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Features

Mastering System Change

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Organizations are increasingly turning to system change to tackle big social problems. But systems are complex, and mastering the process requires observation, patience, and reflection. To begin, here are two approaches to pursuing system change.

Mastering System Change

Gone's for once the old magician with his countenance forbidding;
I'm now master, I'm tactician, all his ghosts must do my bidding.
Know his incantation, spell and gestures too;
By my mind's creation wonders shall I do.

from "The Sorcerer's Apprentice," by J. W. von Goethe[1]

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Illustration by Kevin Mercer

In J. W. von Goethe's poem "The Sorcerer's Apprentice," an old sorcerer leaves his young apprentice behind to clean the house. The boy soon tires of his chore and uses a magic spell to enlist the help of a broom. The broom, however, starts pouring pails and pails of water on the floor. The boy is unable to control the broom, and the house is flooded. When the sorcerer returns, he quickly breaks the spell, cleans up the water, and warns the boy not to use forces he doesn't understand and can't control.

The poor young fellow had what we might call today an unfortunate encounter with complex causality. Instead of creating "wonders" by commanding a bewitched broom whose powers he neither understood nor could control, the apprentice's actions caused chaos and damage.

We were reminded of the apprentice's story when reflecting on the growing interest and sometimes outright infatuation with system change. Like the sorcerer's broom, any system that prides itself on some minimal complexity is difficult to understand or to control. Do we—like the sorcerer's apprentice—ask for trouble when we intend to change systems? Yes, we do!

But that doesn't mean that we shouldn't attempt to change complex systems for the better. What it does mean is that we must be respectful of the difficulty and dangers of trying to do so. In this article, we want to arm you with effective "spells and gestures" to ward off some of the troubles you may encounter when undertaking system change. We will also offer two different approaches, or archetypes, for pursuing system change that we have identified during the course of our research,

and by doing so provide examples of how organizations can master the cause-effect architecture of systems and enact effective change.

THE APPRENTICE'S DILEMMA

Despite the best efforts of policymakers, foundations, NGOs, and social enterprises tackling issues like poverty, preventable disease, and poor education, these seemingly intractable problems persist. In response, many are turning to the idea of system change as a way to solve the root causes of these problems.

Recent articles in *Stanford Social Innovation Review* reflect the hopes and ambitions inherent in efforts to promote system change as a defining approach of social innovation. Reviewing these articles reveals that many people see system change as a silver bullet for increasing the effectiveness of social innovations to create better services by making health-care organizations more capable and agile;[2] integrating the voices of beneficiaries in defining what success means;[3] and transforming the education system into a learning ecosystem.[4]

Another set of system change articles seeks to solve complex social problems more effectively and efficiently by creating space for collective wisdom and action to emerge;[5] understanding the system in which social problems sit;[6] and supporting system entrepreneurs that overcome resource constraints to change systems.[7]

And a third set of system change articles seeks to help foundations and funders make positive social gains sustainable at scale by following five simple rules;[8] employing an "ecosystem of tools";[9] taking into account all aspects of a problem from the start;[10] and coordinating the assets of several funders.[11]

Measured in terms of motivation and ambition, the time is no doubt ripe for system change. But most authors also agree that we are far from competent in dealing with systems. Sara Farley, cofounder of the Global Knowledge Initiative, says that "there is real excitement about systems right now and many are willing to say 'systems matter' even with little understanding what that means." In a recent article about system leadership, the authors expressed similar concerns: "There is a widespread suspicion that the strategies being used to solve our most difficult problems are too superficial to get at the deeper sources of those problems."[12]

But what is even more concerning than the lack of competence is, as Dan Vexler recently pointed out, that the adoption of the systems discourse signals a stark expansion of the social sector's ambitions by aiming higher.[13] Dietrich Dörner, a pioneer in studying how professionals engage with system change, warns about ambitious people with good intentions who lack adequate competence. "Incompetence that would otherwise have remained harmless often becomes dangerous, especially as incompetent people with good intentions rarely suffer the qualms of conscience that sometimes inhibit the doings of competent people with bad intentions,"[14] writes Dörner.

In system work, small mistakes add up because cause and effect are separated in time and are difficult to observe. This dynamic hinders ongoing adaptation, and people may not realize their errors until it's too late. Dörner reminds us that social evils, atrocities, crimes, and even wars may be triggered not by bad intentions but by the inability to deal with the causal complexity of systems. "When simple inability begins a causal series, extremely brutal actions can result in the end."[15]

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This is the story of the sorcerer's apprentice applied to system change. But it's not just the complexity inherent in systems that makes change efforts difficult. We also need to pay attention to how those doing system change experience this dynamic and how they decide and learn from this experience over time.

PSYCHOLOGICAL DYNAMICS OF TRYING TO CHANGE A SYSTEM

Psychologists like Dörner have studied the struggles of thousands of professionals from different backgrounds trying to change complex systems, such as a declining region or a whole city, for the better. These psychologists observed predictable patterns of pathological behavior. Experienced professionals with high ambitions tended to quickly decide on system interventions but spent little time trying to understand system dynamics and characteristics. Expecting success rather than learning caused frustration and emotional stress when their efforts produced early failures and unintended consequences.

To quickly regain a sense of control, participants frequently jumped from one topic area to another. They might, for example, begin by investing in affordable housing, but when challenges emerged, they prioritized agriculture, schools, or community health workers, hoping that some intervention would eventually work. And finally, instead of adequately reflecting on prior decisions, participants resorted to making big bets in single, "no-risk" areas such as job creation or education to create the illusion of success. A negative feedback cycle of ineffective behavior coupled with increasing ambitions and loss of control was the fate of many efforts to make a system "better."

Intervening in complex systems requires keen attention to two issues: to avoid making systems worse by creating unintended negative consequences; and to protect the mental sanity, motivation, and emotional strength of those who aspire to change systems. In other words, steering system change requires that we nurture and develop our levels of competence and ambitions in sync.

UNDERSTANDING AND CHANGING A SYSTEM'S ARCHITECTURE

More than 2,000 years ago, Aristotle understood that comprehending the world requires knowledge of the causes that make it spin. In our research, we have adopted the perspective that the systems people target for change are causal architectures that have social problems as their effect.

The architecture of social systems is fundamentally shaped by the characteristics of people, their beliefs and ambitions, their skills and access to resources, and the norms and rules by which they relate to each other and their environment. Different systems have different architectures and thus generate different patterns of behavior.

This causal architecture also generates the characteristics and dynamics of social problems, or what one might think of as undesirable system effects. In other words, systems themselves are not

problems, but their architecture may create and sustain social problems. System change efforts therefore require spelling out which sets of problems are targeted and determining how system change is an effective way to do something about these problems. System change does not replace problem solving but instead challenges us to couple both dimensions.

Because of the complexity of system architectures, many change proposals rely on collaborative initiatives.[16] But collaboration introduces additional complexity and requires aligning resources, competencies, strategic priorities, and ideologies about effective and legitimate means and ends across partners from different sectors. Whether this complexity can be mastered effectively is an open question. There is much to learn from collaborative system change efforts over the next decades.

But we think there is also much to be learned from looking at how single organizations can change systems by finding ways to operate at lower system complexity and to overcome the apprentice's dilemma. In this article we examine two organizations—Sekem and Gram Vikas—that have made great strides toward changing seemingly intractable problems in Egypt and India, respectively. We believe that they provide two archetypes for system change that improve the odds of mastering causality—of understanding and transforming systems to generate intended outcomes.

The first archetype, exemplified by Sekem, is "changing a system by building a system." In this archetype, an existing system is not directly transformed but rather lured toward a new trajectory by the

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attracting forces of a newly built system with desirable properties. The second archetype, exemplified by Gram Vikas, is "changing a system by isolating a subsystem." This archetype directly transforms the architecture of a lower-complexity subsystem to alter behavior that generates more desirable outcomes. There may well be many more effective archetypes for system change, but the purpose here is to introduce the principles and practices of effective system change archetypes by focusing on these two types.

SEKEM: CHANGING A SYSTEM BY BUILDING A SYSTEM

Systems theory has developed the idea of attractors, particular states, toward which systems gravitate. Social scientists adopted the term "attractors" to denote forces that make systems evolve into and get stuck in unfortunate situations, such as high levels of poverty and inequality. Attractors can also mobilize a system—for example, when a powerful idea resonates deeply within a system and shifts its trajectory toward new possibilities. When President John F. Kennedy articulated the vision to put a man on the moon, his idea acted like a magnet that attracted and reconfigured a large system of research and development across many public and private initiatives to create something that was not considered feasible at that time.

Looking at Sekem allows us to explore the idea of attractors for changing systems in a development context. The organization built a complex system composed of several commercial, social, and educational entities. This system created such radically different and desirable outcomes that it became an attractor with the potential to shift Egypt's trajectory. Sekem is doing this in three ways. It provides such a stark contrast to reality that it acts as a mirror showing Egypt that a desirable future and new possibilities can already be enacted today. Its bold vision has become a welcome symbol of pride and ambition against a background of pessimism and hopelessness in the rest of Egypt. And the fact that Sekem designs, owns, and controls all aspects of the system it is creating provides it with the resilience to withstand the tensions and threats that Egypt (as a transitioning system itself) poses.

Sekem was started by Ibrahim Abouleish, who was born in 1937 into a Cairo manufacturing family that was culturally open-minded and Muslim. The family lived in the city's Jewish quarter, and Abouleish attended a Christian kindergarten and a French elementary school. After graduating from high school, Abouleish moved to the small town of Graz, Austria, to fulfill his dream of studying in Europe. At the University of Graz, he earned a PhD in pharmacology and became a research director at a pharmaceutical company.

In 1975, Abouleish made an extended visit to Egypt and confronted a dysfunctional system. The economy was broken. Businesses had been nationalized and ran deficits. Most people seemed to have jobs that neither inspired them nor provided sufficient income. Rural areas were abandoned for urban centers and urban slums were growing. Waste was piling up everywhere. Health-care and education systems were ineffective. And misguided agricultural policies resulted in water, land, and crop contamination with diseases and pesticides. What a contrast to his memories of a mostly joyful childhood. Abouleish was devastated. "On my return journey I sat in the plane and thanked Allah that I did not live in Egypt, but in beautiful Austria with my wife and two children and my successful career," he says.[17]

But Abouleish's urge to do something about Egypt's problems grew. Many reasons for Egypt's system failure were obvious. Corruption, inefficient economic reforms, lack of accountability for bad services, and inconsistent legal procedures all conspired to attract a system toward a state of painful hopelessness. But how to change this system?

In 1977 Abouleish made a radical decision: He quit his job in Austria and moved with his family to Egypt. He bought 70 hectares (roughly 7,000 acres) of desert land that no one wanted and started an initiative that he called Sekem. His dream was to build a garden in the desert as a basis for comprehensive development of people and the land. Rather than changing the system of Egypt and its many problems, he aspired to build his own system, in the form of a parallel world that people could come see and touch. Sekem would become a mirror for Egypt to show how a healthy system could be realized today.

Many supporters, mainly from Germany, were attracted by this bold vision and came to leave their footprint: Architects designed beautiful houses, cows were shipped from Germany to help build up soil fertility, a medical doctor organized and helped build medical facilities to earn the trust of local communities. Sekem's economic support was based on biodynamic agriculture and enabled the growth of Sekem companies selling organic textiles, foods, and herbal teas as well as biopharmaceuticals. Kindergartens and schools were built, and Sekem's Heliopolis University—which deeply integrates sustainable development into its research, teaching, and outreach activities—opened in Cairo.

Sekem transformed desert land into an oasis, beautifully landscaped with artistic touches and a large amphitheater, plentiful shade trees, and flower gardens at every turn. "I wanted beauty and grace not just in addition to the companies, but as an integral part from the start, spreading its influence over everything," Abouleish wrote.[18]

It took time for local communities and public servants to change their initial reservations and outright hostility into a more supportive relationship with Sekem. Today, Egyptian politicians proudly bring foreign visitors to Sekem, and many countries have invited Sekem to replicate its model. Convinced by Sekem's development of biological pest controls, Egypt changed its agricultural policies to radically limit pesticide use. The farmers surrounding the Sekem farms have imitated and adopted the methods of replacing chemical fertilizers with compost for improving soil fertility. Sekem thus kick-started an Egyptian market for healthy biologically grown food that is now increasing by 15 percent annually.

Sekem also became a preferred employer, due to its emphasis on providing safe, healthy, and dignified work conditions. Sekem encourages every employee to spend about 10 percent of her time on personal development by participating in the many artistic and scientific courses, events, and discussions that are offered. Abouleish had always believed that arts encouraged people to be more open and respectful toward their environment. He considered this spirituality essential for the development of ecological consciousness and social change. New Sekem staff members often resist these activities but soon experience how their participation creates trust and respect and connects people into a community.

The Sekem schools and university also include training in environmental sustainability, the arts, movement, and music, which is quite exceptional in Egypt. Many state-run schools are now inviting Sekem to teach courses in sustainable development. Sekem's female management and the many young female employees who received training in traditional male jobs are acting as role models for the schoolchildren who spend time during their summer break on the Sekem farms or at the Heliopolis "children's summer university."

Helmy Abouleish, who after the death of his father, Ibrahim, in 2017 became CEO of Sekem, created the Egyptian National Competitiveness Council to develop strategies for innovation, green transformation, and education and to influence government policies for sustainable development. However, shifting the trajectory of a large system like Egypt is a slow process. The Egyptian revolution of 2011 put a screeching halt to the transformation of Egypt. About 75 percent of Egyptian private businesses collapsed because of the crisis, but Sekem did not lay off a single employee.

Sekem's organizational resilience and spiritual strength enabled the Sekem community to re-engage with its mission, what its founder called a "200-year plan"—three generations working on attracting people, resources, and policies to lure the system of Egypt onto a new trajectory. Indeed, Egypt's 2014 constitution for the first time emphasized topics such as sustainable development and the protection of workers' and women's rights. The United Nations called this constitution and Egypt's Vision 2030 (its sustainable development strategy launched in 2015) "unprecedented in its scope and significance at the national level." [19]

GRAM VIKAS: CHANGING A SYSTEM BY ISOLATING A SUBSYSTEM

We often hear that in today's hyperconnected world, everything is linked to everything. Consequently, every action has system-wide effects. But if this were really the case, either complex systems would be in a frozen state where no part could make an independent move, or the radical ongoing change in systems would preclude any hope for understanding and intervening in its causal structure.

In many ways, system change resembles an innovation process—an investment in learning with uncertain outcomes.

Fortunately, the Nobel Prize-winning economist Herbert Simon reminds us that complex systems are hierarchical.[20] They consist of layers of subsystems that have lower levels of complexity and that are connected to some, but not all, other subsystems. Consider a human body as a complex system. It consists, for example, of organs, functional subsystems that are much less complex than the entire body. If we could not isolate and intervene in these subsystems, medicine as we know it would not be possible.

Can we use this insight from medicine for social systems too? Our own research indicates that subsystem isolation might indeed be an effective change archetype. "Relational" subsystems such as individuals within a group or families with strong relational bonds, "spatial" subsystems such as remote villages or islands, and "functional" subsystems such as education or health care might all be considered as lower-complexity subsystems of a larger social system. In fact, specialized functional subsystems in developed countries can sometimes be considered almost in isolation.

Mature functional subsystems like health care are the results of decades of improvements and specialization. They are composed of dedicated staff, have clear codes of conduct, and often colocate with distinct infrastructure such as a clinic. All these characteristics of functional subsystems facilitate mastering causality: understanding and transforming their causal architecture.

This mastery, for example, enabled health professionals to transform Nova Scotia's public health-care system.[21] Staff, processes, and infrastructure that were a part of Nova Scotia's health-care

subsystem could be identified and its behavior could be studied. People were trained, information flowed more freely, decision-making processes were improved, and a new vision was articulated to this specialized group of professionals. Prior analysis of the causal architecture of such subsystems is possible and therefore valuable, and design-driven approaches are useful.[22] And the transformation of a functional subsystem like health care can improve the lives of everyone in the larger social system.

The example of Gram Vikas illustrates how spatial subsystems, in this case remote villages, can be isolated and transformed. When Gram Vikas set out to tackle the problem of inequality in rural India, it set itself up for a tough and drawn-out learning curve.[23] Initial efforts were plagued by some of the pathological system change behaviors previously mentioned. Over several years, the organization intervened in various subsystems in rapid succession, driven by high ambitions to make a difference.

In the beginning, Gram Vikas focused on seemingly simple functional subsystems such as small-scale agriculture, dairy, and education. But in developing countries, functional subsystems are harder to isolate and understand. They lack dedicated staff and infrastructure, clear codes of conduct, and stable patterns of operating that facilitate understanding and reconfiguring these systems. As a result, Gram Vikas' tactics frequently resulted in mis-specified and thus ineffective solutions that made vulnerable communities sometimes worse off.

Almost by accident, Gram Vikas (now desperate for some positive action) learned how to provide solutions that had lower risk of failure and generated quick benefits. By providing effective medicines, electricity from biogas, and simple water infrastructure, the organization earned the trust of rural villagers and enabled the organization to learn about the multiple causes of inequality. But this approach also drove Gram Vikas into a pure problem-solving mode where targeting one problem opened up a whole new box of problems. The constant change of focus was overwhelming and left the organization exhausted, and at risk of losing a sense of progress and motivation. Many early members of Gram Vikas left.

Leaders of the organization then had an important insight: Instead of focusing on functional subsystems that were hard to isolate, it would focus on spatial subsystems. A rural village is probably the smallest subsystem that contains all the dimensions of gender and caste inequality in India—economic, cognitive, normative, and power issues. Gram Vikas had learned from prior engagements that the causal architecture of a village is still complex, but its cause-effect dynamic is sufficiently stable to be observed and understood. Villages are also sufficiently isolated from unpredictable environmental influences. These characteristics open an opportunity to learn how to transform the architecture of a village.

Armed with this insight and with the accumulated knowledge from years of studying village life, the organization adopted a new approach, whereby it motivated villagers to engage in a joint effort with Gram Vikas to build water and sanitation infrastructure. The prospect of having a toilet, a shower, and a water tap in the kitchen for every household reduced the villagers' attention and resistance to the reorganization of the village social life that slowly took place in the background.

Taking clues from their prior problem-solving interactions with villagers, Gram Vikas now focused on the causal architecture of the village as a subsystem.[24] Gram Vikas insisted that people from all households in a village were formally elected into a general body and executive committees. Women and lower-caste people participated at equal levels with men, and higher-caste villagers in subcommittees focused on issues like sanitation, water, and education. For the first time, women and many lower-caste people engaged in economic activities and collective decision-making processes. Women were also trained in traditional male crafts such as masonry and fish farming.

Over a period of three years, a village was completely restructured, and Gram Vikas was able to phase out its engagement. At this stage, villagers owned their own transformation through the process of equal membership in all decision bodies. These villagers were also much more confident. They started to collectively bargain with external agencies such as banks, traders, and contractors and demanded support and resources from the government.

Over the course of a decade, Gram Vikas replicated this approach in more than 1,000 villages. This focus on spatial subsystems potentially indicates an alternative approach to the often-voiced ambitions of changing entire systems at the level of the total scale of a problem—for example, inequality in India or even globally. While engaging in large system change may rarely be feasible, one can carve out smaller subsystems that enable organizations to learn and to master causality for effective interventions.

At some stage, these small steps add up to create positive feedback cycles that drive change in the larger system. For example, women from transformed villages do not allow their daughters to get married into a nontransformed village with high levels of inequality and no running water. The hopeful husband-to-be then becomes a powerful change agent for that village and often succeeds in getting the village elders to start talking to Gram Vikas. Transformed villages offer such a desirable contrast to traditional villages in their area that they increasingly become role models and an aspiration for whole regions.

The two archetypes we have described do not exhaust the possibilities for system change. Wars, revolutions, and social movements, for example, are all archetypes that can fundamentally reconfigure the causal architecture of large and complex systems and put them on a new trajectory. But it is unlikely that one could master the complex and unpredictable causality inherent in these archetypes (although some have tried).

Another interesting archetype involves the current efforts to scale up existing solutions to the size of their addressable problems. The causal logic of this archetype partly resides in the expectation that increasing scale will eventually shift a system.[25] Recently, a group of prominent donors have launched the Co-Impact initiative to invest up to $500 million in support of this archetype.[26] All of these initiatives provide important opportunities for learning about effective archetypes, their potential and limits, and when and how proposed change mechanisms such as system entrepreneurship[27] and system leadership[28] work best.

THREE WAYS TO MASTER CAUSALITY

An important challenge for system change initiatives is that learning curves tend to be flat and drawn out. Enacting system change requires observation, careful probing, and reflection. In many ways, system change resembles an innovation process—an investment

in learning with uncertain outcomes.[29] One may not be able to get better fast, and research indicates that expectations of quick results may be counterproductive because our ambitions tend to vastly outgrow our competencies.

Those managing system change work need to pay extra attention to helping stakeholders to remain motivated and committed, to suppressing pathological behavior, and to improving stakeholders' capacity to accumulate relevant knowledge and other resources that increase the number of options for productive action.

Our research indicates that there are three important things organizations can do to help achieve these goals: do things right before doing the right thing; climb system peaks to get a better view; and hire and nurture people with a commitment to learn.

Do things right before doing the right thing | Russell Ackoff, a prominent systems thinker, strongly believed that it was better to do the right thing wrong than the wrong thing right because the former may be improved by learning, but the latter reinforces ineffective behavior. Our data, however, suggest that engaging with a system may be facilitated by doing the "wrong" thing first. In other words, by engaging in activities even if they are not in line with one's mission and learning to do them right—that is, getting good at doing them.

Joe Madiath, the founder of Gram Vikas, shared with us his organization's many initial failures when trying to do the right thing by directly attacking inequality despite having few relevant competencies. The failures took a toll and severely threatened the survival of the organization. "We learned the hard way that we need to fulfill the fundamental needs of villagers first before we win their hearts and minds," says Madiath. When Gram Vikas instead began providing tangible benefits like medical services and electricity, it created the trust and good will that motivated local communities to reveal issues of power and dependency, chronic alcoholism, and indebtedness, the buried causal system architecture that sustained high levels of inequality.

Sekem allocated scarce resources early on to provide services that created quick benefits for communities. It built a medical facility and infrastructure for water, electricity, and transportation that earned it the trust and support of local communities.

The benefits and momentum created by providing concrete services enable organizations to dive deeper into a system's architecture. When people begin to trust the organization, they start to share the hidden system elements that prior analysis or observation alone couldn't unearth. Without this deeper understanding of how a system ticks, there is little hope of engaging with systems effectively.

Initially, organizations should avoid decisions and actions that are hard to reverse or that irritate central actors in the system, such as village elders or officials with power. Services that seem to be compatible with this strategy include simple medicines, access to water, energy sources such as biogas, microfinance, and housing.

To sum up, the goal for system change apprentices is to make small, safe steps and to learn how to walk before picking up momentum and starting to run. Perhaps it's best if we swallow our pride, ambition, and beliefs in our own competence. Instead, let's do some-

thing simple first, learn a lot about a target system, and re-engage with our mission later.

Climb system peaks to get a better view | Doing things right—such as effectively delivering basic benefit-creating services like clean water—enables an organization to occupy a temporary privileged position within a system, like a peak in a complex landscape. Systems have many such peaks, possible interventions that change some aspect of a system for the better and in return provide an organization with valuable resources and insights to plan its next moves.

Most peaks are very small. When Gram Vikas delivered medicines to villages, it gained some insights about the nature of inequality. This was helpful, but it also showed the organization that it lacked the competencies to tackle such a complex problem. However, one of the small peaks that Gram Vikas occupied in its early years—buying cows to provide milk—opened the way to a much larger peak: providing biogas and electricity from cow dung in a financially sustainable manner. Climbing that peak took several years and involved serving more than 8,000 villages and building up an

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effective and well-managed organization. This success created tremendous good will, a reputation as a can-do organization, and the appetite and confidence for operating at large scale.

Gram Vikas now had deep insights into the structure of villages as subsystems, and its reputation provided access to resources from the private, public, and philanthropic sectors. Providing biogas did little to fulfill the organization's mission to tackle inequality. But climbing this peak unlocked the insights and tangible resources required to plan and enact their ultimate intervention, the transformation of villages to lower inequality. Now Gram Vikas could competently re-engage with its mission.

Sekem's initial peak—investments in infrastructure such as roads, water, and electricity that could also be used by local communities—turned out to be a very big peak and one that they are still climbing today. Infrastructure also provided a space that Sekem controlled and could be shaped into a reality that was different from its environment. How system change unfolds is hard to plan, which is why it is important that organizations accumulate resources such as trust, good will, positive reputation, and infrastructure to seize opportunities that arise during system change work.

Climbing system peaks also creates positive momentum and a feeling of success for those working in the organization and their beneficiaries. This experience reduces the emotional stress associated with early failure that otherwise might generate pathological behavior. Organizations also become more ambitious and bolder if they experience success, and in that manner they grow this ambition in sync with developing system competencies.

Hire and nurture people with a commitment to learn | The system change strategy that we propose has implications for how to build an effective change team or organization. Studies on complex

problem solving indicate that contrary to what one might think, prior expertise or general intelligence may not help much in enacting system change.

Systems refuse to behave like the models we hold in our minds based on our experience with other contexts. And intelligence matters mostly to the extent that we define it as a capacity for learning. After all, system work is not so much about doing a lot of the right things but about being willing to do simple things while minimizing harm, persisting in muddling through, and learning along the way. Thus, local knowledge acquisition through deep engagement, patience, and long-term commitment becomes a fundamental success factor.

All of the social enterprises in our research sample that were able to transform systems have senior staff members who have been with the organization for a long time. They have been able to accumulate knowledge that is effective in local systems, a requirement in mastering causality. In its early years, Gram Vikas had to let go of many team members who could not deal with the difficulties of system work or who grew frustrated about climbing peaks that were not directly related to the organization's mission. But the core team then stayed on for almost four decades. This long tenure matched the learning curve of the organization, time that was required for mastering causality. And the core team ensured that the accumulated knowledge about the causal architecture of villages and how it could be transformed did not get lost.

Sekem now has a third generation of managers, many of whom are related to or married to someone from the founder's family. The first children who attended Sekem's kindergartens in the 1970s have often finished their education and gained work experiences abroad. They return to Sekem with new ideas and much-needed competencies to continue the organization's mission of changing Egypt's trajectory. They also know from the founder of Sekem that it will take 200 years of learning to succeed.

AIM FOR TRANSFORMATION, NOT SYSTEM CHANGE

The term "system change" may not, it turns out, be a good way to articulate our ambitions and potential for improving systems. Complex systems change all the time in a dynamic manner without our interventions. Therefore, change per se is neither interesting nor difficult to achieve. In fact, creating a temporary change by providing food, schooling, loans, and medicines or changing the behavior of some actors is often relatively easy. But if an intervention withdraws without having robustly transformed the causal system architecture, things may be as bad as or even worse than before.

Our interventions need to match the particular trajectory that a system is on: the pace and direction of ongoing change. Some systems may be on a positive trajectory that generates better outcomes over time. Potentially, these trajectories can be accelerated to speed up progress for the better. Some systems may be on a negative trajectory with worsening prospects. These trajectories need to be reversed or altered. And other systems may be stuck in trajectories that perpetuate unfortunate outcomes and misery. These systems often need to be mobilized and steered toward positive trajectories.

Our proposed system change archetypes constitute two effective approaches for transforming systems that are on a negative trajectory (Egypt/Sekem) or that are stuck (Indian villages/Gram Vikas). These trajectories are the most difficult to engage with because they require substantial transformations of the systems' causal architectures.

We are hopeful that the many ongoing system change initiatives will help us to uncover other effective archetypes and smart strategies for mastering causality—and that by doing so, we can avoid the misfortune that befell the sorcerer's apprentice. ■

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