Deciphering the Plots of Systems Stories

I love murder mysteries, first made famous by British writers such as Agatha Christie and a staple of popular TV shows like the long-running *CSI*. The essential question they pose is "Who done it?" and the reader/viewer is kept in suspense until the very end in the hope of answering that question. Systems stories are driven by a different question: "Why are people unable to solve a chronic, complex problem or achieve a meaningful goal—often despite their best efforts?" In order to answer this question, it helps to recognize discernible plot lines that tend to shape the behavior of people in social systems.

Many of these plots share a similar and challenging characteristic. Social systems

are not only surprising but also, in the words of systems thinker Donella Meadows, "perverse."[1] I think of them as seductive in that they tend to lead people to do exactly the wrong thing for all the right reasons.

Because these plots are so common, they are called systems archetypes. The better people understand them, the less likely they are to become victimized by them. People can learn to anticipate and prevent these stories from seducing them into doing the wrong thing. Alternatively, if people do become trapped, they can follow equally recognizable paths (known as leverage points) to extricate themselves.

Basic Plot Lines

Several years ago, a participant in a systems thinking workshop analyzed a problem he had tried to solve for a long time. He said, "And to think that I have been going around in circles on this issue for years." At that moment I realized that the problem was not so much that he had been "going around in circles," but that he was *unaware* that he was doing so. The solutions he had tried previously were obvious and effective in the short term. However, they had created unintended

consequences in the long term that made matters worse. Moreover, when the problem recurred, he failed to see how his own solutions contributed to it. Seeing the circles that he was not only embedded in but also helped create freed him to break out of them and identify a more productive path forward. We go around in circles of our own making without realizing it.

Since systems plots unfold in circles, our goal is to uncover the existing ones so that we can create new and more effective stories. While the emphasis in this chapter is on describing the dynamics—not shifting them, a topic that is more fully addressed in chapter 10—it is important to realize that the act of recognizing the circles you are caught in is the first step toward altering them. *Increasing self-awareness is an intervention in and of itself, and the precursor to making any other changes.*

Reinforcing and balancing feedback are the two basic circular structures that describe how systems evolve over time. More complex dynamics result from combinations of these two feedback structures.

REINFORCING FEEDBACK: THE STORY OF AMPLIFICATION

Reinforcing feedback is the basis for what we know as virtuous and vicious cycles. It explains the development of both engines of growth or flywheels as well as spiraling deterioration. For example, Jim Collins has applied the flywheel concept he introduced in his book *Good to Great* to suggest how social sector organizations can develop their own engines of success.[2] He believes that success in the social sector hinges on the ability to grow organizations (not just programs) by building a brand that attracts support, which yields demonstrable results and in turn strengthens the brand. Collins also points out that the same reinforcing dynamic can produce the opposite effect, as when an organization that performs poorly weakens its brand reputation, which makes it more difficult to attract resources and drives results down even further.

The unstable nature of reinforcing feedback is painfully evident in boom-and-bust cycles such as the housing bubble that set off the 2008 economic crisis. In this case, unsafe subprime mortgage lending practices fueled increased housing prices and more lending —until the bad mortgages could no longer be spread farther and the housing market collapsed.[3]

Reinforcing dynamics also appear in self-fulfilling prophecies. For example, the Pygmalion effect explains how one party's expectations (in this case, a teacher's) lead another party (a student) to behave in ways that reinforce these expectations. This dynamic tends to encourage the performance of well-behaved girls and work against active boys and minorities. The Interaction Map developed by Action Design and shown in figure 4.1 describes these interactions in greater detail.

e.g., Manager
"Subordinates
don't care."

B ACTS,
e.g., Subordinates
Level of participation
(declines)

R

A ACTS,
e.g., Manager
Makes decisions and
directs subordinates

B THINKS,
e.g., Subordinates
"We'll just wait to
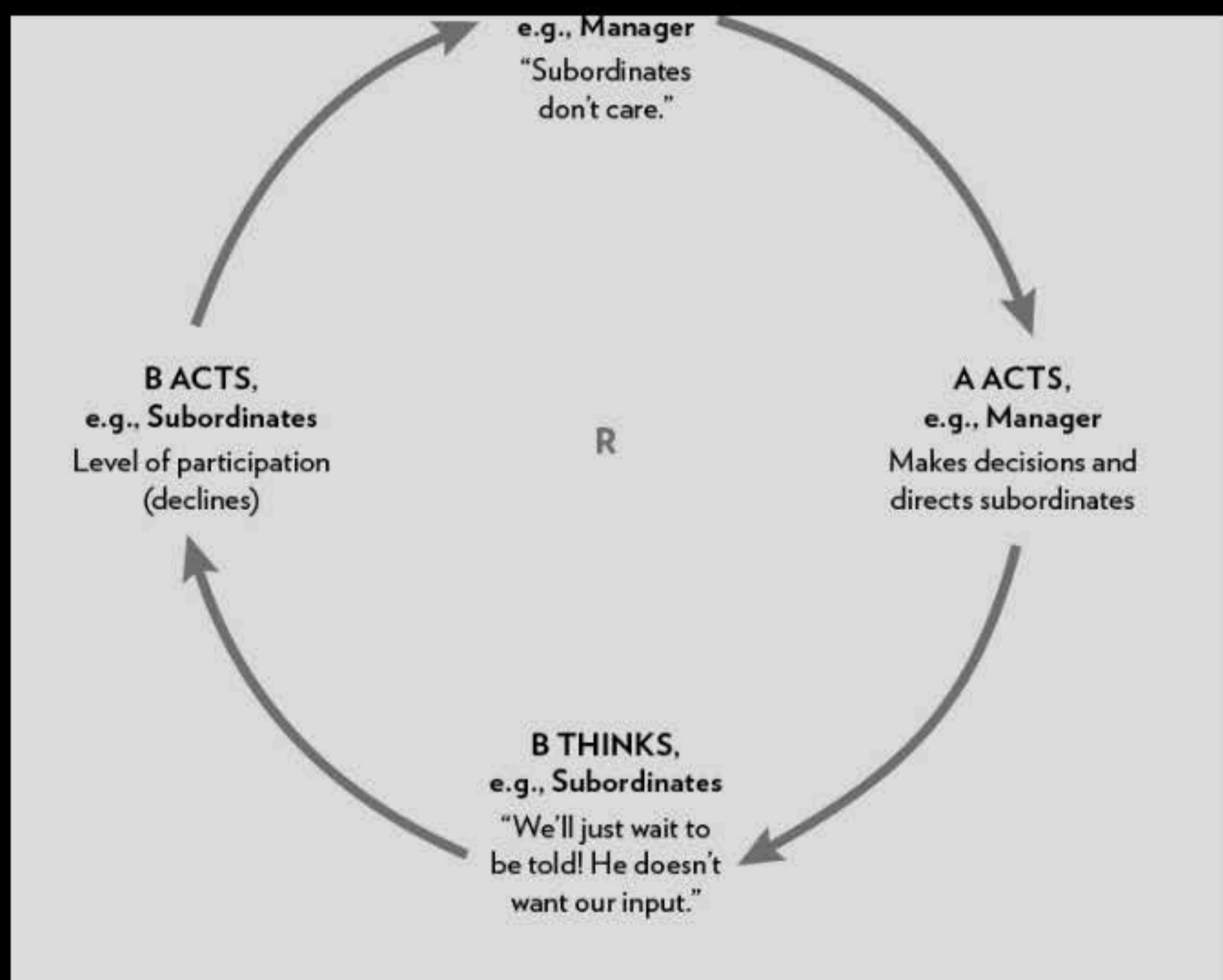be told! He doesn't
want our input."

FIGURE 4.1 INTERACTION MAP. How parties A and B think about and behave in relation to each other is mutually reinforcing. Adapted from Action Design

Most people are accustomed to thinking of growth as linear. However, reinforcing feedback describes a more common process in social and economic systems—that of exponential growth in which a quantity increases by a constant percentage of the whole in a constant time period. Such phenomena as increases in savings and population are familiar illustrations of exponential processes. Foundations and entrepreneurs seeking a long-term return on their social investments benefit from cultivating critical mass or tipping points that build sustainable momentum in a social system.[4]

The following French riddle points out several important implications of exponential growth.[5] Imagine a lily pond where the lily plant doubles in size every day, and the pond is totally covered by the lily in thirty days. When is the pond half covered? The answer, which is surprising for many, is day twenty-nine: Half of the pond is covered just one day before the pond is completely blanketed by the lily. How much of the pond is covered in fifteen days? The answer here is 0.0025 percent. In other words, halfway into the month the lily is barely noticeable.

The exponential nature of organic growth has several consequences for social decision

makers. First, most people tend to expect to see improvements faster than they are capable of developing. Expecting the system to shift quickly can lead to unrealistic demands for growth that ultimately slow improvement down if not kill it entirely. Alternatively, people can miss or misinterpret small improvements and give up prematurely on supporting a change that takes time to manifest. Figure 4.2 depicts the exponential nature of organic reinforcing growth and contrasts it with the more typical linear assumption people hold about how things *should* grow.

Second, a success engine or flywheel is built not only on the individual factors that contribute to growth, but also on how these factors interact to reinforce one another over time. For example, successful micro-lending programs integrate community involvement, peer support, financial investment, economic results, job creation, and community reinvestment in ever-expanding spirals. An implication for social investors might be that they evaluate grantee plans based on the clarity and soundness of their structural design—how the parts fit together—rather than on the individual elements themselves. We will return to how systems thinking can

contribute to articulating such a design or theory of change in chapter 11. For now it can be helpful to notice that one approach to increasing the effectiveness of a theory of change is to explain how parts of the system are intended to interact in both direct and indirect ways over time.

Third, since exponential growth also applies to seemingly trivial problems getting much worse over time, it is important to monitor such problems early on and consider addressing them rapidly instead of hoping they go away. Decades ago, the recognition that small problems fuel bigger ones inspired what's known as the broken windows theory, which suggests that community instability is catalyzed by disorderly conditions.[6] The theory has led police departments around the country to control minor misbehaviors—from littering to vandalism—and maintain a clean environment in order to prevent major crimes from occurring.[7] Critics of the theory argue that petty crime is itself a function of concentrated urban poverty, and that a significant and sustainable reduction in crime levels can only be achieved by improving the quality of life in poor neighborhoods. But either way, the plot is the same: Addressing

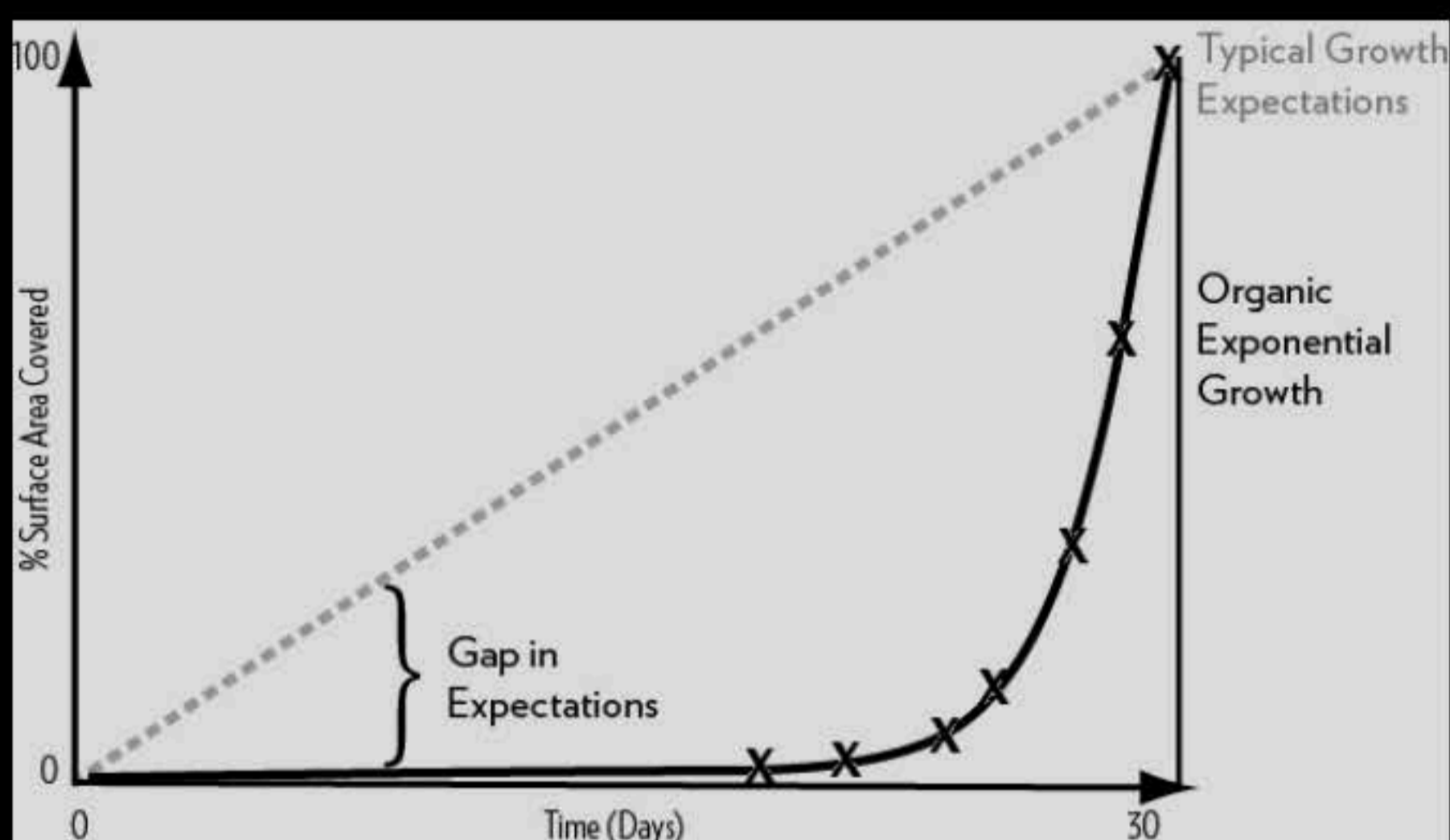upstream problems can prevent them from growing exponentially worse.

FIGURE 4.2: LESSONS FROM THE LILY POND. People tend to assume that growth occurs more quickly (and linearly) than it actually does. It is important to reduce the resulting gap between expectations and reality. In-novation Associates Organizational Learning and Bridgeway Partners

On the other hand, our failure to address climate change in a timely way represents a serious example of underestimating the severity of a problem by depending on trend data alone. Key decision makers in government and the private sector have resisted recommendations to severely cut carbon dioxide emissions in part because of our dependence on fossil fuels and in part because the problem grew so slowly (as meas-ured by the trend of global temperatures) as

to not raise alarms until recently when we are experiencing the effects in real time. An understanding and acknowledgment of the vicious cycles in nature that produced this trend (see appendix A) might have increased political will earlier. Indeed, recent weather patterns and rising sea levels indicate that the curve is likely to have already reached its tipping point as many scientists warned—and our best bet now is to act aggressively to prevent further environmental collapse and figure out peaceful ways of equitably distributing increasingly limited resources.

An understanding of reinforcing feedback can lead foundations, nonprofit leaders, and policy makers to:

- Cultivate the patience to build engines of growth slowly.
- Make decisions based on underlying systems structure instead of trends.
- Break potential vicious cycles quickly.

BALANCING FEEDBACK: THE STORY OF CORRECTION

While the processes of growth and decay might be obvious to many, the dynamics of stability and equilibrium are often dominant and even more difficult to discern. Balancing

loops are the driver for improving a social system—we seek to bridge the gap between a current and desired condition—and the key to understanding a system's resistance to change, because the current system is in equilibrium around goals it is already achieving.

We recognize balancing feedback in our daily experience, for example through a thermostat that regulates room temperature at 68°F, or in our own tendencies to sweat or shiver to maintain an internal body temperature of 98.6°F. In contrast with reinforcing feedback loops, which *amplify* an existing condition, balancing feedback seeks to *correct* or reverse a current state by bridging the gap between actual and desired performance. For example, a foundation might fund a mentoring program between older and younger students to improve graduation rates or a counseling program to reduce teen pregnancy. When balancing feedback accomplishes a desired goal, the corrective process often becomes invisible. When we eat enough food or get enough sleep, we tend to take these functions for granted.

By contrast, we are more aware of balancing processes when a system is *not* accomplishing the goal we state for it. In other words, balancing feedback also helps explain

why systems do not change despite people's best efforts to improve them. Simple corrective processes fail to function as intended in at least one of three ways.

First, we often stop investing in the solution once a problem appears solved. This act of "taking the pressure off" often leads the problem to recur—much to the frustration of the problem solvers. For example, urban youth crime in Boston was a serious problem in the early 1990s. Political and community leaders banded together to develop numerous coordinated solutions in response— from community policing and neighborhood watches to gang outreach and after-school programs. When youth crime declined as a result, political leaders felt obligated to shift funds to more obviously pressing problems. As a result, they gradually began to cut back on the crime prevention programs that worked so well, and the problem returned.[8]

The second tendency is to fail to appreciate the time required to effect change. For example, a recent success story on curbing teen drinking and substance abuse in one Massachusetts community of forty-six thousand, where adults also exhibited above-average rates of alcohol and drug abuse, described how coordinated improvements had

gradually taken hold over a period of eleven years.[9] Such patience and persistence are rare. Normal reactions in the face of time delay are either to become impatient and push for premature results or to give up too quickly.

The third way in which balancing loops can fail to correct an existing situation is when there is lack of agreement on the goals of the system, the current level of performance and what drives it, or both. For example, a report sponsored by the Ball Foundation noted there was no lack of educational innovation in selected US schools and school districts.[10] However, educators seeking to disseminate these innovations on a broader scale were confronted by serious disagreements about both the goals of K–12 education and current performance levels. Some school districts defined their goals in terms of test scores, while others viewed graduation, subsequent employment, or the motivation and capacity for continuous learning as the desired result. Similarly, these school districts measured actual performance differently in terms of test scores, how children performed after graduation, and indicators of creativity and self-directed learning. It is very difficult to define and disseminate a particular strategy when the desired future, system goals, and/

or perceptions of current conditions are am-
biguous or conflicted.

By understanding ineffective balancing loops, funders, nonprofit leaders, and policy makers can:

- Ensure that effective solutions are re-inforced and sustained over time instead of reduced when the pressure decreases.
- Respect time delays by being patient and persistent with social investments.
- Establish a clear and compelling shared vision, joint goals, and a common under-standing of current reality before develop-ing strategy. This is the basis for the change model to be introduced in chapter 5.

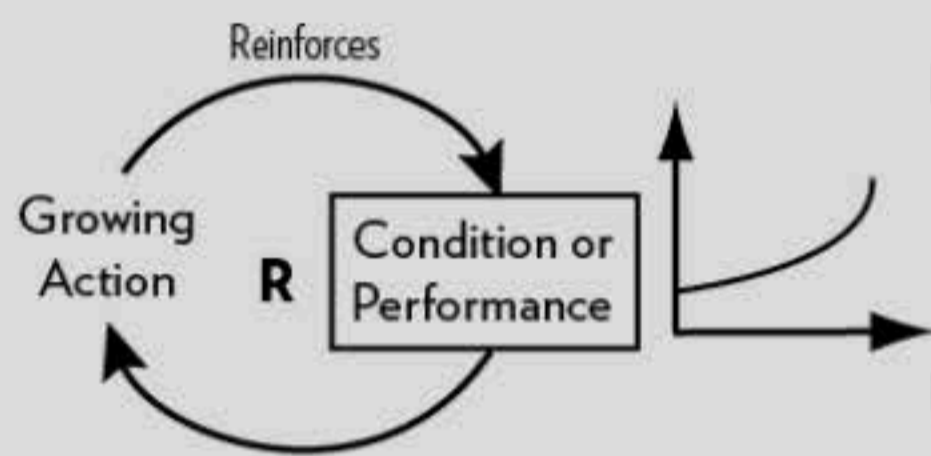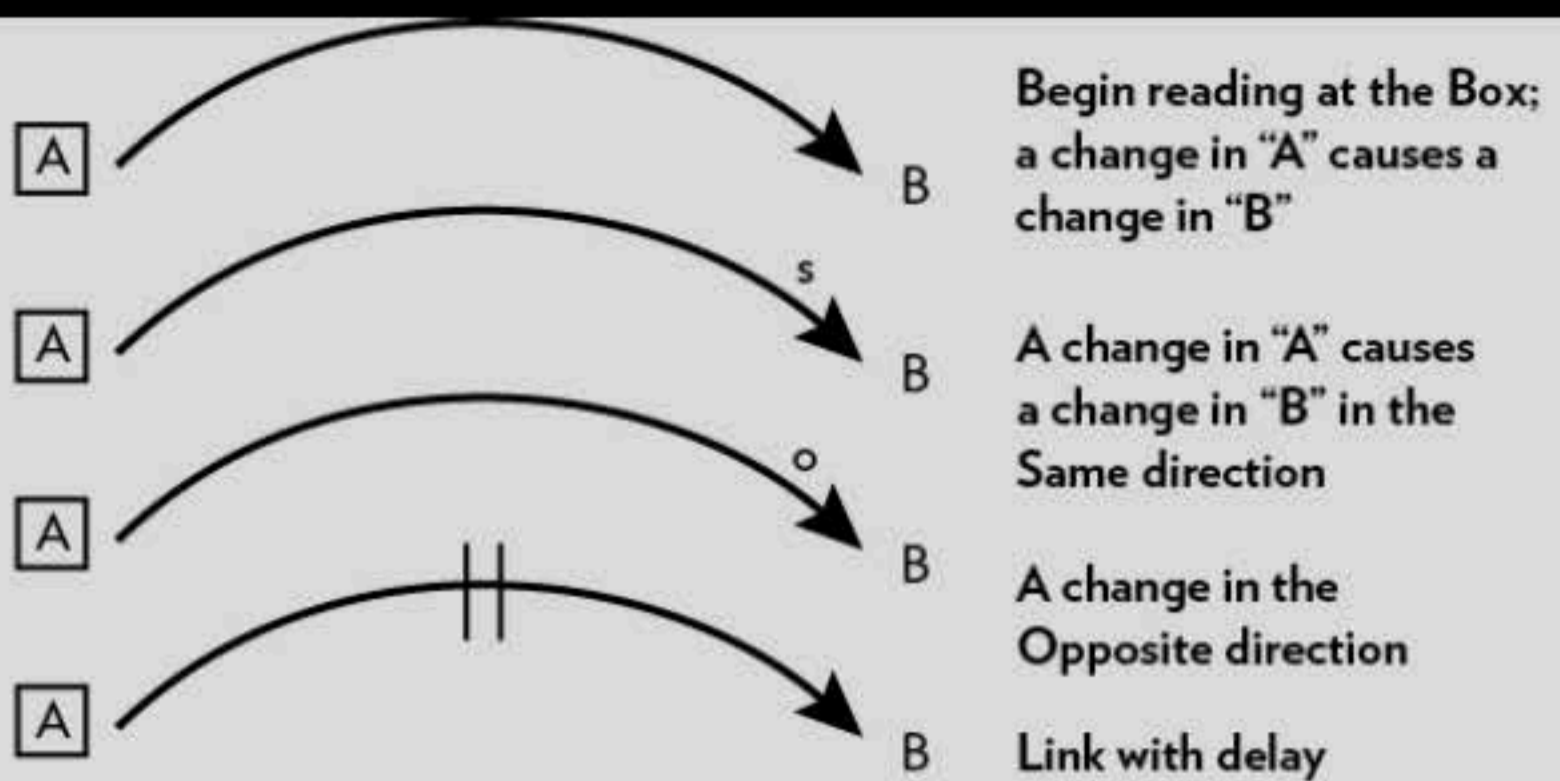Figure 4.3 summarizes the core elements of a systems story.

The Plots Thicken

Most complex problems arise from combin-ations of two or more reinforcing and/or balancing feedback processes. The good news is that we can gain preliminary insight into a wide range of dynamics by becoming familiar with ten of these system archetypes or classic stories. The archetypes are well understood, easily transferable across different system contexts, and often serve as catalysts for dis-

cerning even more complex dynamics.[11] This section describes five in greater detail since they illuminate so many problems in social systems, and introduces five more that are helpful to recognize.
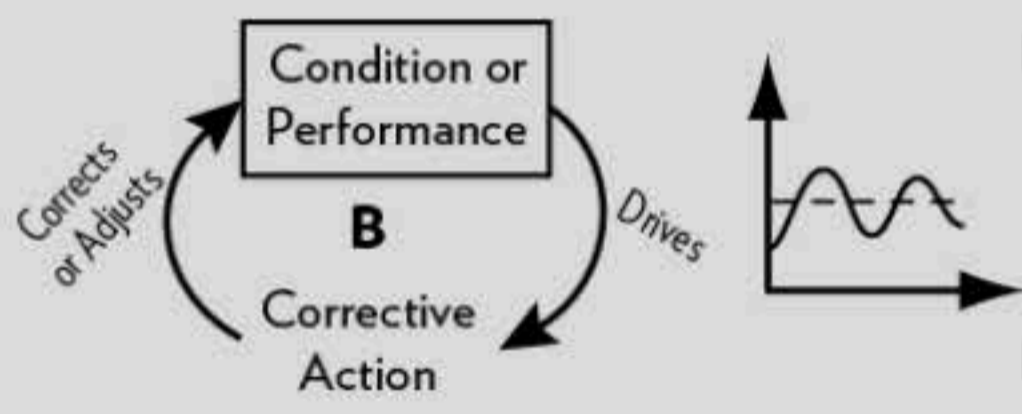
FIXES THAT BACKFIRE

Fixes That Backfire is the story of unintended consequences. Figure 4.4 shows the core dynamic of Fixes That Backfire and the pattern of behavior that arises from it. People implement a quick fix to reduce a problem symptom that works in the short run (B1 in figure 4.4); however, the quick fix also creates long-term unintended consequences that exacerbate the problem symptom over time (R2 in figure 4.4). Moreover, people do not recognize these negative consequences as deriving from the quick fix because of the time delay. Therefore, when the symptom returns they incorrectly assume that the solution is to implement *more* of the quick fix. They think, "It worked the first time; we just didn't do enough of it." When they return to the quick fix, the cycle repeats itself: short-term gains undermined by long-term negative consequences.

FIGURE 4.3 CORE ELEMENTS OF A SYSTEMS STORY. Systems stories are made up of circular cause–effect relationships among variables that change over time. Innovation Associates Organizational Learning

What does a Fix That Backfires look like in practice? Let's return to the TAPI case. The fix of harsh prison sentences reduced crime and the fear of crime in the short run. However, over time prisoners were released, often hardened by their experience or unprepared and legally restricted in their abilities to become productive members of society.

On average across the nation, nearly half of formerly incarcerated people succumb to the pressures to commit another crime in the first three years or are sent back to prison for parole violations. In a related example, drug busts take criminals off the street and thus reduce drug-related crime in the short run. However, they also remove drugs from circulation, thereby increasing drug prices and requiring addicts to steal more to pay for reduced supplies in the long run.[12]
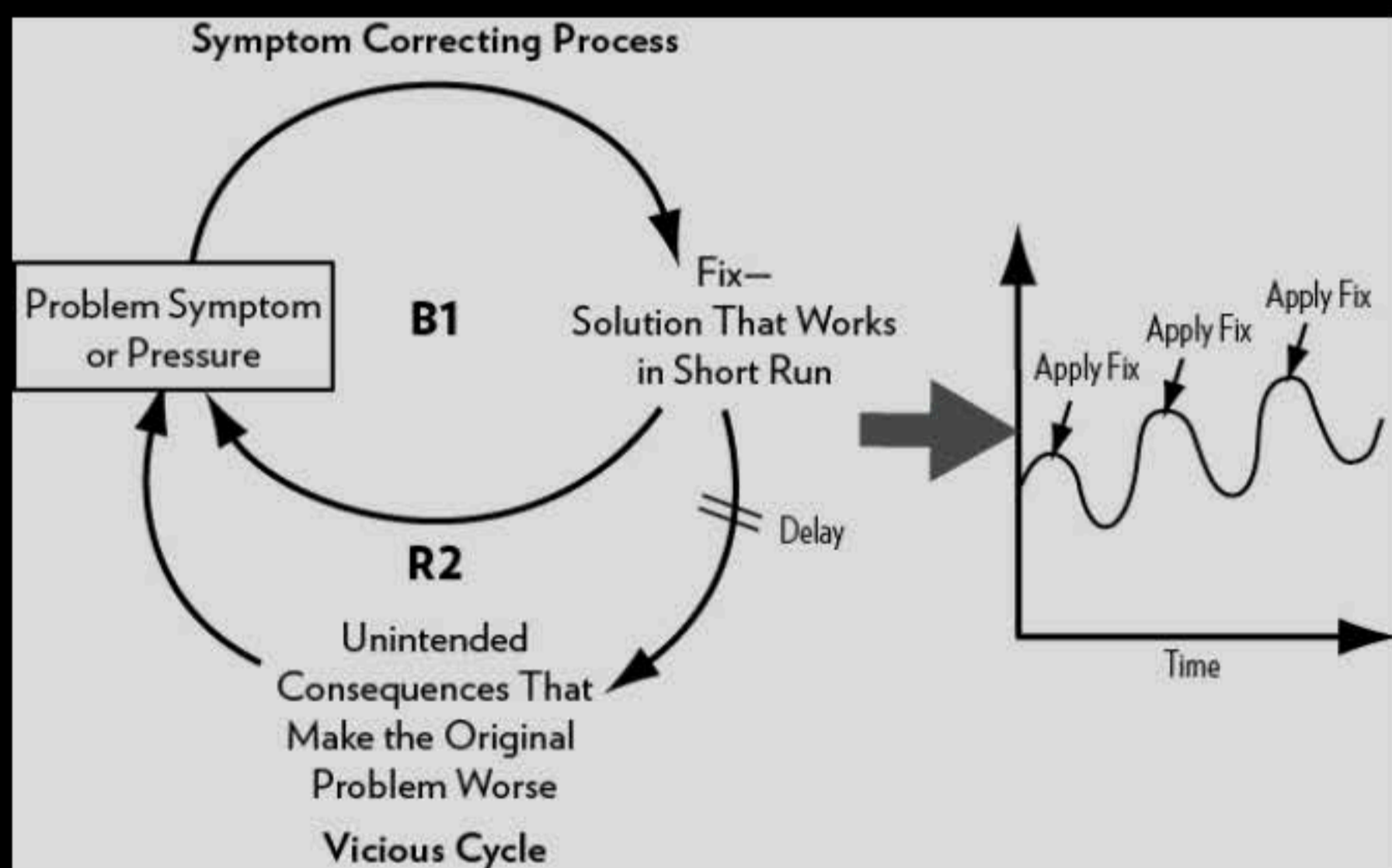

FIGURE 4.4 FIXES THAT BACKFIRE. Fixes That Backfire is the story of a quick fix producing unintended consequences that gradually make a problem symptom worse over time. Innovation Associates Organizational Learning

In health care, as costs of care increase, there is pressure to reduce the length of

hospital stays. However, people are often sent home too early and must be readmitted, thereby increasing costs of care even further.

In her book *The Crisis Caravan*, journalist Linda Polman cites the numerous problems created by well-intentioned funding sent by nonprofits and wealthier countries to relieve the devastation caused by civil war in poor countries. The relief aid, however well meaning, produces several unintended consequences that exacerbate these humanitarian disasters over time: Fighters in the war become healthier and more able to continue fighting, aid supplies are hijacked by despots or elites seeking to maintain power, and cynical leaders manufacture additional disasters to receive more aid. In addition, the funding provided for relief creates a market for relief organizations that come to compete with one another for more funding.[13]

Another type of relief aid, sending food to people suffering from starvation caused by either human-made or natural disasters, backfires in a different way. The people who benefit the most from food aid are children. Because they survive, they are able to reach childbearing age themselves. Countries receiving food aid then face another spike in

population growth and starvation ten to fifteen years after they received the aid.

Cases such as relief and food aid are particularly powerful in raising a poignant and difficult challenge faced by people who want to do good. While there are things people can do to ease others' suffering in the short term, these solutions could make things worse over time. It is incumbent on people who want to help to think through and mitigate the possible unintended consequences of their actions.

Typical keys to overcoming the tendency toward Fixes That Backfire include: questioning the wisdom of the quick fix, identifying an alternative response, or mitigating the negative consequences of the fix if no alternative can be found. Additional possibilities will be covered in chapter 10.

SHIFTING THE BURDEN

In many cases the best way to reduce the likelihood of Fixes That Backfire is to solve the underlying problem that produces the symptoms. People often recognize that a more fundamental solution is desirable, but then wonder why it is so difficult to implement. One of the key reasons is that addressing the root cause of the problem takes longer, is

more expensive, and can entail more risk and uncertainty.

This pull between implementing a quick fix and aiming for a more fundamental solution lies at the heart of the so-called philanthropic challenge: Do we fix the problem now or help people over time? In systems terms, depending on the quick fix is known as Shifting the Burden, which produces a similar pattern of behavior as Fixes That Backfire: Intermittent reductions of the problem symptom mask a gradual worsening of the problem. However, there are several important differences:

- In Shifting the Burden people generally know what the more fundamental solution is, but they cannot generate the motivation and investments required to implement it. By contrast, there is no clear fundamental solution to the problem symptom in Fixes That Backfire, and so a quick fix seems like the only possible response.

- In the short run the success of the quick fix, which is the obvious and easier of the two alternatives, creates temporary improvement in the symptom, which in turn undermines people's motivation to implement the more fundamental solution.

- In the long run implementing the quick fix produces unintended consequences that actually undermine people's ability to implement the fundamental solution even if they want to. One common way in which this ability is reduced is that the quick fix consumes resources (people, time, money) that would otherwise be available to solve the problem more permanently.

- As a result people come to depend more and more on the quick fix over time, and invest less and less in the core solution. This growing dependence on the quick fix is also known as addiction. Despite their better judgment, people become addicted to the quick fix.

The systems structure and resulting pattern of behavior are shown in [figure 4.5](). The top loop (B1) shows the quick fix, while the bottom loop (B2) shows the fundamental solution. B2 is virtual in the sense that it should be activated by the problem symptom but is not; instead the symptom is mitigated by the quick fix to the extent that people do not feel sufficiently motivated to implement a solution that tends to be longer-term and more costly. The combination of B1 and B2 form a vicious cycle that increases use of the

quick fix over time while decreasing incentive to use the fundamental solution. The R3 loop on the side shows that increasing use of the quick fix creates side effects that actually decrease the system's ability to implement the fundamental solution over time, thereby exacerbating the problem symptom even further.

The food aid and TAPI cases are examples of both Shifting the Burden and Fixes That Backfire. With respect to food aid, there is a general understanding in the development community that the fundamental solution to starvation is strong local agriculture. However, receiving food aid undermines motivation to develop local infrastructure. In addition the free food drives down local food prices and makes it difficult for farmers to grow and distribute food profitably, thereby weakening local agriculture even further.
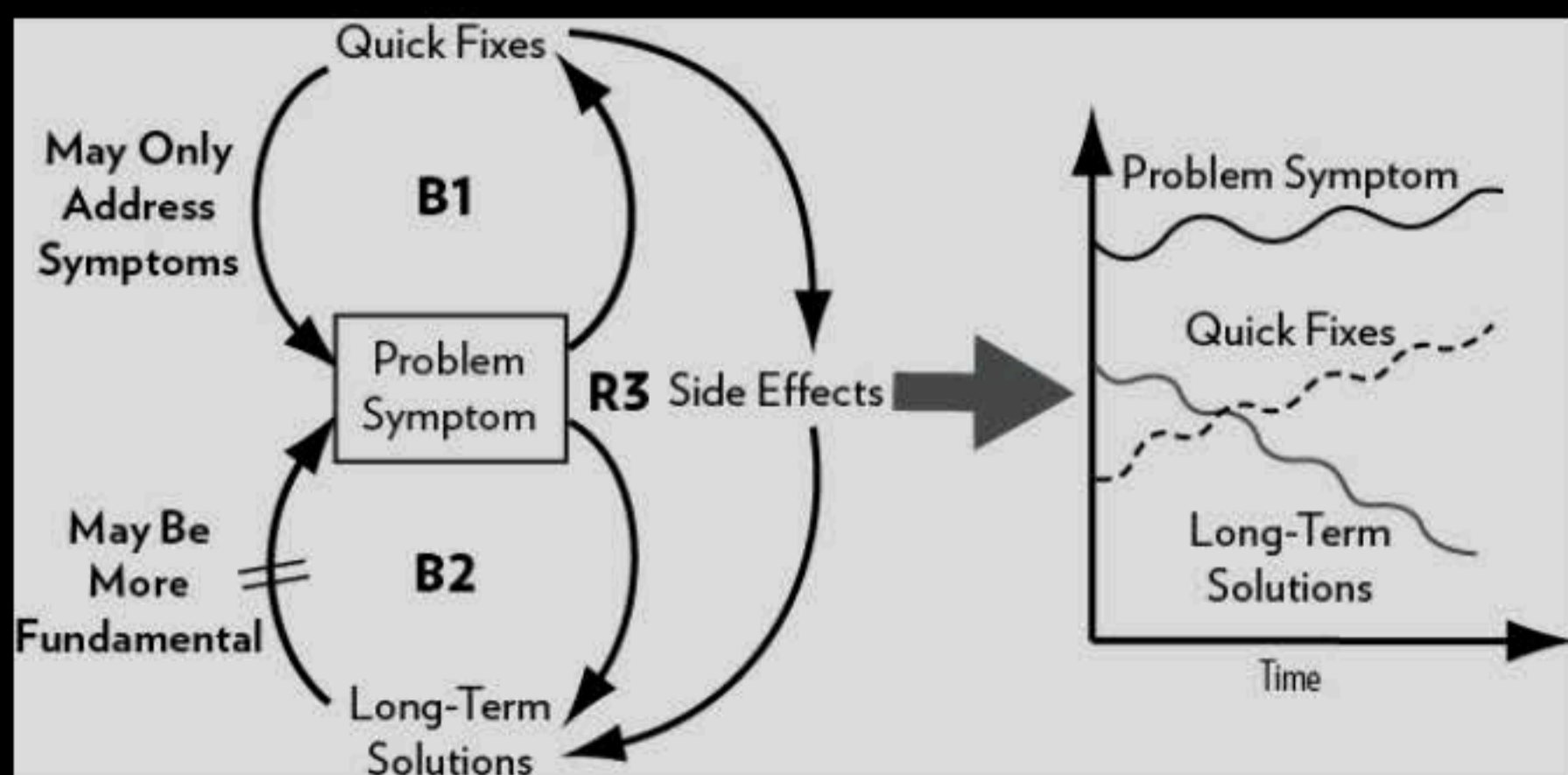
FIGURE 4.5 SHIFTING THE BURDEN. Shifting the Burden is the story of unintended dependency on a quick fix that reduces people's willingness and ability to implement a more fundamental solution. Innovation Associates Organizational Learning

When it comes to criminal justice reform, get-tough prison sentences lead public officials and ordinary citizens to believe that the crime problem has been addressed, thus reducing their motivation to invest in alternative means of solving it. These sentences get offenders off the street, but the burden is shifted when, upon release, formerly incarcerated people are *less* able to do the hard work of resettlement. In addition, the high costs of our current penal system reduce funding for community development and resettlement programs that would reduce crime and the fear of crime in more sustainable ways. Failing to invest sufficiently in community development and resettlement initiatives increases the possibility of crime and its accompanying fears.

In health care, it is common to invest more in treating illness than in preventing it or improving overall health. The long-term consequence of this investment is that there is less money available for influencing the

underlying factors that shape good health in the first place.

There are also examples of quick fixes that undermine fundamental solutions to be found in international development. William Easterly, a professor of economics and co-director of the award-winning NYU Development Research Institute, challenges people who are committed to relieving poverty in developing countries to be wary of supporting technocratic solutions implemented by autocrats.[14] He demonstrates that bottom-up development by mostly small actors is much more effective. While top-down technocratic solutions may provide temporary relief for poor people, or at least the appearance of relief, it also takes funds away from the more fundamental solution.[15]

The Shifting the Burden model plays out in the realm of corporate sustainability as well. As John Ehrenfeld, the executive director of the International Society for Industrial Ecology, explains, "Eco-efficiency, or delivering more value for less environmental burden, has been touted as the primary instrument for achieving sustainability. So has socially responsible investing . . . The problem is that none of this espoused benevolence creates true sustainability. At best, it only

temporarily slows society's continuing drift toward unsustainability; at worst, it serves as feel-good marketing for products and services that in fact degrade and pollute our environment and fail to meaningfully satisfy the needs of consumers."[16] Ehrenfeld distinguishes between what he sees as the quick fix of supporting more efficient consumption and a fundamental solution that changes the prevailing consumption-driven economic model to one that emphasizes the nonmaterial factors driving quality of life and does not depend on resource-depleting products to create satisfaction.

Peter Buffett, one of the sons of Warren Buffett and chairman of the NoVo Foundation, also calls for redefining the quality of life when he challenges what he calls "philanthropic colonialism."[17] He points out that growing the nonprofit sector is a quick fix to the problem of income inequality because it distracts donors from the deeper work of developing a more humanistic approach to capitalism. Buffet questions the logic of increasing poor people's capacity to consume at the expense of creating a more meaningful experience of prosperity for all. The unintended consequence of depending on the nonprofit sector to solve social problems

is that philanthropically minded public- and private-sector leaders can justify what they have earned through a structure that concentrates wealth in their hands by giving some of that wealth back to the poor without challenging the system of inequality itself.

Keys to overcoming the tendency toward Shifting the Burden include: questioning the wisdom of the quick fix, challenging assumptions that discourage investment in the fundamental solution, and establishing a long-term vision that motivates implementation of this solution. Additional possibilities will be covered in chapter 10.

LIMITS TO GROWTH

Limits to Growth is the story of unanticipated constraints (see [figure 4.6](#)). Its underlying message is that nothing grows forever. Any engine of growth or success (the R1 loop on the left of the diagram), however effective for a period of time, will inevitably be constrained by external and/or internal factors (that produce the B2 loop on the right side of the diagram). External factors might include the availability of funding, the accessibility of the target population, and the quality of natural resources. Internal constraints might include managerial capability, operational

capacity, and an organization's willingness or ability to collaborate with others.

One common example facing most social innovations is the problem of scale-up. Once the innovation is proven, it still faces challenges in expanding its reach to a broader client base. Constraints might come in the form of organizational capacity, funding, and/or ability to create effective partnerships.[18] An example of external constraints is the drain on environmental resources that sustain life as we know it, a problem identified in the pioneering 1972 book aptly titled *Limits to Growth*.[19]
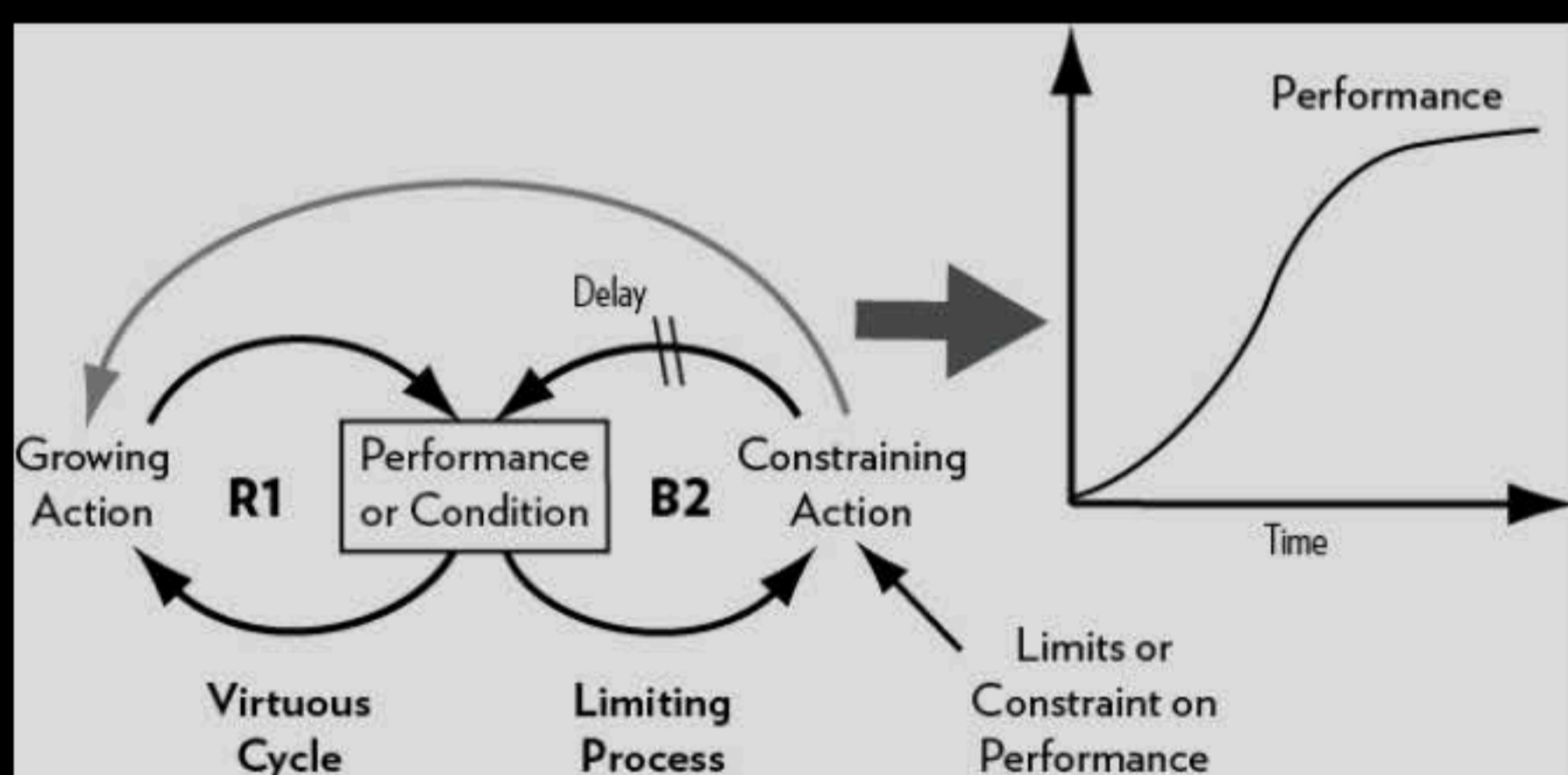

FIGURE 4.6 LIMITS TO GROWTH. Limits to Growth is the story of growth inevitably constrained by limits that must be overcome in order to sustain success. Innovation Associates Organizational Learning

When faced with Limits to Growth, the key steps leaders can take to mitigate the effects of the constraints are to resist the temptation to rely more heavily on the existing growth engine, identify or ideally anticipate the limits, and invest to overcome them using resources provided by the current engine or drawn from outside sources. Chapter 10 describes many strategies for increasing nonprofit capacity and scaling up successful social innovations with the Limits to Growth plot in mind.

SUCCESS TO THE SUCCESSFUL

The tendency to concentrate wealth or success in the hands of the few is itself a common dynamic in social systems (see figure 4.7). In a system with fixed resources, if party A gains an early advantage over party B, A can use that advantage to acquire even more resources (R1, which is a virtuous cycle for A). Meanwhile, party B begins at a disadvantage that grows over time as it becomes less and less able to generate additional resources (R2 is a vicious cycle for B). In other words, opportunity breeds success, success breeds opportunity—and the reverse is also true.

In particular, in his recent book on income inequality *Capital in the 21st Century*, French

economist Thomas Piketty points out that accrued benefits to the already wealthy come not just in the form of more goods, but also in the form of capital that makes them even more productive and thus concentrates wealth further and further into their hands.[20] Capital includes savings and inherited wealth that lead to such income-generating investments as stocks, land, higher-quality education, better health care, and access to influential people. By contrast, while money spent by people on acquiring goods may provide more comfort, it does not necessarily increase their access to the factors of production required to create more wealth.[21]
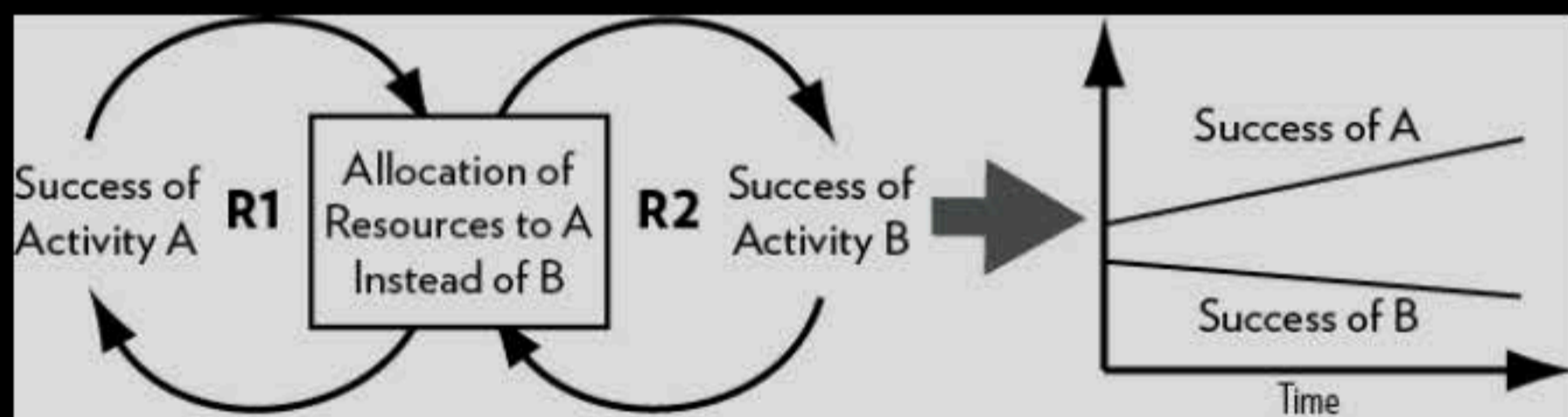

FIGURE 4.7 SUCCESS TO THE SUCCESSFUL. Success to the Successful explains how one party's success and another party's failure can be so closely linked. Innovation Associates Organizational Learning

While certain dynamics help the rich get richer, others work directly or indirectly against the poor and especially minorities.

This is what experts like Keith Lawrence, co-director of the Aspen Institute Roundtable on Community Change, call structural racism, which he defines as "the normalization and legitimization of an array of dynamics—historical, cultural, institutional and interpersonal—that routinely advantage whites while producing cumulative and chronic adverse outcomes for people of color."[22]

Examples of structural racism include gerrymandering and other restrictions imposed on largely minority voters. People who have been in prison, who are also largely black men, face higher hurdles to reenter society when they are released, including a criminal record that often discourages prospective employers. Infants and young children born into poor families get a worse start in life because their parents are often under enormous economic and emotional stress and do not have access to quality health care and preschool services. Recent studies show that the best way to fight inequality is to give these families help early—even before birth.[23]

While it is tempting to associate the Success to the Successful dynamic with capitalism, the tendency exists in most societies: capitalist, communist, and traditional. Sustainable societies moderate it through vari-

ous redistributive mechanisms that enable all of its members to live in relative balance.

ACCIDENTAL ADVERSARIES

As described in the Collaborating for Iowa's Kids case, Accidental Adversaries is the story of two prospective partners who gradually—and inadvertently—become enemies. As shown in figure 4.8, parties A and B ideally contribute to each other's success through actions they take that benefit the other (outside loop R1). When A for its own reasons is less successful than it wants to be, it independently adopts a solution that improves its own performance (B2). However, its solution unintentionally obstructs B's success. When B is less successful than it wants to be, it adopts a solution to improve its own performance that works for it (B3). However, B's solution unintentionally undermines A's success. The combination of independently chosen solutions that inadvertently obstruct each other's performance is a vicious cycle (R4). In essence, parties A and B create Fixes That Backfire on themselves by making life more difficult for the partner that could potentially help them.
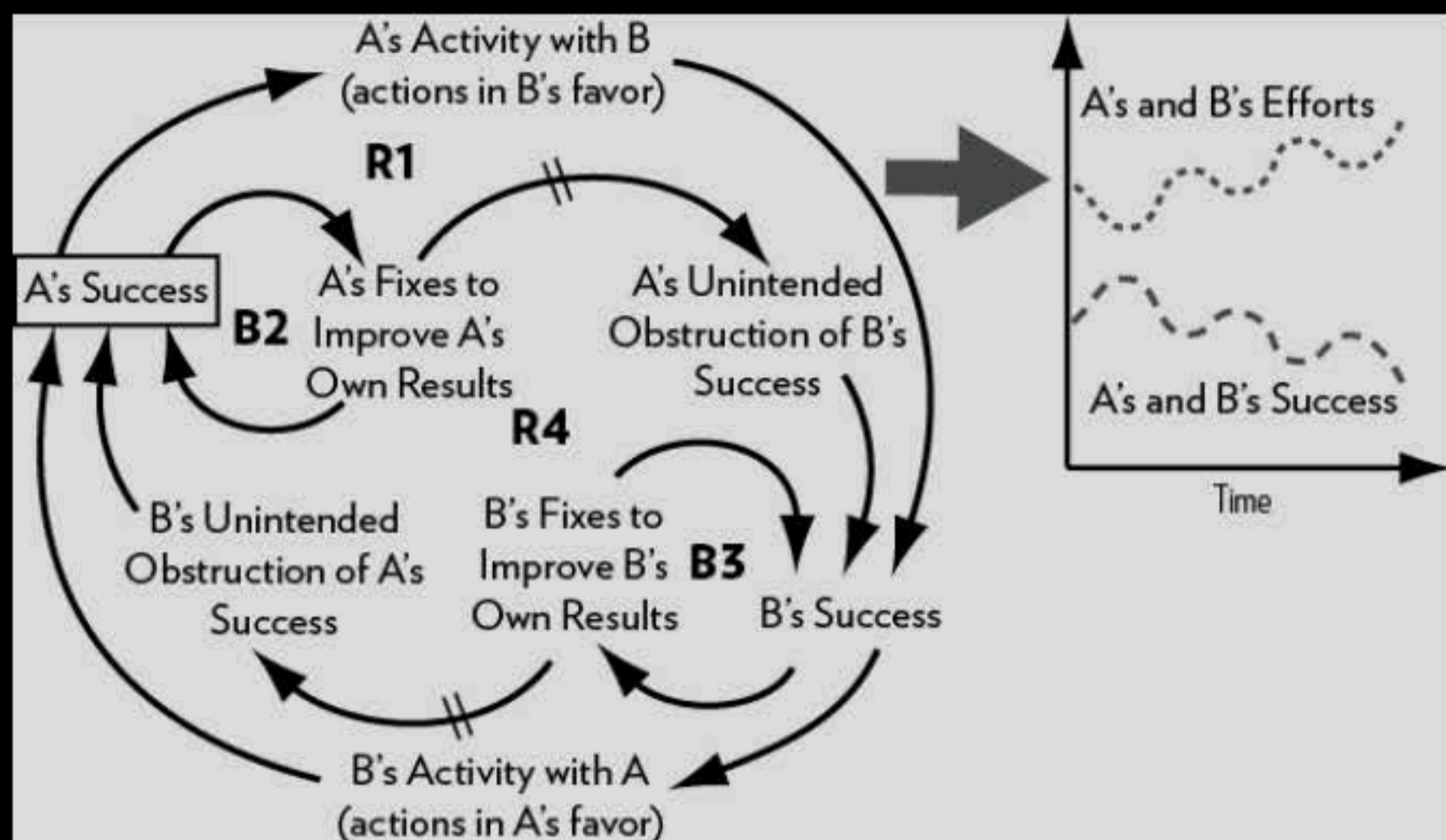
FIGURE 4.8 ACCIDENTAL ADVERSARIES. Accidental Adversaries describes how a promising relationship can unwittingly deteriorate into an adversarial one. Innovation Associates Organizational Learning

The Iowa case is an example of inadvertent conflict between a central organization and its geographic representatives. Stakeholders identified this conflict between the state Department of Education and Area Education Agencies as a system; they likewise identified the conflicts between AEAs as a system and individual AEAs, between individual AEAs and local school districts, and between local school districts and the state Department of Education. The same dynamic created tension between a community college district and the five individual colleges that made up the district. In this case a new college

president wanted to centralize functions historically managed by each of the individual colleges in order to increase efficiencies across the district. However, the colleges resisted centralization because they were concerned that losing control of these functions would reduce their ability to customize services for their distinct student bodies.

A very different example is the tension that exists between elected officials and civil servants.[24] Elected officials need the civil servants who work for them to implement initiatives, and civil servants benefit from the political influence provided by these officials. However, shifting political administrations often lead elected officials to implement changes that make it difficult for civil servants to fulfill mission outcomes despite election cycles, and the civil servants in turn seek to maintain mission-critical work.

For example, when William Riley became administrator of the US Environmental Protection Agency (EPA) under President George H. W. Bush, he sought to expand the organization's mission beyond solely regulation to focus more on pollution prevention and conservation. To accomplish this, he sought to integrate EPA programs around a place-based or whole systems approach to environmental

outcomes. This required moving away from the siloed structures and programmatic measures of success generated by years of legislative policies.

Then, four years later under the Clinton administration and new EPA leadership of Carol Browner (who to her credit tightened the Clean Air Act's ambient-air-quality standards), the agency reverted to the original siloed structures and programmatic measures of success despite many opportunities to do otherwise with the passage of the Government Performance and Results Act. During that time, however, senior civil servants in the Boston regional office kept Riley's integrated and pollution prevention approach alive through their restructuring of this office to create an ecosystem protection division and pollution and enforcement protection division. They also redesigned the programmatic and individual performance measures by reinventing the performance management system to reflect a place-based, integrated approach to outcomes. They did this out of a strong belief that the public good was best served by focusing on the organization's ends of environmental outcomes, not just the means of permits and enforcement cases, and despite overwhelming resistance

from some of their bosses in Washington and Boston as well as some of their peers. In an ideal world, both groups would work together to integrate, improve, or retire fragmented and antiquated laws and policies; establish shared strategic plans and goals that are both long- and short-term; and utilize all existing resources on behalf of the mission and strategic goals.

More generally, the keys to strengthening the partnership between Accidental Adversaries are to clarify the potential benefits of the partnership to both parties, emphasize that the problems caused by both sides have not been intentional, and support both groups to develop solutions to their respective problems in ways that do not undermine the other group.

OTHER SYSTEMS STORIES

Five other plot lines that can be easily recognized across multiple social problems are Drifting Goals, Competing Goals, Escalation, Tragedy of the Commons, and Growth and Underinvestment.

Drifting Goals is the story of an unintentional drift to low performance. It is a special case of Shifting the Burden, where the easiest alternative to implementing a long-term fun-

damental solution is to lower the goal of the system (thereby reducing the need to make such an extensive investment). For example, in recent years we have come to accept an increasing polarization in US politics, one that has threatened the very functioning of our federal government more than once. We allow this at the expense of effectively challenging the electoral process and the influence of money on political influence. On a more personal note, we have come to tolerate disrespectful language and highly sexualized expression in music and videos available to children (my son is ten) instead of questioning the values that generate them.

Competing Goals comes in two forms: conflicting goals and multiple goals.[25] In the first case, it is impossible to achieve two different goals by taking the same action. In the case of deep-seated conflicts, the goal of defeating one's enemy cannot be accomplished at the same time as the goal of peaceful coexistence. For example, the voices of Israelis and Palestinians who prefer a peaceful two-state solution are gradually drowned out by extremists on both sides who want their neighbors to be eliminated or subjugated instead.[26] By contrast, the problem of multiple goals is one of overload—people trying to accomplish too

many goals and therefore being ineffective in achieving any of them.

Escalation is the story of unintended proliferation: The harder you push, the harder your adversary pushes back. Most commonly, escalation describes efforts to dominate or gain revenge on the other party. Arms races and wars are examples of this dynamic, where each party tries to gain advantage over the other by force. Ironically, escalation also explains the "race to victimhood" found in identity-based conflicts where each side seeks to demonstrate that it is the more affected victim of the other's aggression.[27] Psychologist Terrence Real explains that these tendencies toward aggression and victimization are two sides of the same coin by observing that people tend to "oppress from the victim position" as a way of justifying their aggression.[28]

Tragedy of the Commons is the story of depleting a collective resource that no party feels individually responsible for maintaining.[29] It is most easily recognizable in the destruction of our natural resources—whether overharvesting fisheries and forests, polluting air and water, or exhausting valuable topsoil. A more subtle form within organizations is the tendency of individual departments to place excessive demands on

a centralized special resource (such as IT), thereby undermining the effectiveness of that resource over time.

Growth and Underinvestment is the story of self-created limits. By investing insufficiently in a new venture, an organization fails to adequately fund the capacity that would be required to meet growing demand. Because capacity is unable to keep up with emerging demand, the demand itself not only fails to increase but may actually decline. Moreover, the organization then interprets limited demand as a signal that its originally conservative investment was justified, instead of as an indication that sufficient investment in building capacity—not just demand—is the key to long-term growth. Examples of this occur in inadequate funding of new social ventures and restricting investment to expanding an organization's direct services at the expense of developing requisite organizational capacity.

Before closing this section, it is helpful to note one other story line, known as the Bathtub Analogy. This analogy adds the concept of flow to those of stocks (or levels or variables) and feedback relationships introduced so far. The analogy states that the level of water in a bathtub (or carbon dioxide in the

atmosphere, homeless people in a city, units of affordable housing in an area, and so on) is governed by the relative flows of water into and out of the tub. If you want to change the level of water in the tub, you have to change the relative rates at which water flows in and drains out, as figure 4.9 explains.

The analogy gained national attention as *National Geographic*'s Big Idea of the Year in 2009.[30] Developed by Professor John Sterman at MIT and described as The Carbon Bathtub, the idea is "simple, really: As long as we pour CO_2 into the atmosphere faster than nature drains it out, the planet warms. And that extra carbon dioxide takes a long time to drain out of the tub." In order to reduce the level of CO_2 in the atmosphere, it is necessary to both reduce CO_2 inflows *and* increase CO_2 outflows, when in fact economic growth and destruction of rain forests are producing the opposite effects. While the analogy seems deceptively obvious, Sterman notes that the tendency to confuse stocks (or levels) with flows is "an important and pervasive problem in human reasoning."
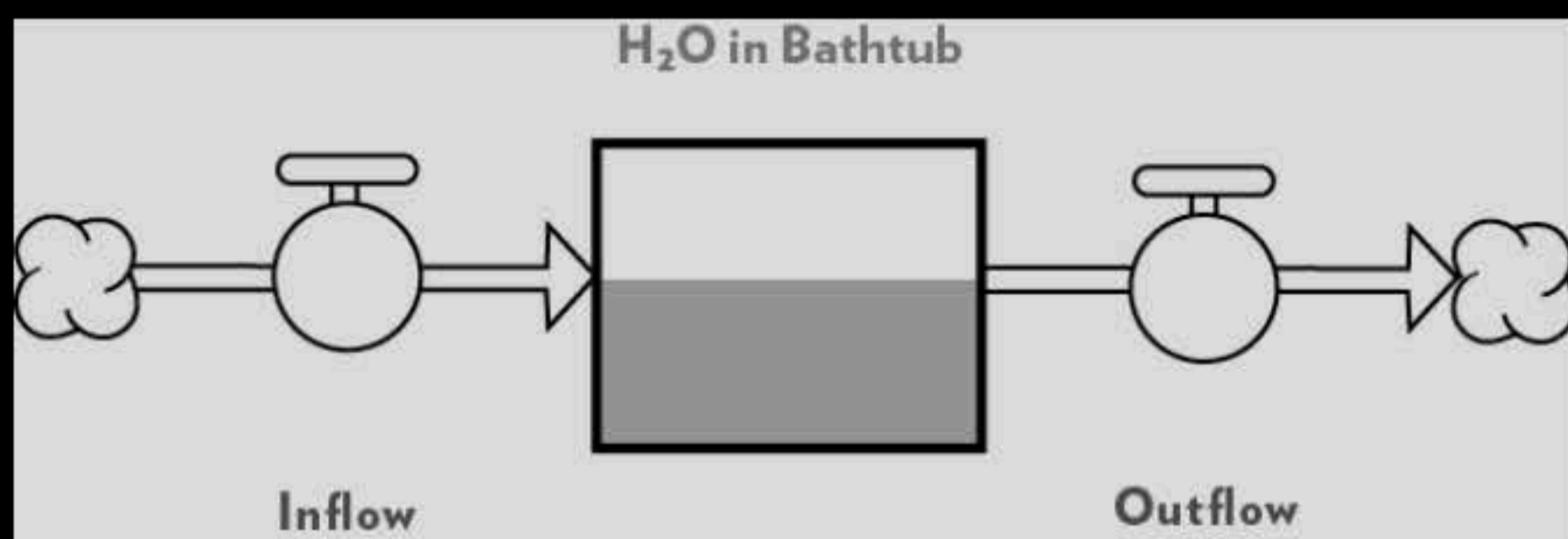
FIGURE 4.9 THE BATHTUB ANALOGY. The Bathtub Analogy highlights the importance of understanding stocks and flows when analyzing system behavior. Innovation Associates Organizational Learning

The twelve archetypes (including the foundational ones of reinforcing and balancing feedback) introduced here and summarized in table 4.1, as well as the Bathtub Analogy, form the basis for more complete stories, not their end point. However, these common and recognizable story lines can give people enormously valuable insights into more complex issues. These insights in turn provide the essential self-awareness required to shift less-than-functional dynamics.

The Stories Behind the Story

The dynamics described in the stories above are in turn perpetuated by two other key factors: people's *beliefs and assumptions* about how things should work, and their under-

lying *intentions* (or purpose). In other words, the system behaves the way it does in part because people are trying to prove that their assumptions are true and to achieve certain goals that they might not even be aware of or acknowledge.

In the case of Collaborating for Iowa's Kids, the fundamental belief held by each organization was that it was doing the best it could to improve K–12 education for children at its level (statewide, regional, or local), and that shortfalls in educational performance were caused by organizations in the system other than itself. The purpose of each organization was to optimize performance across the geographic area for which it was responsible, which it incorrectly assumed would optimize performance for all children throughout the state.

TABLE 4.1. SUMMARY OF SYSTEMS ARCHETYPES

Virtuous/Vicious Cycles	**Amplification and Reinforcement:** A reinforcing process producing success or disaster.
Balancing Process	**Correction:** We try to reduce the gap.
Fixes That Backfire	**Unintended Consequences:** The long-term negative consequences of a quick fix.
Shifting the Burden	**Unintended Dependency:** The quick fix we become addicted to.
Limits to Growth	**Unanticipated Constraints:** The limiting mechanism on spiraling growth.
Success to the Successful	**Winner Takes All:** Your success produces my failure.
Accidental Adversaries	**Partners Who Become Enemies:** Two parties want to cooperate, but each sees the other undermining its success.
Drifting Goals	**Inadvertent Poor Performance:** Actual and desired performance levels gradually fall.
Competing Goals	**Conflicting or Multiple Commitments:** Trying to satisfy conflicting goals or achieve too many can lead to accomplishing none.
Escalation	**Unintended Proliferation:** The harder you push, the harder the competitor pushes back.
Tragedy of the Commons	**Optimizing Each Part Destroys the Whole:** Everyone takes advantage of a resource that doesn't belong to anybody.
Growth/Underinvestment	**Self-Created Limits:** We push on the growth side and underinvest in the capacity to grow.

Source: Innovation Associates Organizational Learning and Bridgeway Partners

In the case of The After Prison Initiative, advocates of reform believe that rates of incarceration continue to increase despite decreasing crime levels because of structural racism. Others say that high incarceration rates have in fact caused crime levels to drop, although they also note that the marginal benefit of continuing to increase the number of people in prison might not be justified in terms of corresponding decreases in crime.[31]

Reformers perceive that the underlying purpose of harsh prison sentences is to marginalize people of color and other minorities because they are different, while many elected officials argue that the purpose of public safety is being achieved by get-tough sentencing.

Being able to recognize all these plot lines in a systems story helps enormously as we enter the next stage—managing change through the four-stage process.

Closing the Loop

- Systems structures can be summarized in terms of recognizable story lines or plots that recur across a wide variety of social issues.
- The key drivers of systems stories are what people assume to be true and their underlying intentions.
- There are several ways to shift these dynamics. The first step in all cases is to become aware of them and one's role in perpetuating them.