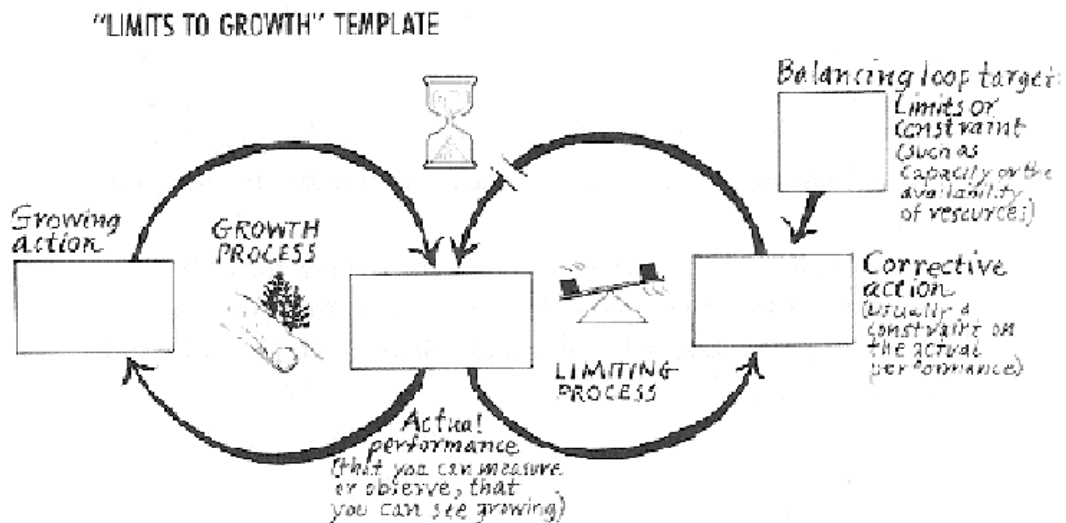


Senge, Kleiner, Roberts, Ross and Smith (1994) p. 126

Limits to growth

The limits to growth archetype connects a reinforcing growth loop with a limiting process from a balancing loop. As the growth process slows, they keep doing more of what worked before, but it stops working. The system runs up against a constraint that is built in from the start, such as limitations on resources or capacity. The harder they push, the harder the system seems to push back. Growth may plateau or it could collapse all together. Some examples include quality programs that quickly run out of steam, new product introductions, and reform efforts.

Strategies to cope with limits to growth include resisting the temptation to invest in more of what worked in the past, investing in removing constraints rather than boosting the drivers of growth, anticipating limits before they come into play, and looking for other sources for growth before the current cycle fades.



Senge, Kleiner, Roberts, Ross and Smith (1974) p. 130

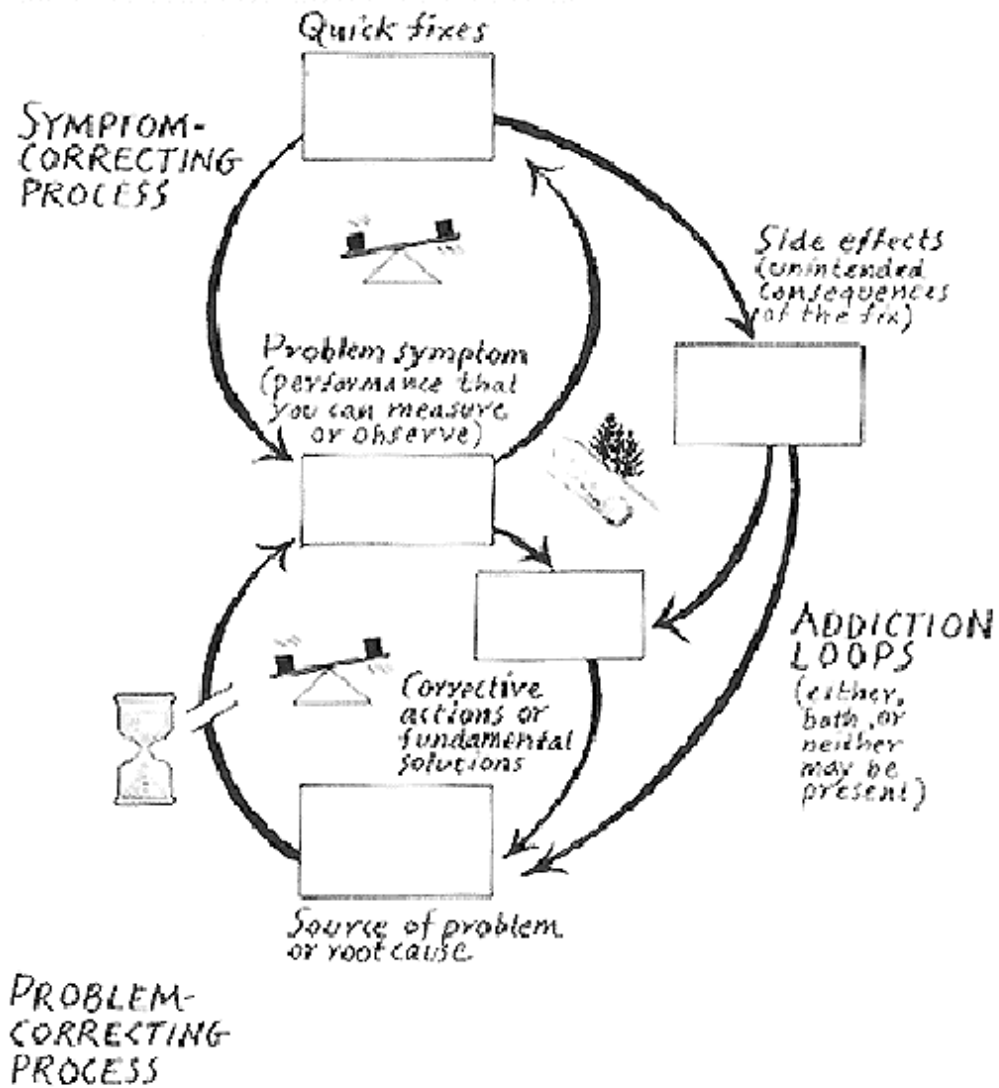
### Shifting the burden

The Shifting the Burden archetype begins with a problem symptom, something that can be observed or measured. As with fixes that backfire, someone in the system tries a quick fix to alleviate the symptom. This action diverts attention from the root cause of the problem and reinforces the idea that the quick fix is the only possible solution. The template is made up of two balancing loops. The loop in which the real solution affects the underlying cause and drives the observable problem is constrained by the unintended consequences of the quick fix. The loop in which the quick fix creates unintended consequences and changes the observable problem is constrained by the underlying problem that never gets addressed but continues to drive the original symptom. Eventually, the quick fix may create more problems than it solves. The capacity of the system to fix itself declines because of all the energy that goes into the quick fix.

Shifting the burden gives crisis managers control over the situation. They are rewarded for making things look better in the short term, but not for fixing the shortcomings in the system that may have caused the crisis in the first place.

Strategies to shift the burden back on the root cause include clarifying the symptom, identifying the quick fix, and looking for the unintended consequences. The next step is to look for alternative solutions to the quick fix, assuming that it is no longer an option. Rather than using the archetype to identify the one best answer, it is preferable to look for a variety of options and see which ones deal with the underlying cause of the problem. Quick fixes are like an addiction. To reduce the dependency on the short-term fix they must concentrate on the long term solution and the benefits of developing that capability.

**"SHIFTING THE BURDEN" TEMPLATE**



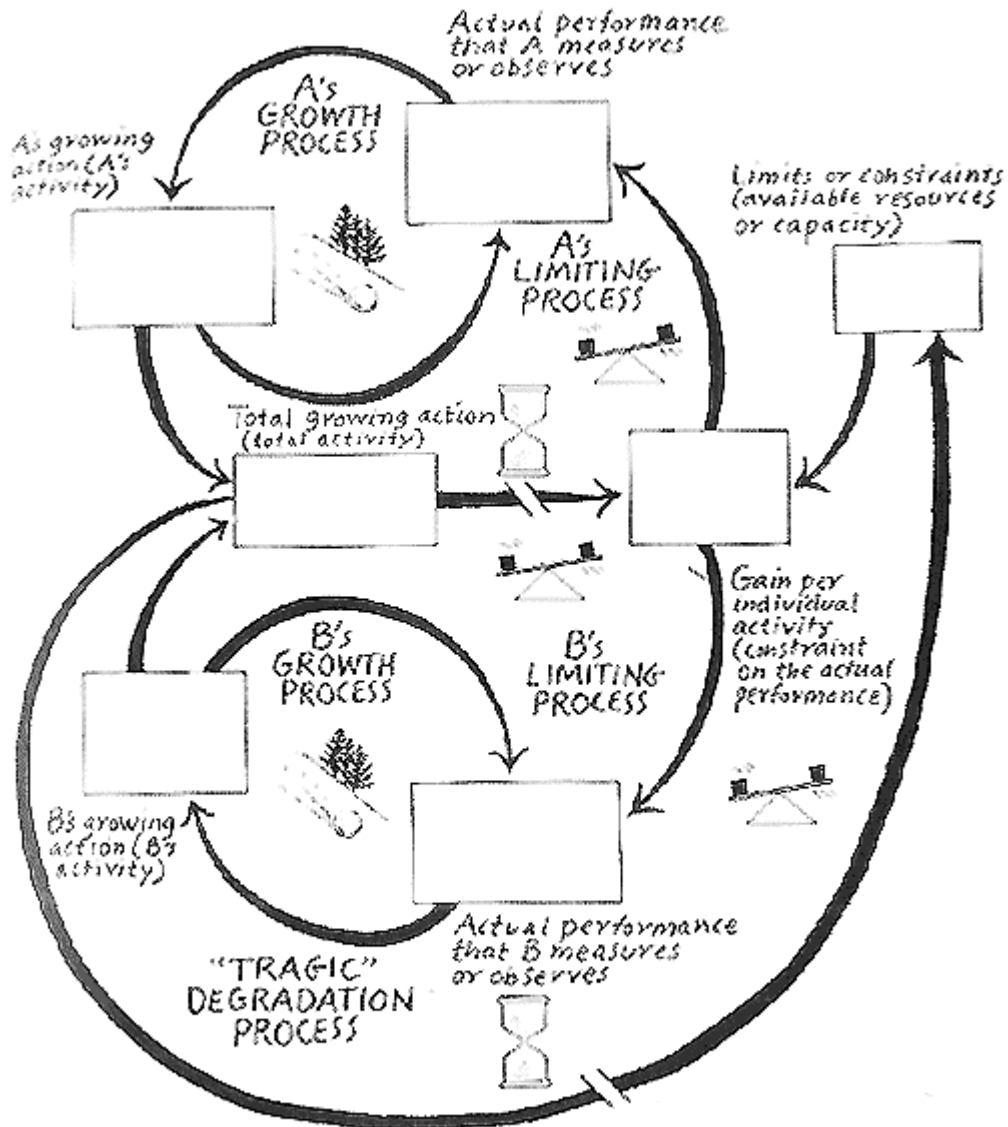
Senge, Kleiner, Roberts, Ross and Smith (1994) p. 136

### Tragedy of the commons

The tragedy of the commons results when too many people try to benefit from a common resource that no one person controls. It consists of two reinforcing loops that intersect in a balancing loop. To analyze their situation using this archetype, begin by looking at the actual performance of their unit that can be observed and measured. That outcome is driven by a growing process which creates a growing action that increases use of the shared resource. Other users of the resource are also observing a growth in their performance, driven by another growing action. The other user's growing action also creates growth in the factors that affect use of the shared resource. After some delay, their process and the other user's growth both become constrained by limits on the shared resource. Consequently, outcomes for both degrade. The archetype gets its name from the "Commons," a shared field that everyone in a village can use to graze their livestock. The tragedy of the commons occurs when no one has an incentive to reduce overgrazing and everyone appears to benefit by adding one more animal to the herd. Each additional animal over the capacity decreases the benefits for everyone, but no one has an incentive to reduce their use of the common resource.

To cope with the tragedy of the commons, individuals must become aware of the collective cost of their efforts. Sometimes the common resource must be closed off until it can recover. Sometimes the common resource can be replenished from outside sources. Authority outside the system must regulate individual behavior because the system drives them to keep using up the shared resource. "One car driver can't fix gridlock by staying off the freeway. (Senge, et al, p. 144).

**“TRAGEDY OF THE COMMONS” TEMPLATE**



Senge, Kleiner, Roberts, Ross and Smith (1994) p. 143

### Accidental Adversaries

The Accidental Adversaries archetype explains how people who want to be in partnership with each other end up bitterly opposed. It begins with two interdependent individuals or groups, whom we'll call Actor A and Actor B.

Actor A takes actions that benefit B. This leads to B's success. B takes actions to improve on that success. These actions unintentionally obstruct A's success even though they help B improve.

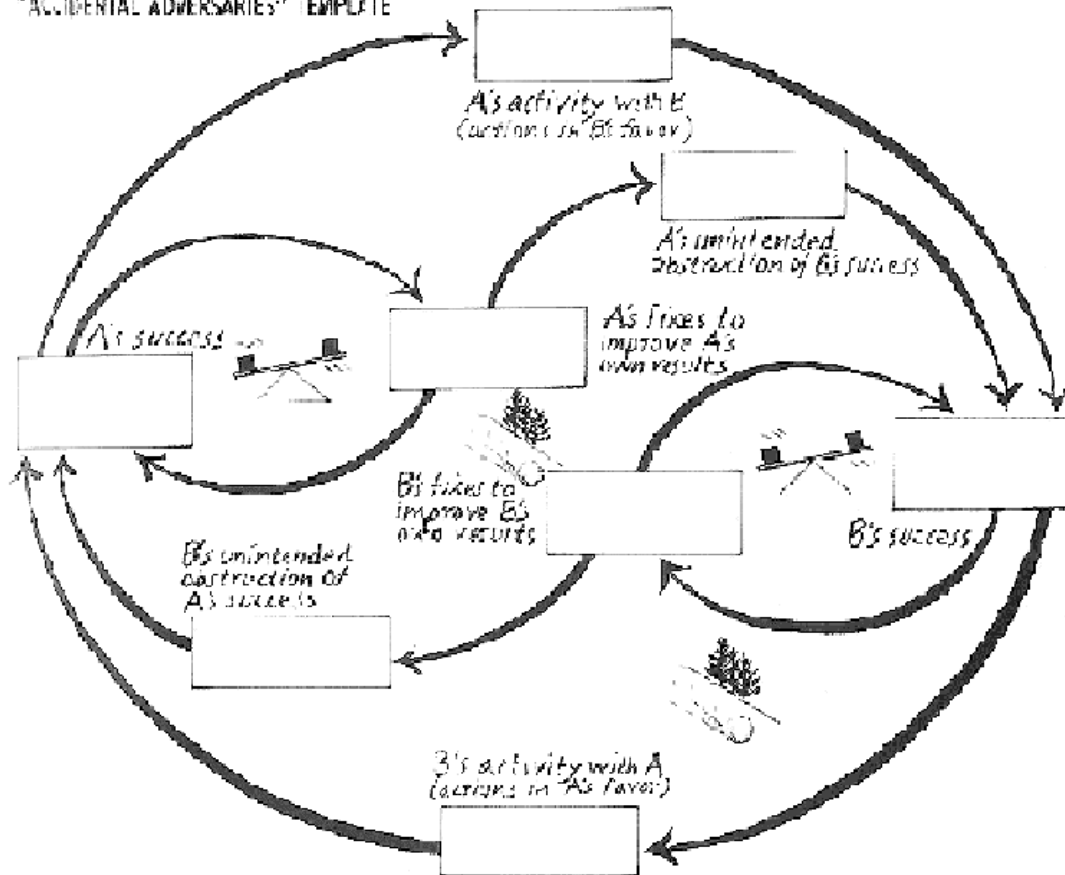
At the same time, Actor B takes actions that benefit A. This leads to A's success so, like B, A takes actions to improve its results. The fixes unintentionally obstruct B's success.

A's fixes and B's fixes are locked in a reinforcing loop. The more they try to improve their own situation, the more they hinder the others. Both B and A are hindered from improving by the other's attempts to improve internally. By this time, both A and B have forgotten that their original collaboration was mutually beneficial. Communications grinds to a halt as both sides blame the other for interfering with their success.

To cope with the "Accidental Adversaries" archetype, Senge, et al, (1994) recommend investigating how their fix or solution undermines the other partner's fundamental needs. Leverage may come from strengthening the actions that support the other partner and inducing them to do the same for them, rather than increasing actions that help them at their expense.



"ACCIDENTAL ADVERSARIES" TEMPLATE



Senge, Kleiner, Roberts, Ross and Smith (1994) p. 147

#### **Step 4: The Archetype Family Tree connects the other archetypes**

The next step in the analysis is to create a family tree that links the groups' archetypes together looking at both reinforcing branches and balancing branches of the tree. The archetypes derived by the group may be quite different from the examples listed above.

One approach is to widen and deepen the loops in the previous archetypes. Senge et al recommend asking:

☛ What else is affecting this element? Trace these elements into new loops.

☛ What are the interrelationships between the elements that we did not notice before?

Add these elements and links.

☛ Are the added links part of balancing loops or reinforcing loops?

☛ Are the loops relevant and important to the story?

☛ What theme is emerging?

☛ What are the implications of this structure?

☛ Have we moved to a new archetype?

☛ How do we redesign this to meet our purposes?

☛ Where do we have leverage?

#### **Systems Sleuth: Looking for Solutions with the most leverage**

To find where the system has the most leverage, Senge, et al, (1994) recommend that they describes the situation using archetypes they have designed and then follow these steps:

What is the goal of the system?

What is the system capable of?

Where is the system going?

What should be changed?



Once they have a proposed solution, test it with the following questions: (p. 161)

1. What crutches and dependencies exist in this situation?
2. To achieve the fundamental solution, who would have to be the fundamental actor?
3. Would any reorganization of human relationships be required for this fundamental solution?
4. Could anything be done to make the necessary shift of orientation easier for the people involved?
5. Is there a delay which makes it difficult to see the value of their fundamental solution, or a lack of delay that makes the "quick fix" appealing?
6. As they look at the system, what is it capable of? At its best would be the most desired outcome which their system could achieve?
7. To achieve the most desired goal, what parts of the system would have to be changed further?

### **Applications for Facilitators**

For facilitators, the benefits of the systems approach are many. First, it helps groups work at a fundamental level that goes beyond personalities and political conflicts. It helps them to see how systems drive behavior regardless of which individuals are in the system at any given time. It helps the facilitator work with the group to uncover leverage points that will achieve the most positive change with the least expenditure of energy. The Fifth Discipline Fieldbook is an excellent resource for building an organization's capabilities for learning about itself and solving difficulty problems.

## References

Goodman, M.; J. Kemeny; and C. Roberts (1994) The language of systems thinking: "Links" and "loops." In Senge, et al, (1994) *The Fifth Discipline Fieldbook*.

Senge, P (Editor), C. Roberts, R. Ross, B. Smith, and A. Kleiner (1994) *The Fifth Discipline Fieldbook : Strategies and Tools for Building a Learning Organization*. New York: Currency/Doubleday.

Senge, P. (1990) *The Fifth Discipline The Art and Practice of the Learning Organization*. New York: Currency/Doubleday.

Senge, P. (1992) *Systems Thinking: A language for learning and acting*. Framingham, Mass.: Innovation Associates.

## The Presenter

Jim Spee has been a student of group facilitation since 1986. He has facilitated strategic planning, action planning, focused discussions, and ground rules development for nonprofit agencies, schools, colleges, and small businesses.

Jim has been a member of IAF since 1996. He has attended IAF conferences in Dallas, Tulsa, Santa Clara, and Williamsburg. In Santa Clara, he facilitated a workshop titled "Using ToP in the Classroom" with about 15 participants. In Williamsburg, he facilitated two workshops, one on Technology of Participation™ and an shorter version of this workshop on systems thinking. Jim holds MBA and PhD degrees in Management from Claremont Graduate University. He is assistant professor of management and business at University of Redlands and teaches working adults throughout Southern California. He was the editor of the IAF conference proceedings in 1998, 1999 and 2000. He is an associate editor of the IAF journal Group



Facilitation. He is also a member of the Western Academy of Management and the Vice President of the Western Casewriters Association.