Applying Systems Archetypes

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So, you've chosen a problem you want to study using systems thinking tools. You gather together some coworkers, round up some flip-chart paper and markers, and sit down to work. But, after an hour of trying to match the problem to a particular archetype and drawing diagrams that quickly look like spaghetti, you give up in despair. It all seems so simple when you read about it; why is it so difficult to actually do*?*

Applying archetypes such as "Shifting the Burden," "Fixes That Fail," and "Limits to Growth" to a problem can be a confusing and difficult process. It is easy to spend a lot of time trying to figure out which archetype best matches your particular situation, or trying to get your arrows to go in the right direction. But before you let yourself get caught up in the notion that there is one "right" way to use the archetypes, let's explore several possibilities. Archetypes can be used in at least four ways:

1. *as "lenses";*
2. *as structural pattern templates;*
3. *as dynamic scripts (or theories);*
4. *as tools for predicting behavior.*

The primary value of any of these approaches is that each provides a different method for initiating discussion and gaining insight into a problem or issue. One method, or a combination of several of them, may best fit your team's particular situation—or your own preferred learning style. For example, a team may choose to focus on the theories behind the archetypes to enrich its understanding of the dynamics within its organization. Or an individual who thinks in terms of patterns might be drawn to using the archetypes as pattern templates to grasp the structure underlying a particular problem.

In this volume, we examine these four ways of applying the systems archetypes, and then introduce guidelines for taking effective action in problem solving.

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IMS002E

Systems Archetypes as "Lenses"

When using systems thinking tools to address an organizational issue, it is often helpful to employ the archetypes at first simply to initiate a general inquiry into the nature of the problem. Using an archetype in this way can be similar to putting on a pair of special eyeglasses. If we look at a situation through the lens of the "Shifting the Burden" story line, we will ask different questions and focus on different things than if we use the "Tragedy of the Commons" archetype. It is not a question of which one is "right" but, rather, what unique insights each archetype offers. "Trying on" different stories leads us to ask provocative questions and can ultimately reward us with productive conversations.

To use the archetypes as lenses, we need a basic understanding of the main lessons, key elements, and outcomes or high-leverage actions that are embodied in each archetype (see Appendix A, "Systems Archetypes at a Glance" on p. 12). This level of understanding allows us to analyze a situation, identify potential story lines at work, explore their implications, and gain some initial understanding of the problem under study.

The Copy Center Dilemma: "Tragedy of the Commons" and "Shifting the Burden"

For example, consider the problem of A-B-C, a large company in which multiple departments must rely on one photocopy center for their copying needs. In an effort to meet all the departments' needs fairly, the manager of the photocopy center completes the photocopy jobs in the order in which they arrive at the center—in short, on a first-come, first-served basis.

However, during a recent growth spurt at the company, employees from numerous departments had begun inundating the copy center with photocopy jobs. As the copy center's work load ballooned, employees began complaining about the length of time it took the center to complete their copying jobs. To ensure that every department's needs were met, the division established a system whereby employees can ask the administrative head of the division to assign rush-job status to their copy projects. Projects given this priority status thus get handled before other copy jobs that may have arrived first at the copy center.

"Trying on" different stories leads us to ask provocative questions and can ultimately reward us with productive conversations.

The scenario has all the classic features of a "Tragedy of the Commons" archetype. A large number of players (the individual departments) are competing for a single resource, or "commons" (the copy center's capacity). The incentive is for each department to have their photocopy jobs prioritized. However, the combined total of their efforts will eventually hurt the other departments, as the copy center is forced to handle more and more rush jobs. The irony of the situation is that despite the inevitability of this outcome, it is in no department's interest to stop having their copy jobs prioritized; in fact, the longer it takes to get priority jobs completed, the more each department will request priority status for their jobs. Yet because the leverage in a "Tragedy of the Commons" structure lies in having a single governing authority manage the commons, the rush-job system can be seen as an appropriate role for the division's administrative head.

If we look at the same situation through the lens of a different archetype, however, we can see other potentially relevant issues. For example, we know that the story line of the "Shifting the Burden" archetype says that a problem symptom cries out to be fixed. In "Shifting the Burden" situations, we tend to implement a solution that alleviates the symptom in the short run rather than to invest in a more lasting solution. Resorting to a quick fix reduces the pressure to examine the deeper structures that may lurk at the root of the problem.

Looking at the copy center situation from the perspective of this archetype, we might be prompted to wonder whether the rush-job solution will send the signal that the division's administrative head will "bail out" the departments whenever the copy center gets overloaded. The departments, having come to depend on these bailouts, may fail to make an effort to manage their own work flow better. And the division overall will neglect to think of other options for solving the problem, such as augmenting copy services at times. Over time, the fix may become so entrenched that it turns into a permanent "Band-Aid solution" that will shift the wrong kind of responsibility to the division. For one thing, the division's administrative head will be spending more and more

time approving rush jobs instead of doing his or her own work. In this case, the "Shifting the Burden" archetype reveals how the short-term solution shifts the burden of responsibility and overextension from the individual departments to the division.

Productive Conversations and Deeper Inquiry

Looking at the world through the lenses of archetypes is an effective approach because it reminds us that there are multiple ways of perceiving any issue—and all of these ways can contribute insight into the problem at hand. Using the archetypes as "lenses" also puts our *primary* focus on systemic structures and not on individuals. This is particularly important at the initial stage of problem diagnosis, because it lets us engage people in the diagnosis process without triggering defensiveness.

If you decide to take the approach of using the archetypes as "lenses," try answering the questions listed in the accompanying sidebar to gain insight into your problem and to see which lenses may be relevant (see "Trying on Different Eyeglasses").

TRYING ON DIFFERENT EYEGLASSES

Questions to Ask When Putting on Each of the Archetype "Lenses"

Drifting Goals

- Are there goals or standards that are eroding over time?
- Are people focused on achieving the goal or on reducing the discomfort of not achieving the goal?

Escalation

- Are there two or more players of equal power whose individual actions can be perceived as a threat by the others?
- Does each player have the capacity to retaliate with similar actions?

Fixes That Fail

- Have actions been taken to respond quickly to a crisis without much consideration of long-term consequences?
- Have similar actions been taken in the past in response to similar crises?

Growth and Underinvestment

- Do investments tend to be made as a reaction to growth rather than in anticipation of growth?
- Do problems created by growth, rather than long-range planning, act as the organizational signal to invest?

Limits to Success

- Are once-successful programs experiencing diminishing returns?
- Are there limits in the system that are constraining the growth?

Shifting the Burden

- Are actions that were taken to alleviate problem symptoms shifting attention away from more fundamental solutions?
- Are there additional consequences that systematically erode the underlying capability of the organization?

Success to the Successful

- Are there two or more equal options whose investment decisions are linked in a zero-sum game?
- Does the success of either option depend on initial conditions?

Tragedy of the Commons

- Is there a large number of equal players who have free or equal access to a common and limited resource?
- Is the system set up to be self-regulated, with no overarching governing body?

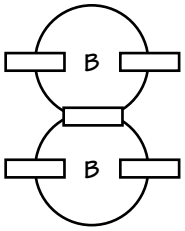
Systems Archetypes as Structural Pattern Templates

When talking about complex organizational issues, it is easy for a team to stray from the main topic into sideline issues that are not very relevant to the issue at hand. Without the clarity of focus provided by a common picture, much can be shared while little is actually accomplished.

Using systems archetypes as structural pattern templates can help focus a group's attention on the heart of an issue. The pattern templates are especially useful *after* a group has taken a stab at drawing a causal loop diagram of its issue. The group can then stand back, look at its diagram, and see whether it resembles one of the pattern templates in its main dynamics.

By providing a visual representation of a pattern of linked causes and effects, these powerful structures allow us to see beyond individual events in our organizations to the larger forces at work. We begin to see the world in terms of inter-

ARCHETYPES AS STRUCTURAL PATTERNS

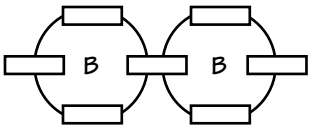


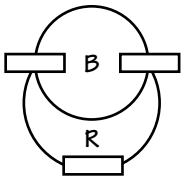
Drifting Goals

Two balancing loops strive to close the gap between a goal and current reality.

Escalation

Two or more players manage their own balancing loop in response to the threatening actions of others.



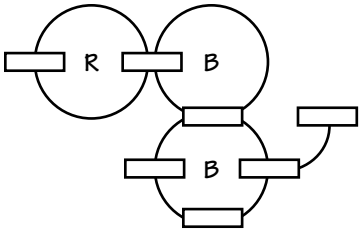


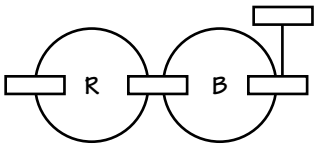
Fixes That Fail

Efforts to bring something into balance create consequences that reinforce the need to take more action.

Growth and Underinvestment

A reinforcing loop creates pressure in the system that is relieved by one or more balancing loops that slow growth.



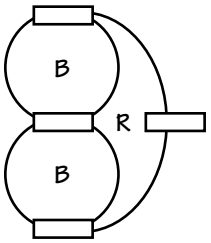


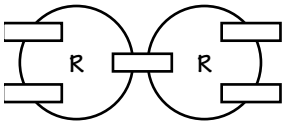
Limits to Success

A "Limits to Success" structure has a specific system constraint—namely, an investment-policy balancing loop.

Shifting the Burden

Two balancing loops compete for control in "solving" a problem symptom, while a reinforcing side-effect of one solution makes the problem worse.



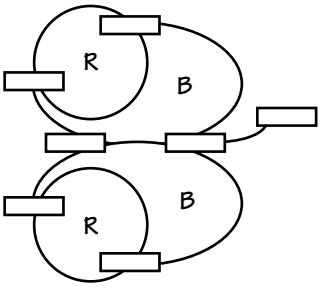


Success to the Successful

Two reinforcing loops compete for a common, limited resource.

Tragedy of the Commons

The sum total of two or more reinforcing activities strains a limited resource and creates balancing consequences for all.



related factors—and loops, not the diagrams' component variables, become the smallest unit of our analysis. We are no longer satisfied with a linear process that emphasizes isolated factors as causal agents. Instead, we want to know how those factors relate to other components of the system of which they are a part. In this sense, structural pattern templates let us see a situation in large "chunks."

single variable
↓
single loop
↓
patterns of loops

The "Archetypes as Structural Patterns" chart shows the loop structures of each of the archetypes. Highlighting the basic reinforcing and/or balancing loop patterns of the archetypes provides a starting point for identifying those dynamics in our own organizations. This chart can help us see broader structural patterns at work, rather than viewing each event as a unique, individual occurrence.

Lengthening Delivery Times: "Drifting Goals" in Action

To see how this works, imagine that you are the CEO of the small but rapidly growing company ImageTech, a software developer. Customer complaints about lengthening product delivery times seem to be on the rise. You have been able to keep the problem in check by expediting orders when customers complain, but when you revisit the issue at the end of the year, you realize that the average delivery time has risen to an all-time high of six weeks.

To try to address the problem, you first identify the forces leading to the delay (A causes B causes C, etc.). You

might, for example, decide that the current warehouse manager is not coordinating the shipping process smoothly enough and that you need to hire a new person who can better manage balancing capacity with the fluctuating demand. You possibly would even be tempted to stop here, satisfied that you had thought deeply enough about the matter.

The archetype templates, however, could move your thinking beyond this linear process, and reveal the fuller, systemic story behind the dynamics. You might, for example, sketch a causal loop diagram of the problem and then scan the templates and decide that you are dealing with a "Shifting the Burden" situation, because you have multiple balancing loops and a problem symptom in your diagram. However, you may also notice that "Drifting Goals" has a similar pattern template. So, after more discussion and experimentation with different versions of your diagram, you could decide that in fact "Drifting Goals" best embodies ImageTech's situation (see "Drifting Delivery Time Standard"). One fact that might convince you of this is that the balancing feedback in your diagram is closing the gap between your goal (quick turnaround of orders) and your current reality (a six-week delivery delay) by reducing the delivery standard itself. Mapping your story onto the template forces you not only to see the balancing loop that has been working to reduce the gap, but also other corrective actions you could take—such as investing in more capacity—to meet your goal.

Seeing Similar Structures Across Diverse Situations

Mapping out the loop structures of any archetype in this way helps us identify the structures behind the behavior patterns that we observe. We can then use the pattern template to see similarities across seemingly diverse situations. For example, in addition to ImageTech's problems with lengthening delivery times, the company also has an increasingly aging chain of receivables. Although each of these two issues is very different, and the cause of the aging receivables may or may not be related to the increasing delivery delays, each demonstrates a pattern of eroding goals and can be addressed using similar corrective actions. Developing an ability to transfer lessons from one situation to another enables us to accelerate learning across the organization.

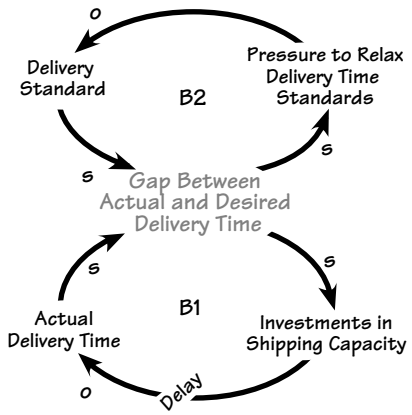
It is important to note that the point of this approach is not to "fit" your diagram to an archetype, but to use the actual structural patterns of the archetypes to gain a deeper understanding of your situation. Once we look beyond individual events and begin to see the underlying structural *patterns* that are producing them, we can make fundamental improvements in our organizational systems. This ability to leverage learning across a wide range of situations is one of the most powerful benefits of the systems thinking approach.

Systems Archetypes as Dynamic Theories

Quality pioneer Dr. Edwards Deming once said, "No theory, no learning." In order to make sense of our experience of the world, we must be able to relate that experience to some coherent explanatory story. Without a working theory, we have no means to integrate our differing experiences into a common picture. For example, most people are familiar with the Sufi tale of the four blind men, each of whom is attempting (unsuccessfully) to describe an elephant based on the part of the animal he is touching. Trying to understand what is going on in an organization often seems like a corporate version of that story. Most organizations are so large that people see only a small piece of the whole; thus they get a skewed picture of the larger enterprise. In order to learn as an organization, we must create a theory about what we don't know, based on what we currently *do* know.

Each systems archetype embodies a particular theory about dynamic behavior that can serve as a starting point for selecting and formulating raw data into a coherent set of interrelationships. Once those relationships are made explicit, the "theory" of the archetype can then further guide us in testing the causal relationships through direct

DRIFTING DELIVERY TIME STANDARD



The "Drifting Goals" structure suggests that, in ImageTech's situation, balancing feedback (B2) is acting to close the gap between the goal (quick turnaround of orders) and the current reality (a six-week delivery delay) by reducing the delivery standard itself.

observation, data analysis, or group deliberation.

Each systems archetype also offers prescriptions for effective action. When we recognize a specific archetype at work, we can use the theory of that archetype to begin exploring that particular system or problem and work toward an intervention.

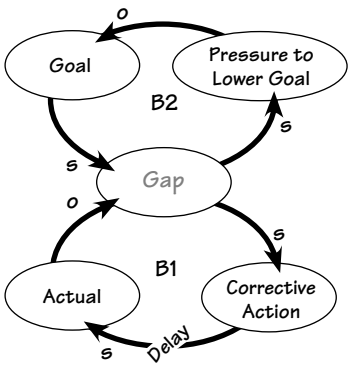
For example, if we are looking at a potential "Fixes That Fail" situation, the theory of that archetype suggests that a "quick-fix" solution can have unintended consequences that ultimately exacerbate the original problem. On the other hand, the "Growth and Underinvestment" theory warns against the possibility of a company's failing to overcome limits to its growth by neglecting to make capacity investments as that growth approaches those limits (see "Archetypes as Dynamic Theories").

Systems archetypes thus provide a starting theory from which we can develop further insights into the nature of a particular system. However, the diagram that results from working with an archetype should not be viewed as the "truth," but rather as a useful working model of what we know at any point in time. To illustrate, let's look at how the "Success to the Successful" archetype can help us create a working theory of an issue of technology transfer.

"Success to the Successful": An Example of Technology Transfer

An information systems (IS) group inside a large organization was having problems introducing a new email system to enhance company communications. Although the new system was much more efficient and reliable than the ones in use, very few people in the

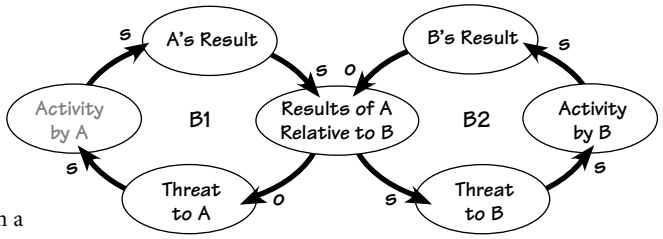
ARCHETYPES AS DYNAMIC THEORIES



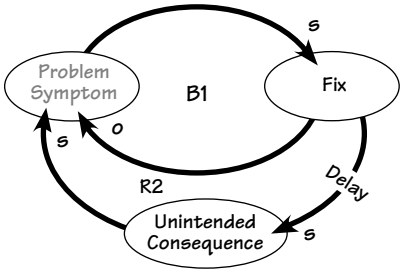
DRIFTING GOALS

The "Drifting Goals" archetype states that a gap between a goal and an actual condition can be resolved in two ways: by taking corrective action to achieve the goal, or by lowering the goal. It hypothesizes that when there is a gap between the goal and the actual condition, the goal is lowered to close the gap. Over time, the continual lowering of the goal will lead to gradually deteriorating performance.

ESCALATION



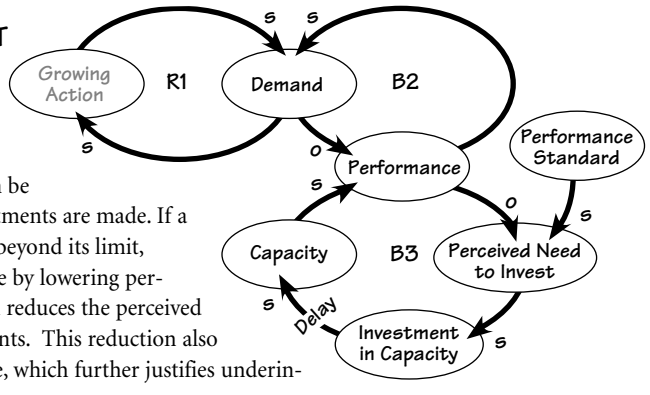
The "Escalation" archetype occurs when one party's actions are perceived by another party to be a threat, and the second party responds in a similar manner, further increasing the threat. The archetype hypothesizes that the two balancing loops will create a reinforcing figure-8 effect, resulting in threatening actions by both parties that grow exponentially over time.



FIXES THAT FAIL

The "Fixes That Fail" archetype states that a "quick-fix" solution can have unintended consequences that exacerbate the problem. It hypothesizes that the problem symptom will diminish for a short while and then return to its previous level, or become even worse over time.

GROWTH AND UNDERINVESTMENT



The "Growth and Underinvestment" archetype applies when growth approaches a limit that can be overcome if capacity investments are made. If a system becomes stretched beyond its limit, however, it will compensate by lowering performance standards, which reduces the perceived need for capacity investments. This reduction also leads to lower performance, which further justifies underinvestment over time.

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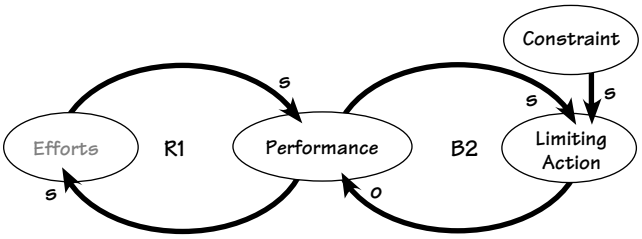
ARCHETYPES AS DYNAMIC THEORIES

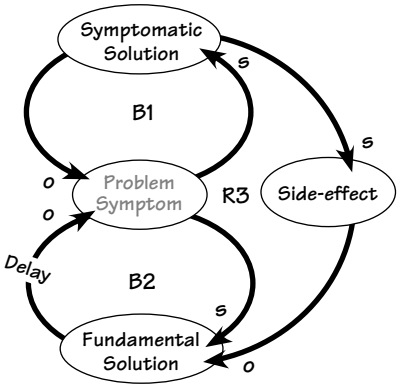


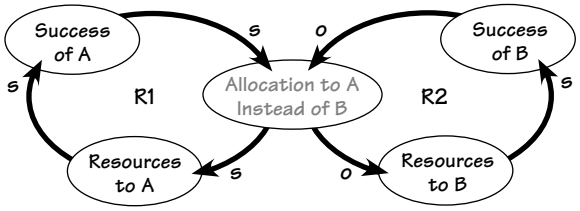
LIMITS TO SUCCESS

The "Limits to Success" archetype states that a reinforcing process of accelerating growth (or expansion) will encounter a balancing process as the limit of that system is approached. The archetype hypothesizes that continuing efforts will produce diminishing returns as one approaches the limit.

SHIFTING THE BURDEN

The "Shifting the Burden" archetype states that a problem symptom can be resolved either by using a symptomatic solution or applying a fundamental solution. The archetype hypothesizes that once a symptomatic solution is used, it alleviates the problem symptom and reduces pressure to implement a more fundamental solution. The symptomatic solution also produces a side-effect that systematically undermines the ability to develop a fundamental solution or capability.



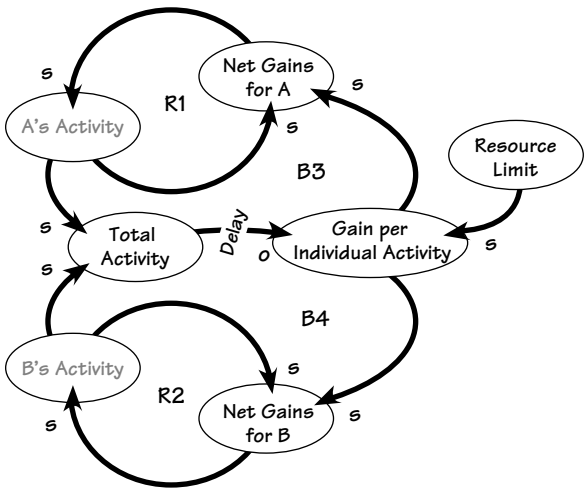


SUCCESS TO THE SUCCESSFUL

The "Success to the Successful" archetype states that if one person or group (A) is given more resources than another equally capable group (B), A has a higher likelihood of succeeding. The archetype hypothesizes that A's initial success justifies devoting more resources to A, further widening the performance gap between the two groups over time.

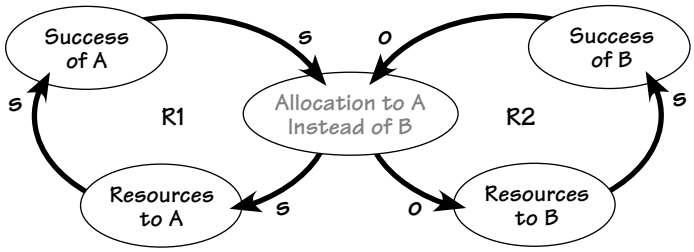
TRAGEDY OF THE COMMONS

The "Tragedy of the Commons" archetype identifies the causal connections between individual actions and the collective results (in a closed system). It hypothesizes that if the total usage of a common resource becomes too great for the system to support, the commons will become overloaded or depleted, and everyone will experience diminishing benefits.

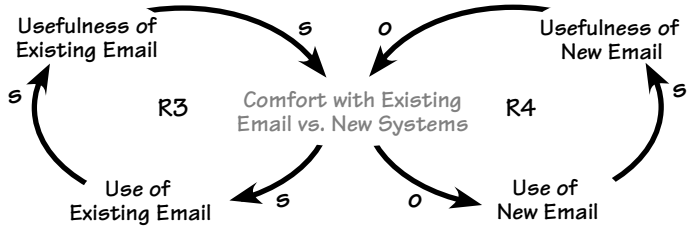


SUCCESS TO THE SUCCESSFUL EMAIL

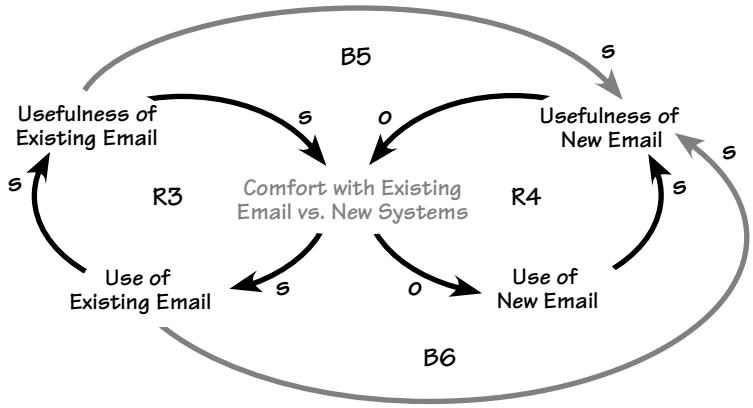
"SUCCESS TO THE SUCCESSFUL" TEMPLATE



CORE DYNAMIC THEORY



EXTENDED DYNAMIC THEORY



Starting with the "Success to the Successful" story line (top), the IS team created a core dynamic theory linking the success of the old email systems with the success of the new system (middle). They then identified structural interventions they could make to use the success of the old system to fuel the acceptance of the new one (loops B5 and B6, bottom).

company were willing to switch from their existing email systems. The situation sounded like a "Success to the Successful" structure, so the group chose that archetype as their starting point for exploring the problem.

The theory of this archetype (see "Success to the Successful Email") is that if one person, group, or idea ("A") is given more attention, time, resources, or practice than an alternative ("B"), A will have a higher likelihood of succeeding than B (assuming that the two are more or less equal). The reason is that the initial success of A justifies devoting more of whatever is needed to keep A successful, usually at the expense of B (loop R1). As B gets fewer resources, B's success continues to diminish, which further justifies allocating more resources to A (loop R2). The predicted outcome of this structure is that A will succeed and B will likely fail.

When the IS team mapped out its issue onto this archetype, their experience corroborated the relationships identified in the loops (see "Core Dynamic Theory" in "Success to the Successful Email"). The archetype helped paint a common picture of the larger "elephant" troubling the group, and clearly stated their problem: Given that the existing email systems had had such an early head start in this structure, the IS group's attempts to persuade people to use the new system were likely to fail. Furthermore, the more time that passed, the harder it would be to ever shift from the existing systems to the new one.

Using the "Core Dynamic Theory" diagram as a common starting point, the group then explored how to use the success of the existing system to somehow drive the success of the new one (see "Extended Dynamic Theory" in "Success to the Successful Email"). They hypothesized that creating a link between "Usefulness of Existing Email" and "Usefulness of New Email" (loop B5) and/or a link between "Use of Existing Email" and "Usefulness of New Email" (loop B6) could introduce counterbalancing forces that would fuel the success loop of the new system. Their challenge thus became to find ways in which the current system could be used to help people appreciate the utility of the new

system, rather than just trying to change their perceptions by pointing out the limitations of the existing system.

Managers as Researchers and Theory Builders

Systems archetypes can enable managers to become theory builders of the policy- and decision-making processes in their organizations, and help them explore why the systems behave the way they do. As the IS story illustrates, these archetypes can be used to create rich frameworks for continually testing strategies, policies, and decisions that then inform managers of improvements in the organization. Rather than simply applying generic theories and frameworks like Band-Aids on a company's own specific issues, managers must take the best of the new ideas available and then build a workable theory for their own organization. Through an ongoing process of theory building, managers can develop an intuitive knowledge of why their organizations work the way they do, and in this way take effective, coordinated action.

Systems Archetypes as Tools for Predicting Behavior

Managers within organizations often invest a lot of time making never-ending attempts to forecast, anticipate, and otherwise guess at future outcomes by looking at historical data. Such attempts are based on two deep-rooted assumptions: that everything in the future is inherently uncertain, and that past behavior is a good predictor of future behavior. Without a thorough understanding of the underlying structures that produce the observed behaviors, however, forecasts tend to fail when we need them the most—when future behavior deviates from past behavior.

Inaccurate forecasts stem from two causes: Either we do not understand the mechanisms governing the actions we are trying to predict, or the situations themselves are inherently unpredictable. In the latter case, there isn't much we can do other than take our best shot with whatever methods seem to produce the best results. But before we throw up our hands in despair, we should be careful to differentiate between true uncertainty and *predetermined elements*—those things we can predict if we have an adequate understanding of the structure driving them.

For example, if there is an auto accident on a major highway at rush hour, we can predict that traffic jams within the city and ripple effects on secondary roads will be the predetermined outcomes of that event. The structure of the system—number of lanes, alternative routes, speed limits, rush-hour traffic volume, population density—makes the outcome very predictable.

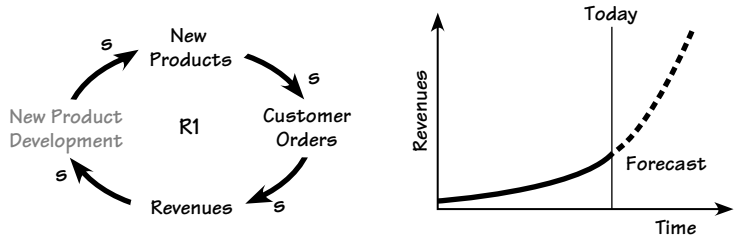
Together, systems archetypes and behavior-over-time diagrams (BOTs) can help us identify such predetermined outcomes of a particular situation. Systems archetypes can help us see the structures within a complex system, while BOTs offer a glimpse into the expected behavior of that structure over time.

Identifying Predetermined Elements

For example, in many companies, new product development serves as the main engine of growth (see "Reinforcing Growth with New Products").

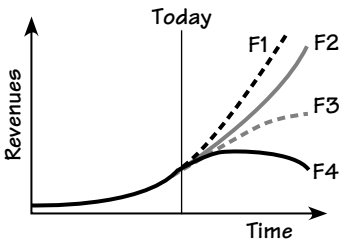
As new products are released, customer orders and revenues increase, which provides more funds to pump back into new product development (R1). In this situation, our sales data would show that we are on a healthy growth curve, and most forecasts would predict more of the same. If we look at the situation from a "Limits to Success" perspective, however, we can go beyond straight-line projections by better understanding the structural forces at play. In reality, there are many different possible outcomes that can never be predicted by historical data alone (see "Multiple Futures" on page 10).

REINFORCING GROWTH WITH NEW PRODUCTS



A reinforcing dynamic of new products' increasing revenue, which is then invested in additional new products (R1), will initially produce a growth curve.

MULTIPLE FUTURES



There are many possible outcomes for revenues, given our current reinforcing structure of increasing product offerings: forecasted growth (F1), continued growth at a slower rate (F2), plateau (F3), or decline (F4).

When mapped on a BOT diagram, it is clear that revenues could grow at a slower rate (F2), plateau (F3), or collapse (F4). Given these possibilities, what kind of prediction can we make for future outcomes? The answer is determined not by looking at past data, but by looking at the underlying structure driving the behavior.

When we understand the structural landscape, we can better distinguish between uncertainty and predetermined elements. In a "Limits to Success" structure, we would look for balancing loops that the growth in revenues might trigger. We can ask ourselves questions like, how does the volume of marketing campaigns seem to affect sales over time? Are there pressures building in the organization as a result of the growth? What does the production capacity look like over time? Is the size of the market growing or stagnating? Charting these factors over time can offer insight into the particular balancing processes that need to be addressed in order to eliminate potential limits to growth *before* they impinge on future sales.

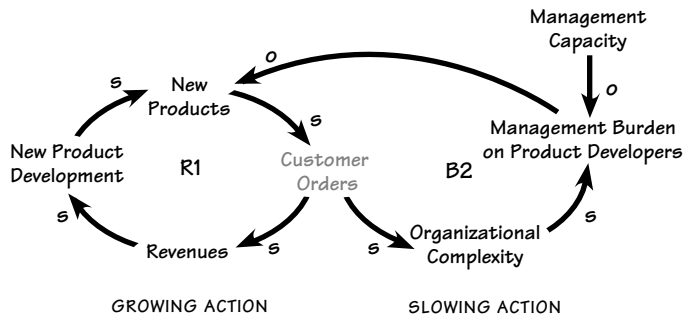
For example, as customer orders grow, the organizational infrastructure needed to service them also grows (see "Identifying Predetermined Consequences of Limits").

As more people are hired, the organizational complexity increases and places an additional managerial burden on those responsible for developing products. If the company's way of managing its product development effort does not change with the changing needs (which is often the case in a fast-growth environment), a decline in new products is a predetermined consequence of the "Limits to Success" structure. The more the company tries to push harder on the growing action, the stronger the slowing action will become, as long as the structure of the management capacity limit remains unchanged.

Creating (Not Forecasting) Your Future

This link between structure and behavior plays a critical role in our systems thinking worldview. Linking each archetype with a specific set of behavior patterns can help us see into the future with a new set of eyes. We can then clarify the difference between true uncertainty and predetermined events that have yet to unfold. By identifying and working on the underlying structures that produce the behaviors, we can better predict the future by helping to create it—by taking actions that will lead to the outcomes we desire—instead of just trying to forecast it.

IDENTIFYING PREDETERMINED CONSEQUENCES OF LIMITS



The "Limits to Success" structure suggests that there are potential balancing processes that could limit future growth. For example, as the organizational infrastructure grows to service the increasing orders, product developers might have less time to devote to creating new products (B2). The result may be a decline in products, and a consequent decline in orders (R1).

Guidelines for Designing Systemic Interventions

Although the collective insight that comes out of using the systems archetypes in any of the ways discussed above can add much value to a team process, insight alone is not enough. In order for systems thinking efforts to shape organizational performance, those insights need to be translated into action. To be effective, an intervention must be self-sustaining and self-correcting, and it must address the underlying source of

problems. Below is a four-step process for using the archetypes to design effective organizational interventions.

1. Map out the Intervention

Once you have a systems archetype representation of the problem, a first step is to look at where effective interventions can break vicious cycles, connect parts of the system, or reduce delays. By explicitly mapping those interventions, you can sharpen your sense of their impact on the system. Some possibilities:

Break a link. Look for ways to break the causal connection between two variables. For example, in a case where taking on new hires is leading to a rise in training required, you could break this link by hiring people who are already familiar with the industry or the nature of the problem.

Add a link. You may find that there are distinct parts of the system that should be connected. For example, if a drop in employee morale is leading to a rise in the turnover rate, you could add a link to this dynamic by introducing an intervention such as an employee-empowerment program.

Shorten a delay. Identify the delays in the system, and map out a process for shortening them. Delays can come in the form of material or information flows, capacity expansions, or even changes in perceptions.

2. Draw out the Expected Behavior

Once you have mapped out some possible interventions, the next step is to try to evaluate the impact those actions might have on the system. You first want to identify the key variables that would be affected and then ask, "If we changed the system successfully, what new patterns of behavior would we expect to see?" By drawing out the expected behavior of key factors over time, you create a reference point against which you can check the actual outcome.

3. Do Controlled Experiments

Before committing to any large-scale actions, it is important to run small, relatively self-contained experiments whenever possible and to use them as learning opportunities. Such experiments can provide a low-risk way to test interventions and see if they reveal any trade-offs between short-term and long-term results or if they produce any unintended side-effects. If the situation does not allow for direct, controlled experiments—either because the system is too complex and/or the time delays are too long—it may make sense to test the interventions by developing a computer simulation model that represents the key features of the situation.

4. Get All Stakeholders Involved

To implement most intervention efforts, a company needs the full support and commitment of all important stakeholders. This requirement poses a dilemma for many managers: Although it may be desirable to engage all stakeholders in designing solutions to a problem, it is not always feasible to do so. And yet, anyone not directly involved in the design process may have difficulty being fully supportive of the proposed solution. This is where a management flight simulator can be useful. An interactive simulator can engage those stakeholders in a thinking process similar to that experienced by the original design team. By testing their assumptions in the simulator, they, too, can come to their own appreciation of the issues.

For a summary of strategies for using the archetypes, refer to Appendix B, "Using the Archetypes," to see how to develop action plans that will address the problem systemically.

Long-Term Commitment

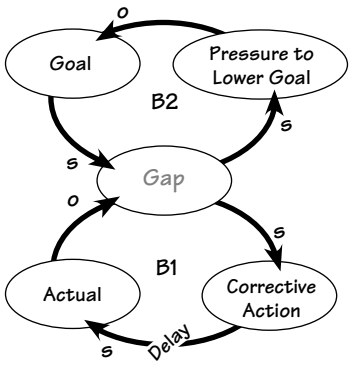
Keep in mind that there is no one right solution to any complex problem. The best interventions are likely to feature a combination of carefully planned actions that are refined over time based on feedback from the system. They also require patience; the best solutions aim to change a system *gently,* and take time. Using the systems archetypes to map out your current situation and your intended interventions can help you develop robust strategies and address your problems systemically. But it is rarely a one-shot deal—you need to continually review the performance of the overall system, so you can intervene *before* problems occur.

Whether you use systems archetypes as "lenses," as structural pattern templates, as dynamic theories, or as tools for predicting behavior, the archetypes can be valuable aids to understanding what is driving your organization's behavior. More important, they can help you move beyond merely reacting to events to designing effective strategies for reshaping patterns of behavior—and ultimately to creating the results you truly desire for your organization.

APPENDIX A: SYSTEMS ARCHETYPES AT A GLANCE

DRIFTING GOALS

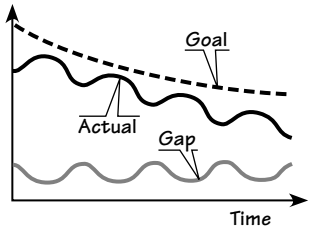
In a "Drifting Goals" archetype, a gap between the goal and current reality can be resolved by taking corrective action (B1) or lowering the goal (B2). The critical difference is that lowering the goal immediately closes the gap, whereas corrective actions usually take time.



Guidelines

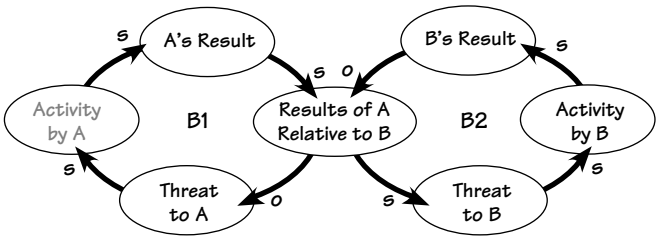
- Drifting performance figures are usually indicators that the "Drifting Goals" archetype is at work and that real corrective actions are not being taken.
- A critical aspect of avoiding a potential "Drifting Goals" scenario is to determine what drives the setting of the goals.
- Goals located outside the system will be less susceptible to drifting goals pressures.

Behavior Over Time

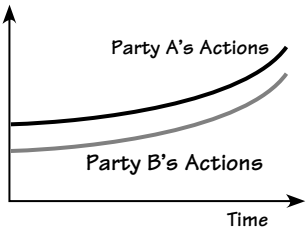


ESCALATION

In the "Escalation" archetype, one party (A) takes actions that are perceived by the other as a threat. The other party (B) responds in a similar manner, increasing the threat to A and resulting in more threatening actions by A. The reinforcing loop is traced out by following the outline of the figure-8 produced by the two balancing loops.



Behavior Over Time



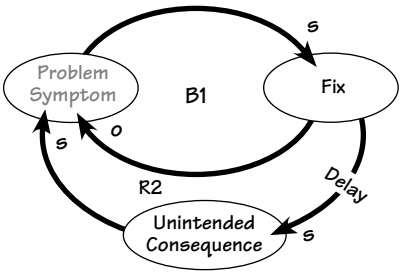
Guidelines

To break an escalation structure, ask the following questions:

- What is the relative measure that pits one party against the other, and can you change it?
- What are the significant delays in the system that may distort the true nature of the threat?
- What are the deep-rooted assumptions that lie beneath the actions taken in response to the threat?

FIXES THAT FAIL

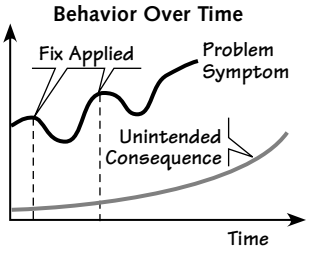
In a "Fixes That Fail" situation, a problem symptom cries out for resolution. A solution is quickly implemented that alleviates the symptom (B1), but the unintended consequences of the "fix" exacerbate the problem (R2). Over time, the problem symptom returns to its previous level or becomes worse.



Guidelines

- Breaking a "Fixes That Fail" cycle usually requires acknowledging that the fix is merely alleviating a symptom, and making a commitment to solve the real problem now.
- A two-pronged attack of applying the fix and planning out the fundamental solution will help ensure that you don't get caught in a perpetual cycle of solving yesterday's "solutions."

Behavior Over Time



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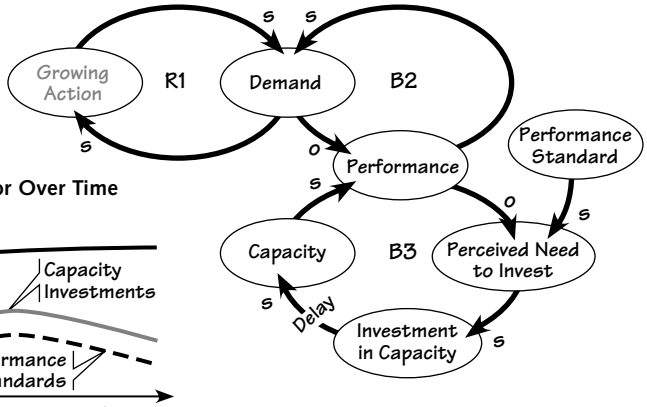
APPENDIX A: SYSTEMS ARCHETYPES AT A GLANCE

GROWTH AND UNDERINVESTMENT

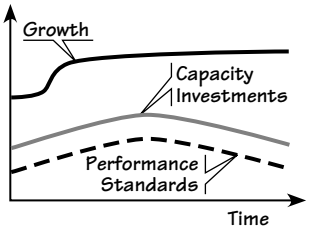
In a "Growth and Underinvestment" archetype, growth approaches a limit that can be eliminated or pushed into the future if capacity investments are made. Instead, performance standards are lowered to justify underinvestment, leading to lower performance which further justifies underinvestment.



Guidelines

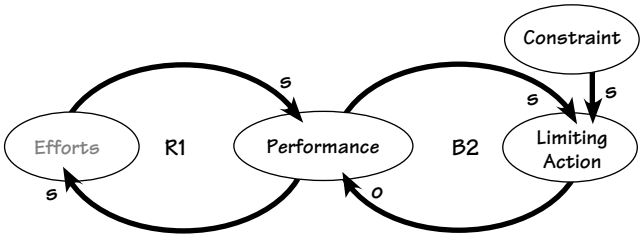
- Dig into the assumptions that drive capacity investment decisions. If past performance dominates as a consideration, try to balance that perspective with a fresh look at demand and the factors that drive its growth.
- If there is a potential for growth, build capacity in anticipation of future demand.

Behavior Over Time

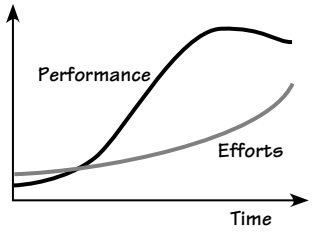


LIMITS TO SUCCESS

In a "Limits to Success" scenario, continued efforts initially lead to improved performance. Over time, however, the system encounters a limit that causes the performance to slow down or even decline (B2), even as efforts continue to rise.



Behavior Over Time

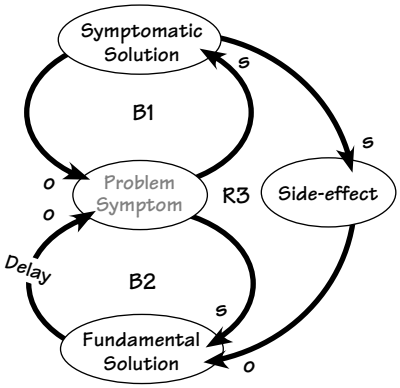


Guidelines

- The archetype is most helpful when it is used well in advance of any problems, to see how the cumulative effects of continued success might lead to future problems.
- Use the archetype to explore questions such as, "What kinds of pressures are building up in the organization as a result of the growth?"
- Look for ways to relieve pressures or remove limits before an organizational gasket blows.

SHIFTING THE BURDEN/ADDICTION

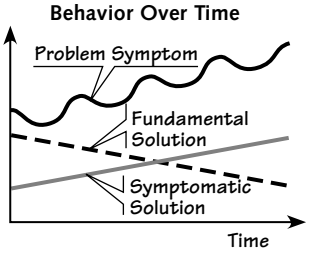
In a "Shifting the Burden," a problem is "solved" by applying a symptomatic solution (B1) that diverts attention away from more fundamental solutions (B2). In an "Addiction" structure, a "Shifting the Burden" degrades into an addictive pattern in which the side-effect gets so entrenched that it overwhelms the original problem symptom (R3).



Guidelines

- Problem symptoms are usually easier to recognize than the other elements of the structure.
- If the side-effect has become the problem, you may be dealing with an "Addiction" structure.
- Whether a solution is "symptomatic" or "fundamental" often depends on one's perspective. Explore the problem from differing perspectives in order to come to a more comprehensive understanding of what the fundamental solution may be.

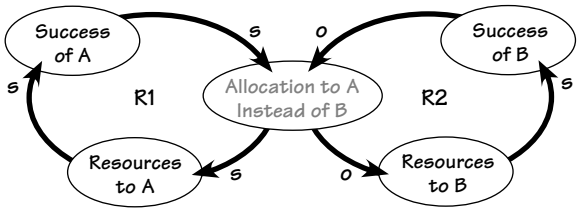
Behavior Over Time

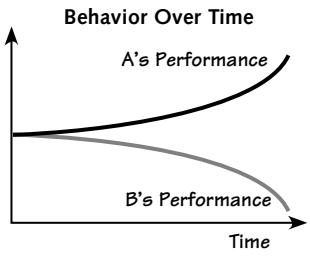


APPENDIX A: SYSTEMS ARCHETYPES AT A GLANCE

SUCCESS TO THE SUCCESSFUL

In a "Success to the Successful" archetype, if one person or group (A) is given more resources, it has a higher likelihood of succeeding than B (assuming they are equally capable). The initial success justifies devoting more resources to A than B (R1). As B gets less resources, its success diminishes, further justifying more resource allocations to A (R2).



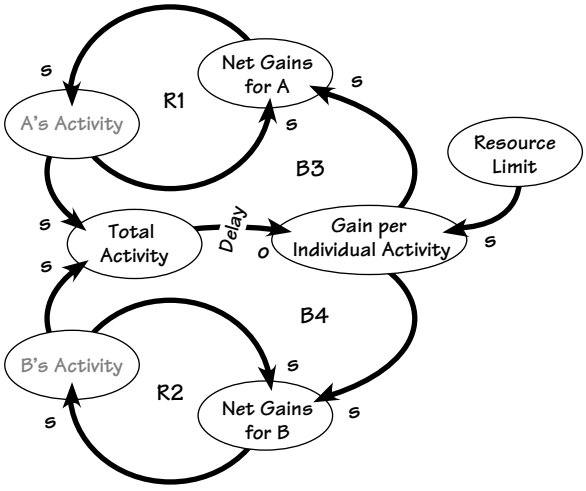


Guidelines

- Look for reasons why the system was set up to create just one "winner."
- Chop off one half of the archety14pe by focusing efforts and resources on one group, rather than creating a "winner-take-all" competition.
- Find ways to make teams collaborators rather than competitors.
- Identify goals or objectives that define success at a level higher than the individual players A and B.

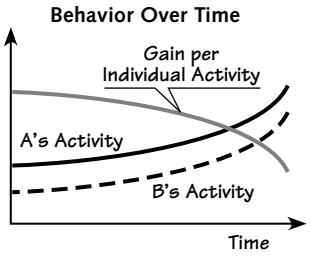
TRAGEDY OF THE COMMONS

In a "Tragedy of the Commons" structure, each person pursues actions that are individually beneficial (R1 and R2). If the amount of activity grows too large for the system to support, however, the "commons" becomes overloaded and everyone experiences diminishing benefits (B3 and B4).



Guidelines

- Effective solutions for a "Tragedy of the Commons" scenario never lie at the individual level.
- Ask questions such as: "What are the incentives for individuals to persist in their actions?" "Can the long-term collective loss be made more real and immediate to the individual actors?"
- Find ways to reconcile short-term individual rewards with long-term cumulative consequences. A governing body that is chartered with the sustainability of the resource limit can help.



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APPENDIX B: USING THE ARCHETYPES

Archetype/Application	Seven Steps

DRIFTING GOALS

Application: **Staying Focused on Vision**
Various pressures can often take our attention away from what we are trying to achieve. The "Drifting Goals" archetype helps explain why an organization is not able to achieve its desired goals. Used as a diagnostic tool, it can target drifting performance areas and help organizations attain their visions.

1. Identify drifting performance measure.
2. Look for goals that conflict with the stated goal.
3. Identify standard procedures for closing the gap. Are they inadvertently contributing to the goal slippage?
4. Examine the past history of the goal. Have the goals themselves been lowered over time?
5. Anchor the goal to an external reference.
6. Clarify a compelling vision that will involve everyone.
7. Create a clear transition plan. Explore what it will take to achieve the vision, and establish a realistic timeline.

ESCALATION

Application: **Competition**
One of the reasons we get caught in escalation dynamics may stem from our view of competition. The "Escalation" archetype suggests that cutthroat competition serves no one well in the long run. The archetype provides a way to identify escalation structures at work and shows how to break out of them or avoid them altogether.

1. Identify the competitive variable. Is a single variable the basis of differentiation between competitors?
2. Name the key players caught in the dynamic.
3. Map what is being threatened. Are your company's actions addressing the real threat, or simply preserving core values that may no longer be relevant?
4. Reevaluate competitive measure. Can the variable that is the foundation of the game (price, quality, etc.) be shifted?
5. Quantify significant delays that may be distorting the nature of the threat.
6. Identify a larger goal encompassing both parties' goals.
7. Avoid future "Escalation" traps by creating a system of collaborative competition.

FIXES THAT FAIL

Application: **Problem-solving**
Almost any decision carries long-term and short-term consequences, and the two are often diametrically opposed. The "Fixes That Fail" archetype can help you get off the problem-solving treadmill by identifying fixes that may be doing more harm than good.

1. Identify problem symptom.
2. Map current interventions and how they were expected to rectify the problem.
3. Map unintended consequences of the interventions.
4. Identify fundamental causes of the problem symptoms.
5. Find connections between both sets of loops. Are the fixes and the fundamental causes linked?
6. Identify high-leverage interventions. Add or break links in the diagram to create structural interventions.
7. Map potential side-effects for each intervention in order to be prepared for them (or to avoid them altogether).

GROWTH AND UNDERINVESTMENT

Application: **Capital Planning**
If demand outstrips capacity, performance can suffer and hurt demand. If this dynamic is not recognized, the decrease in demand can then be used as a reason not to invest in the needed capacity. "Growth and Underinvestment" can be used to ensure that investment decisions are viewed from a fresh perspective, rather than from a reliance on past decisions.

1. Identify interlocked patterns of behavior between capacity investments and performance measures.
2. Identify delays between when performance falls and when additional capacity comes on-line—particularly perceptual delays regarding the need to invest.
3. Quantify and minimize acquisition delays.
4. Identify related capacity shortfalls. Are other parts of the system too sluggish to benefit from added capacity?
5. Fix investment decisions on external signals, not on standards derived from past performance.
6. Avoid self-fulfilling prophecies. Challenge the assumptions that drive capacity investment decisions.
7. Search for diverse investment inputs. Seek new perspectives on products, services, and customer requirements.

APPENDIX B: USING THE ARCHETYPES

Archetype/Application	Seven Steps
LIMITS TO SUCCESS	
Application: **Planning** If we don't plan for limits, we are planning for failure. The "Limits to Success" archetype shows that being successful can be just as dangerous to long-term health as being unsuccessful. By mapping out the growth engines and potential danger points in advance, we can anticipate future problems and eliminate them before they become a threat.	1. Identify the growth engines. 2. Determine doubling time of those processes. 3. Identify potential limits and balancing loop(s)—physical capacity, information systems, personnel, management expertise, attitudes/mental models. 4. Determine change required to deal effectively with the limit(s) identified. 5. Assess time needed to change. Is there a discrepancy between the doubling time and the changes that need to be made to support that growth? 6. Balance the growth. What strategies can be used to balance the growth engine with the time frame of the investments that must be made to sustain it? 7. Reevaluate the growth strategy. Continually challenge assumptions in context of the broader company.
SHIFTING THE BURDEN	
Application: **Breaking Organizational Gridlock** Organizational gridlock can be caused by interlocking "Shifting the Burden" structures, as one function's "solution" creates problems in another area. The archetype provides a starting point for breaking gridlock by identifying chains of problem symptoms and solutions that form walls between functions, departments, or divisions.	1. Identify the original problem symptom(s). 2. Map all "quick fixes" that appear to be keeping the problems under control. 3. Identify impact on others. What are the impacts of those "solutions" on other players in the company? 4. Identify fundamental solutions. Look at the situation from both perspectives to find a systemic solution. 5. Map side-effects of quick fixes that may be undermining the usability of the fundamental solution. 6. Find interconnections to fundamental loops. Find the links between the interaction effects and the fundamental solution that may be creating gridlock. 7. Identify high-leverage actions from both perspectives.
SUCCESS TO THE SUCCESSFUL	
Application: **Avoiding Competency Traps** The "Success to the Successful" archetype suggests that success or failure may be due more to initial conditions than intrinsic merits. It can help organizations challenge their success loops by "unlearning" what they are already good at in order to explore new approaches and alternatives.	1. Investigate historical origins of competencies. 2. Identify potential competency traps. 3. Evaluate current measurement systems—are they set up to favor current systems over other alternatives? 4. Map internal view of market success. What are the operating assumptions around success in the market? 5. Obtain external views of market success. Ask "outsiders" for alternative strategies. 6. Assess effects on the innovative spirit. Is the current system excluding or limiting the spirit of experimentation that will lead to new alternatives? 7. Continually scan for gaps and areas for improvement.
TRAGEDY OF THE COMMONS	
Application: **Resource Allocation** In a "Tragedy of the Commons" situation, the complex interaction of individual actions produces an undesirable collective result, such as the depletion of a common resource. The archetype can be used to help connect the long-term effects of individual actions to the collective outcome, and develop measures for managing the common resource more effectively.	1. Identify the "commons." What is the common resource that is being shared? 2. Determine incentives. What are the reinforcing processes that are driving individual use of the resource? 3. Determine time frame for reaping benefits. 4. Determine time frame for experiencing cumulative effects of the collective action. 5. Make the long-term effects more present. How can the long-term loss or degradation of the commons be more real and present to the individual users? 6. Reevaluate the nature of the commons. Are there other resources or alternatives that can be used to remove the constraint upon the commons? 7. Limit access to resources. Determine a central focal point—a shared vision, measurement system, or final arbiter—that allocates the resource based on the needs of the whole system.

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Daniel H. Kim is a cofounder of the MIT Center for Organizational Learning and Pegasus Communications, Inc., and publisher of *The Systems Thinker®*.

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Editorial support was provided for this volume by Lauren Johnson and Kellie Wardman O'Reilly.

Suggested Further Reading

Learning Fables (available in soft cover or as e-books)

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