In 2011, an open online artificial intelligence course offered at Stanford University attracted several hundred thousand registrants, launching frenzied global interest in how teaching and learning could be extended by colleges and universities. In 2017, Purdue announced it was purchasing Kaplan to create a new public online university. In California, decades-long flirtation with distance education resulted in the formation of a statewide online college in early 2018. In June 2018, two large public Australian universities (University of South Australia and University of Adelaide) announced they were exploring options for a merger to create a more competitive international university. These examples highlight the radical responses that higher education institutions are now required to undertake as a result of the significant pressures from reduced research funding, increased government requirements to address labor market needs, mounting public calls for accountability, and growing questions about the utility of a traditional college/university degree.

A Leader’s Framework for Understanding and Managing Change in Higher Education

By George Siemens, Shane Dawson, and Kristen Eshleman
For higher education leaders, this environment can be overwhelming as traditional approaches for managing institutions seem woefully underpowered to meet the multitude of economic-social-technical changes. The integrative approaches and core principles of complexity science can provide a framework to address these challenges and to understand the role of rapidly changing colleges and universities in a society that has long been experiencing disruption and transformation.

**Enter Complexity Science**

Complexity is the foundation of life—evident in even the most mundane of situations. Recall a time when you've found yourself stalled in traffic. You probably began to wonder about ways to solve the traffic problem. If only more people took public transport. If only the government implemented more public transport zones. Wouldn't these actions resolve the problem? In short, no.

Traffic, like higher education, is a complex system. Imposing actions or designing for strict management of behavior does not lead to direct linear outcomes. The relationships between jobs, locality, families, housing, work and government policy, tax processes, crime, psychology, environment, access to education, and urban planning interact and converge in what is known as a Complex Adaptive System (CAS). The complexity inherent in this system relates to more than the large number of interacting agents. The actions and interactions that these agents perform are often independent and unpredictable. In the context of implementing large-scale transformations in higher education, there is much we can learn from studying a CAS. Complexity can be understood as a theory of change and adaptation that details how change occurs within systems as well as the principles and mindsets needed to flourish in turbulent environments.

Understanding such system dynamics incorporates a range of insights from biology, information science, anthropology, sociology, and psychology. More so, managing within a CAS is unpredictable and requires new ways of thinking and new ways of doing. These approaches often feel counterintuitive to the causal-seeking attributes that have evolved in the human mind. In the example above, traffic congestion cannot be solved by dismantling a car and learning about its individual functions. Further, attempts to control traffic congestion through strict management in the form of traffic lights and intersections can exacerbate the problem. Likewise, we cannot provide solutions to the challenges confronting higher education by adopting reductionist thinking. Unfortunately, reductionist thinking has great appeal to people faced with a mind-numbing scope of change. In fact, the reductionist thinking often prevalent in higher education produces numerous inequitable, unplanned, and detrimental consequences.

In contrast, the complexification of higher education is an intentional goal of engaging with complexity rather than attempting to reduce it to its constituent parts. Effective vision generation, planning, and goal achievement in the modern uncertain economic-social-technical environment benefits from embracing complexity and the utilization of strategies and actions that reflect a CAS. The five complexity principles detailed later offer an organizing framework for administrators, academics, and policymakers to consider as they navigate uncertain, unpredictable, and rapidly changing educational contexts.

**Defining Complexity**

The first challenge is navigating the breadth of various sources that attempt to define complexity. A quick search reveals discussions of complexity from consultants and educators in government, biology, neurology, political science, sociology, organizational theory, and philosophy. Definitions are aligned with the intended use of the author and the specific disciplinary context. Researchers recognize the definitional challenges: “Complexity is so general a term that it seems to mean something different to everyone.” General agreement, however, exists that complex systems involve “many simple parts [that] are irreducibly entwined.” These parts, or agents, interact in ways that give rise to “evolutionary processes and often surprising ‘emergent’ behaviors.”

The actions that lead to emergence occur within a conceptual framework of self-organization and adaptation at agent-level interactions. These agent-level interactions are supplemented by interactions with the environment and inclusion of feedback in subsequent evolution, a process “that further increases its knowledge and intelligence.” Central, then, in a CAS are (1) the agents, (2) the interconnectedness of multiple agents, (3) the environment, and (4) feedback influencing the ongoing evolution of the system. These basic elements interact in ways that produce outputs that are not always easy to predict. As a simple illustration, many of the intractable problems in academic environments, such as attempting to increase the success of under-represented learners, cannot be achieved through the implementation of a policy. Cause-and-effect in social
Five Complexity Principles

An important role of higher education is preparing individuals to engage meaningfully in society. What happens, however, when the modes of interacting with information presented in formal learning environments no longer align with the lived experiences of learners in work and other environments? The existing higher education system—with its focus on credit hours, semester-long courses, and formal credentialing—fails to account for new practices available in a digital, and globally connected, world. This is evident in today’s global online learning environments, which increasingly blur formal and informal practices.

Five principles of complexity science are of particular relevance to the higher education system. These attributes—networks, emergence, self-organization and social coordination, feedback sensitivity, and agility—are sufficient to provide higher education leaders with an entry into complexity science as a means of observing, understanding, and interacting with change.

**Complexity Principle #1: Networks**

We live in networks. Our use of media, transportation, communication, work, and banking is indicative of the range of networks that permeate all aspects of our lives. The rapid spread of the 2014 Ebola outbreak was due to our tightly connected global village. What is local is global. Nowhere is this truer than in our information networks. Through social media, events can go viral in minutes. For students, access to professors via YouTube recordings or open online courses has thinned the classroom walls. Networks form the underpinning structure of society and of our education system.

In spite of this reality, it is unusual for colleges and universities to adopt networks in a substantive way. The Digital Learning Research Network (dLRN) [https://linkresearchlab.org/dlrn/](https://linkresearchlab.org/dlrn/) reflects the difficulty that existing systems have for distributed network structures. The inception of dLRN was a $1.6 million grant from the Bill & Melinda Gates Foundation in 2014. The focus for dLRN was to integrate research expertise with localized needs across the California, Georgia, and Arkansas higher education systems. It became apparent early in the process that colleges and universities were not structured in a manner that could easily facilitate the development of collegial networks. For example, sharing doctoral students, engaging in co-creation of resources across different systems, and planning and budgeting processes highlighted the inability of these systems to adjust for nonmainstream activity. While researchers were generally comfortable working with others, the systems for planning and financial resource allocation and overall accounting required a more linear arrangement established in isolation of other co-providers. Although the project as a whole was successful, the experience of constantly pushing against linearity to enable network performance was a substantial resource drain. Mary Uhl-Bien and her colleagues outline this tension between administrative and adaptive functions in an organization, emphasizing the need for leadership to be active in the emerging sites of conflict that inevitably arise between the organizational functions that call for stability (business as usual) and those that demand creativity and adaptation.

Networks reflect the fundamental change needed to transition from conventional thinking to thinking in systems and complexity. The structural attributes of a college or university (e.g., organizational charts and faculties) can restrict innovation by impeding the flow of information and opportunities for cross-fertilization of ideas between disciplines. Higher education institutions have started to adopt systems are not so tightly coupled as to produce a desired outcome from a single simple action. For leaders, the transition from simple cause-and-effect to integrative thinking is the key insight that complexity science offers.

Unfortunately, researchers in complexity science have largely focused on understanding complexity as a phenomenon, rather than as an approach to fostering organizational change. With some exceptions in business environments, complexity science has not been widely promoted or adopted in higher education across the range of processes that include budgeting, planning, vision setting, implementation, and subsequent monitoring. However, the application of complexity theory in education environments is not entirely novel: a brief search of academic databases reveals several articles and texts from early 2000, linked to systems change. What is unique today is that the scope of complexity has changed rapidly due to a range of economic-social-technical trends, resulting in growing gaps between the utility of traditional higher education management approaches and the emerging network, systems, and CAS models. The world itself has become more connected and integrated over the past several decades, increasing the need for greater understanding of how systems inter-relate, integrate, and perform when dramatic new realities are introduced, such as the 2008 global financial crisis or smaller-scale events such as mergers between colleges and universities, or changes to national student loan models.
strategies to minimize this silo effect, including “cluster hires” of academic and professional staff across faculties and the creation of new interdisciplinary research labs. These innovations, however, continue to occur in a heavily siloed system.

Understanding networks and how institutional structures can either enable (foster learning) or govern (get in the way of learning) is a critical design criterion for the future of higher education. Primarily, networks represent a shift in control over information and resources. This transition from hierarchy to networks in education surfaces staff and student expectations for greater transparency with senior leadership while placing more autonomy in the hands of learners. In the public domain, it raises the level of accountability for what happens in classrooms and how teaching practices impact future employability. Networks also move college and university activities into the mainstream, as experienced by Middlebury and Evergreen State Colleges in 2017. In networks, everything is just a short jump from everything else.

There are many advantages for a networked institution where information flow is rapid and where actors have an increased degree of autonomy. However, in the leadership space, there is a competing need for stability and security. Leaders must be comfortable with this tension and identify the sites of coalescence or emergence of such networks of power in order to enact change when necessary. Leading in a system of constant transparency requires openness and democratic engagement with all constituents in the higher education sector while still retaining the important role of making decisions on those emerging innovations that hold the greatest long-term promise.

**Complexity Principle #2: Emergence**

It is not surprising that developing effective leaders in education has long been an area of research interest and professional development. Traditional notions of “command and control” managerial...
leadership were established in times of stability when action and response could be seen as a linear process. Such leadership models are less effective in modern organizations where rapid innovation and adaptation are essential attributes for sustainability. Leadership models that work on a reductionist model fail to account for the inter-relationships between the different parts of a system.

The interconnected nature of these relationships can produce another system attribute called emergence. Emergence is the generation of behavior that lies one “stage above” current actors. This means that individuals create society, an entity that exhibits distinct attributes not present in the sum of its parts. For example, millions of people on social media create social movements or draw attention to injustices or amplify what were previously localized causes. For leadership, this raises important challenges regarding changing, redirecting, and influencing emergent systems toward planned goals or targets. More recently, work in effective models of leadership has focused on understanding the system dynamics and developing the environment for where emergence of desired outputs can begin to occur at a local and ground-up level. Such a model of complexity leadership “enables the learning, creative, and adaptive capacity” that occurs within a CAS. As noted above, a complexity leadership approach seeks to balance the interplay between the administrative and the adaptive functions in an organization. When pressure is placed on an organization (e.g., financial, technical, political, or social), the enabling leadership responds by balancing the interactions that operate in these two primary organizational areas.

The administrative functions include the day-to-day operational and coordinating tasks. This area is one of stability and enables standardization and scale in the organization. It is not an area that can quickly or appropriately innovate. For the education context, such operations may include adhering to state and national policies and regulations, balancing budgets, retaining student enrolment details, and managing course schedules and timetables as well as assessment dates. A second dynamic is the adaptive functions of the organization. This is an area that is frequently tasked with developing innovative responses to complex issues. For instance, student retention is a multifaceted institution-wide challenge. A response to declining retention will not emerge from applying more administration. It can be addressed only by understanding the relationships and challenges that permeate within the schools and faculties, teachers, courses, and surrounding contexts and by understanding how an individual student interacts in these spaces. This is a complex problem requiring a more holistic and innovative response that is developed through the adaptive areas of the organization. In short, reviewed policy or enhanced technologies will not address retention without an understanding of how these resources are enacted in situ.

Change and innovation must be developed from the bottom up. Those closest to the phenomenon (e.g., as a result of new student profiles, rapid adoption of technologies, proliferation of social media for communication, students’ exploration of content and resources outside of the classroom) are better able to sense and respond in a way that supports learners rather than marginalizes them. However, when a significant number of innovations (responses to a problem) are in operation without further opportunity for scale, an organization can appear scattered and inefficient. The interplay, and balance, between administrative and adaptive roles is essential; this is where transformational or enabling leadership is essential. The role of emergence is to have ideas and concepts arise organically, driven by those who are closest to the change pressures. Organizational leadership that has created and fostered this type of culture finds itself less at odds with the zeitgeist. The intent of leadership, then, is to create organizational mechanisms that allow information to flow across an organization, particularly to decision-makers.

If the operational balance of control is shifted toward enabling, an organization is unlikely to be able to quickly respond to complex pressures. Alternatively, if the balance is shifted to the adaptive functions, then the organization may lack the capacity to scale and standardize, ultimately diminishing future opportunities to innovate. In this context, an enabling leadership seeks to foster and build power networks that bring together diverse agents in a system. When actors from diverse groups in an organization come together to address an emerging concern or issue, there is often friction. Such friction, however, can result in novel ideas able to effectively respond to complex pressures. Resolving the friction is a key enabling function that can then commence shifting the response from small innovation to scale by including the administration roles of the organization. In an age of complexity, leadership must enable opportunities for creative and entrepreneurial responses by cultivating the conditions for complexity to thrive and for grassroots innovation to emerge.

Complexity Principle #3: Self-Organization and Social Coordination
To foster opportunities for emergence among local and grassroots actors,
leaders are confronted with the need to enable self-organization. Self-organization involves the processes whereby individual agents begin to organize and achieve tasks or activities. Many of us have experienced or observed this dynamic on social media when an event, often a crisis, unfolds and requires individuals to act in a coordinated response. For example, following the 2014 earthquake in Haiti, over 450 volunteers from the OpenStreetMap community solved a complex challenge by collectively mapping the roads within Haiti using newly released satellite images, as a result creating “the most detailed map of Haiti in existence” and assisting rescuers’ and reconstruction efforts. With an open platform—or at a minimum, a platform that allows individuals to contribute—complex problems and challenges can be handled through self-organization and social organization strategies. Similar open and connected acts of creativity and self-organization underpin much of the open-source movement and many of the critical technologies we all use on a daily basis.

Leading change in education has historically been an exercise in command and control. A look at K-12 education reform reveals efforts to reduce institutions to machines and its people to data points. No Child Left Behind (2001) and Race to the Top (2009) are engineered designs—linear, ordered, and outcomes-based. A complexity approach looks at institutions as human systems. Approaching the problem through this lens, we can see that what is needed is a way to enable the evolution of the system through the actions of its people. The practical output of seeing an organization as a human system is a collection of policies and procedures that enable ideas and information to flow, ensuring that innovative solutions are generated. In higher education, one example is the University of South Australia’s first UniJam in 2016. The online event was designed to enable all staff and students to engage in an open, transparent discussion about the future goals and vision for the university. Evolving from this two-day event was the formation of the university’s strategic action plan. In short, the process allowed the university’s priorities to emerge from collective action rather than from a top-down hierarchical implementation.

Open and social organization must be reflected in managerial-level tasks that enable ongoing input from all individuals but still respect the responsibility of leaders to make decisions and be accountable for the performance of their departments and institutions. Yet, what does it mean to engage in open systems with feedback loops that invoke the contributions of many individuals? Social media provides numerous examples of groups of people self-organizing to solve a problem or create something novel. At the time of this article, a hit-and-run driver, who killed a cyclist, was identified through a simple image of a four-inch piece of plastic. Many individuals, connected around a shared problem and each with specialized knowledge, are capable of producing outputs that seem almost impossible. For example, could you find the location of a flag with only a camera pointing toward the sky? A group of individuals accomplished this task using “plane routes and star [constellations] to find” it. Similar illustrations exist in the MIT Red Balloon Challenge, where ten red balloons were placed across the United States. The winning team found all balloons in under nine hours using social network principles to share information. Unleashing this type of distributed and self-organizing intelligence is a vital role of any organizational leadership.

What makes using communal or self-organized knowledge challenging is that the intent of an organization is to organize. The chaotic nature of open knowledge spaces seems counter to the need for leaders to produce consistent outputs. Fortunately, there are “places to intervene in a system”—places that allow leadership to take advantage of the chaotic creativity of the masses while still pursuing and achieving planned outcomes. As Donella Meadows emphasizes, in human systems like higher education, leadership can rely on several systems-level techniques to intervene or shape the overall performance:
Designing the physical structure of a system (often found in learning commons for students, but not similarly duplicated in faculty commons for interdisciplinary interactions)

Varying the speed and quality of feedback

Enlarging or reducing the flow of information

Altering rules, constraints, and incentives

Revising and clarifying organizational goals

Fostering desired cultural mindsets and values

Complexity Principle #4: Feedback Sensitivity

How do systems of agents exhibit patterns of complexity and higher-order functioning? Perhaps no principle has greater influence on this than feedback. As John Miller and Scott Page have noted, these environments include “a set of diverse actors who dynamically interact with one another awash in a sea of feedbacks.” Feedback serves to micro-direct agents, much like Peter Pirolli and Stuart Card’s information foraging or the ways in which ants or bees provide indicators to others. In a systems context, feedback is the central entity that enables a system, regardless of how inefficient it is in its current state, to become more efficient, sophisticated, and intelligent. The key is having methods for capturing and sharing the feedback that is generated as agents and systems coevolve.

In academic environments, this requires the intentional development of numerous feedback mechanisms that are grounded in sense-making theory and anthropological methods to provide the clearest insights for culture change. Leaders must understand the existing organizational culture before they can manage effectively in conditions of uncertainty. Feedback mechanisms bring to light the often unanticipated outcomes associated with large-scale change. Hence, as much effort should be placed into feedback planning as in the original planning of a goal or outcome. Consideration should be given to questions such as the following:

1. What are the important things we need to know about this initiative as we deploy it?
2. What are our critical data points?
3. How will we collect and incorporate feedback?
4. Have we structured this initiative in such a way that we can redirect it when we receive feedback?
5. Do we have a clear process for communicating to members of the community how their contributions will be used and how decisions will be made?

The interplay between vision and feedback is critical. A clearly articulated vision should be at times responsive to feedback and at other times resilient to feedback. The managerial processes that determine when feedback is contextually valid and when it is a distraction are central to making decisions in a CAS.

Complexity Principle #5: Agility

August 14, 2003, was a sweltering day in the northeastern United States and southern Canada. Just after 4:00 pm EDT, a series of technological failures resulting in a cascading collapse of the electricity grid, impacting 55 million people in the largest blackout in North American history. A tightly coupled, rigid system exhibits these types of cascading failures due to its inability to adjust or adapt. A key attribute of a CAS is the agility that it displays. In order for any system to become agile, its structure must be able to absorb unintended consequences without cascading failure.

The ability to do so starts with leadership. Leaders of large organizations must engage in plans and models that allow for and encourage adaptation. Unfortunately, in higher education this is difficult to achieve, because colleges and universities form only one small part of a system that resides within larger macro systems. The impact of numerous federal agencies, financial accountability, regulatory pressures, international rankings, connections to industry, financial aid, and more means that a college or university is constrained in its ability to set and chart a dramatically different course from the system in which it exists. However, a mindset of agility can enable leadership to plan and deploy approaches that shape the culture of an organization to embrace uncertainty, tolerate ambiguity, and treat unpredicted outcomes as a springboard for agile responses. For higher education institutions that want to embrace change, initiatives such as R&D programs, “skunk works” projects, and innovation hubs are important—though not sufficient. Leadership must prepare for a range of future barriers, constraints, and social trends. An agile system needs to be constantly assessed, stress-tested, evaluated, and viewed through a range of future scenarios.

Complexity as a Driver of Innovation

Stuart Kauffman, a theoretical biologist and complex systems researcher, articulated what he termed the adjacent possible—a theory that can also be applied to innovation management.
The concept of adjacent possibles represents all the potential designs that are one step removed from the present configuration of a system. In essence, the genesis of an idea resides in its relationship to what is now currently possible. As this idea is brought to fruition, a new possibility emerges alongside additional attributes to the system that can be leveraged for innovations. Most breakthrough innovations don't happen out of the blue. Instead, they develop from existing ideas that collide with other ideas over time. These so-called innovations are essentially the result of a recombination of all the existing “spare parts” within a system. Although the number of adjacent possibles at a given time is finite, as one possibility is explored, more emerge. In this way, innovations are incremental and contextual.

Higher education is a diverse community that is good at generating new ideas. In the case of adjacent possibles, the outcomes are unknown. To achieve more radical innovation, leaders need to put in place a valued parallel process for experimentation. Some of the best examples of idea owners to test hypotheses as their ideas move through stages and gates. And like any startup, Davidson can quickly stop ideas that are not feasible and can unlock additional resources as learning is validated.

Leaders should aim for the kinds of environments that create the conditions for exploring adjacent possibles. Steven Johnson illustrates how these environments “expose a wide and diverse sample of spare parts—mechanical or conceptual—and [how] they encourage novel ways of recombining those parts.” He goes on to explain how “environments that block or limit those new combinations—by punishing experimentation, by obscuring certain branches of possibility, by making the current state so satisfying that no one bothers to explore the edges—will, on average, generate and circulate fewer innovations than environments that encourage exploration.”

**Leading Change in Complex Systems**

What does it look like to lead a CAS defined by self-organization? How can a process be guided to result in effective adaptation to a changing context? As society as a whole has shifted to networks, this is an area of interest for business, particularly marketing departments, governments, and any individual striving to bring about change. The levers of influence are no longer centrally held, but they do exhibit patterns that can be influenced.

For higher education leaders to be successful in times of uncertainty, we suggest using a model that embeds the five principles of complexity science noted above within a well-adopted organizational framework for continuous improvement: People → Process → Tools (see table 1).

**People**

People—whether students, academics, or leaders—are the central agents in higher education. Complexity science, espe-
cially when applied to social systems, has models that support cooperation and evolution. Leaders can draw on these models to foster the kind of cooperation that leads to effective change in higher education. Using CAS principles requires looking beyond organizational charts and silos and beyond the walls of an institution in order to see the broader patterns in the continual change. Knowledge is being produced at a scale we have not seen in the past, and complexity science tells us that small, insular systems limit the ability to generate new knowledge that best aligns to the pace of change.

Top-down decision-making by a few will not keep up with this pace. Leaders need access to larger networks that bring a greater diversity of ideas and the ability to divide and accumulate that knowledge. Hierarchical, vertical structures are designed for linear decision-making; what is needed is better coordination and extension of the interactive networks that already exist. Shifting away from organizational charts and toward those networks enables a better flow of information.

Institutions also stand to benefit from greater networking beyond their own walls. The colleges and universities best positioned to succeed and acquire new knowledge will be the ones that can redesign their structures to remove governing constraints and participate in larger networks. To do this, they will need to increasingly promote the networking capabilities and CAS mindsets of their faculty and staff. Large networks require a high degree of trust, supported by ease of communication and low transaction costs.

**Process**
Leaders facing the need for greater innovation should also consider moving away from ten-year strategic

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**Table 1. The Intersection of People, Process, and Tools with the Five Complexity Principles**

<table>
<thead>
<tr>
<th></th>
<th>People</th>
<th>Process</th>
<th>Tools</th>
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<tbody>
<tr>
<td><strong>Networks</strong></td>
<td>Leadership actively connects and promotes within and intra-institutional research projects, exploring novel network models for research, teaching, and governance.</td>
<td>Incentivizing innovations results in research network formation across countries and institutions; explore academic programs that involve multiple institutions.</td>
<td>Tools and processes like UniJAM and faculty commons are used to promote organizational idea exchange and activate collective intelligence.</td>
</tr>
<tr>
<td><strong>Emergence</strong></td>
<td>Leadership supports and solicits novel ideas and creates physical and virtual spaces for idea exchange.</td>
<td>Leadership has clearly detailed processes to capture and share organizational innovations and to communicate how promising ideas are moved toward adoption and scale.</td>
<td>Tools for emergence are related to feedback and general organizational communication tools. The key is to promote broad-scale interactions that enable emergence.</td>
</tr>
<tr>
<td><strong>Self-Organization and Social Coordination</strong></td>
<td>Self-organization benefits from leadership promoting a culture of shared governance. Leadership needs to invest in spaces and enable permission for self-organization.</td>
<td>Self-organization is the process.</td>
<td>Tools for self-organization overlap with the other tools presented. Communication, idea generation, and voting and ranking tools and processes are needed.</td>
</tr>
<tr>
<td><strong>Feedback Sensitivity</strong></td>
<td>For leadership, feedback is essential not only for innovation but also for continued evaluation and monitoring of organizational culture.</td>
<td>Organizational processes are in place to solicit feedback and assess the impact on culture.</td>
<td>Technologies for capturing feedback continually—a culture of listening—are consistently deployed.</td>
</tr>
<tr>
<td><strong>Agility</strong></td>
<td>Leadership develops and deploys futures scenarios, actively stressing-testing the institution against various future outcomes.</td>
<td>Planning processes that focus less on multi-year plans and more on creating flexibility in processes and mindsets are required here.</td>
<td>Models are used to assess economic impact of trends. Data-centric approaches are used to plan and simulate possible outcomes of new program initiatives.</td>
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plans and traditional performance management. To encourage greater emergence and agility, and to push their teams beyond a typical checklist, leaders can adopt quarterly and cross-team OKRs (Objectives and Key Results) throughout the institution. OKRs are basically “stretch” goals. The concept started at Intel and Google, with the purpose of challenging teams to focus less on the question “What are we capable of doing this year?” and more on the question “Where do we want to go?”25 In true complexity spirit, the steps to get there are not entirely clear, so teams make assumptions about the key results that they believe will get them where they want to go. The shorter cadence for OKRs allows teams to learn and adjust quickly in conditions of uncertainty.

Standard goal setting is applied when the outcomes are clear and the teams know their limitations. OKRs, on the other hand, are intended to stretch teams in ways that encourage agility and discovery. The process is more self-organized and emergent than a traditional top-down approach. In these ways, OKRs are better aligned to a CAS.

Beyond strategic planning and management, higher education leaders also need to create processes for exploration similar to industry R&I models. Colleges and universities have rigorous processes for incremental change but generally lack the ability and processes to manage bold ideas, where the outcomes are unknown.

Tools

If the sole focus of leadership is on efficiency and cost-cutting, the risk arises of setting up structures and accountability measures that do not allow for agility, thereby exposing the entire system to cascading failures. These types of rigid structures limit an organization’s capacity to rapidly respond to an external pressure. In addition to being responsible for strong execution in the present, successful leaders also need to be futurists. In complexity science, idea modeling has been used to explore the effects of variations on existing systems. Advancements in computing make it possible to simulate a higher number of future designs that guide strategy and model the evolution of cooperation. Higher education institutions are increasingly making use of data and business intelligence tools to find efficiencies—data and tools that can also be applied to idea modeling. Organizations like the Santa Fe Institute and the Institute for the Future (IFTF) provide a variety of accessible tools and strategies that support idea modeling and provide professional development for leaders and innovation teams. These models can provide the design criteria to test the effectiveness of experiments in early prototypes.

But how will we know if these models are working? At its core, innovation is about culture change. As we begin testing the ideas coming from our communities, we need ways of determining whether or not these experiments are moving our institutional culture toward beneficial coherence. Getting to the real meaning of change in higher education requires more than what traditional data can provide. It requires a deeper representation of the lived experience made clearer through methods like sensemaking.

The Liberal Arts Consortium for Online Learning (LACOL) is exploring a tool and method called SenseMaker, which offers an additional data layer to address this level of cultural complexity. Understanding whether or not our institutions are responding to external change pressures is a matter of cultural exploration, the assessment of which is complex and may not lend itself to narrowly defined research questions or the measurement of predictable outcomes. SenseMaker is rooted in complexity science, reflecting campus cultures as ecosystems composed of many interwoven systems whose trajectories or outcomes cannot be reliably predicted. Through narratives and self-signification, the tool distributes cognition and reveals patterns that represent a more holistic picture of student, faculty, and staff experiences, often in surprising or idiosyncratic ways. It also enables qualitative research at scale and a higher degree of individual agency and feedback not typically provided in traditional assessment.

For leaders to be responsive to external pressures and guide campus cultures around change, they not only need to become better futurists but also need to listen to the authentic voices within the community and recognize broad patterns. That means being open to narratives, and interventions, that defy our assumptions and predictions.

Conclusion

Higher education is rapidly evolving in response to changing economic models, the emergence and growth of startups, declining enrollments, new student profiles, and an increased emphasis on addressing inequality. For leaders and academics alike, this uncertainty and complexity is disorienting. The scope and the speed of change suggest that higher education cannot continue under an assumption of “business as usual.” Instead, a fundamentally different approach to teaching, learning, administration, and research is required. We believe that complexity science offers the best lens to understanding and managing this change. Through
complexity science, higher education leaders can apprehend and make sense of broad-ranging trends, as well as the urgent need to plan for and provide systemic responses.

Notes
6. For example, see the dLRN lists of publications and projects.
7. Mary Uhl-Bien, Russ Marion, and Bill Mekelvey, “Complexity Leadership Theory: Shifting Leadership from the Industrial Age to the Knowledge Era,” The Leadership Quarterly 18, no. 4 (August 2007).

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