Systemic Change in Sun Microsystems

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An International Experience in Systemic Change: Azerbaijan

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Section 5

The Process of Systemic Change

Step-Up-To-Excellence: A Protocol for Navigating Whole-System Change in School Districts

Francis M. Duffy

Piecemeal change to improve schooling inside a school district is an approach that at its worst does more harm than good and at its best is limited to creating temporary pockets of "good" within school districts. When it comes to improving schooling in a district, however, creating temporary pockets of good isn't good enough. Whole school systems need to be transformed in a sustainable way.

To transform an entire school system, change leaders in that system must know what a system is and how it functions, and they must be skillful in using a specially designed protocol to navigate whole-system change in their school districts. This article introduces readers to one example of a change protocol called *Step-Up-To-Excellence* (SUTE) (Duffy, 2003, 2004).

SUTE is a three-step process that is preceded by a Pre-Launch Preparation phase. (The original version of SUTE had 5 steps. In the spirit of continuous improvement, Steps 2-4 were combined to create Step 2 of the current version, thereby reducing the protocol to three steps.) After a period of change followed by a period of stability, change leaders recycle the transformation process to begin a new pre-launch preparation period, since school system transformation is a never-ending journey that moves a district ever closer to its idealized vision. The process proceeds as follows:

- Pre-launch preparation
- Step 1: Redesign the entire school system
- Step 2: Create strategic alignment
- Step 3: Evaluate whole-system performance
- Recycle to the next pre-launch preparation phase

SUTE was designed to create and sustain systemic change inside school districts. Because the term "systemic change" has different meanings, it is important to clarify exactly which meaning was used to design the SUTE protocol. Squire and Reigeluth's (2000) concept of ecological systemic change guided the design of SUTE.

Ecological systemic change views school districts as systems with rich networks of interrelationships and interdependencies within the district and between the district and its "systemic environment" (the larger system of which it is a part, its peer systems within that larger system and other systems with which it interacts outside of its larger system). This perspective recognizes that a significant change in one part of a school system requires changes in other parts of the system. This view of systemic change is how "systems thinkers" view systemic change in organizations (e.g., Ackoff, 1981; Banathy, 1996; Checkland, 1984; Emery & Purser, 1996; Senge, 1990).

SUTE is also designed on the premise that there are three paths that must be followed simultaneously to create and sustain whole-system change in school districts (Duffy, Rogerson, & Blick, 2000). The three paths are: Path 1, transform a district's relationship with its external environment; Path 2, transform a district's core and supporting work processes; and Path 3, transform a district's internal social "architecture" (which includes organization design, reward systems, organization culture, job descriptions, administrative policies and procedures and so on).

Presently, SUTE is being used in conjunction with Reigeluth's *Guidance System for Transforming Education* (GSTE) in the Metropolitan School District of Decatur Township, Indianapolis, Indiana. The principles that underpin the SUTE protocol are also part of several whole-system change initiatives in school districts like San Diego Public Schools, Kent County Public Schools (Maryland), the Chula Vista School District (California) and the Baldrige award-winning Chugach School District in Anchorage, Alaska.

Readers are invited to visit www.thefmduffygroup.com for additional information about SUTE. Those who would like to receive a free quarterly report about whole-system change distributed via E-mail may contact Dr. Duffy at duffy@thefmduffygroup.com and request that their name be included on his distribution list.

The Guidance System for Transforming Education

Charles M. Reigeluth

The Guidance System for Transforming Education (GSTE) is a process model that provides guidance to a facilitator helping a K-12 school district (never just a single school) to engage in systemic change. The GSTE does not provide any indication of what changes should be made in the district; that decision is left to the district's stakeholders. It was originally developed by Jenlink, Reigeluth, Carr and Nelson (1996; 1998) and has undergone further development through its use in a systemic change effort in Decatur, a township in Indianapolis (see Section 4). The GSTE is comprised of:

- a set of core values about the change process,
- some "continuous events," which are activities that must be addressed continuously throughout much or all of the change process, and
- some "discrete events," which are a chronological series of activities for engaging in systemic change.

Some of the values upon which the GSTE is based include: caring for children and their future, systemic thinking, broad stakeholder ownership, process orientation, participant commitment, dialogue, consensus-building, disclosure, respect, collaboration, organizational learning, vision, flexibility, culture and a neutral facilitator who has experience in district-wide systemic change.

The continuous events must be constantly monitored and addressed by the facilitator and other participants in the change process. There are currently 18 such events: evaluate and improve the change process, build and maintain political support, sustain motivation for change, develop and sustain appropriate leadership, build and maintain trust, evolve mindsets and culture, secure necessary resources, develop skills in systems thinking, allocate necessary resources, develop group-process and team-building skills, build team spirit, engage in self-disclosure, engage in reflection, develop design skills, communicate with stakeholders (2-way), build and evolve community, foster organizational learning and build an organizational memory.

The discrete events for the systemic change process fall into the following five phases.

Phase I. Initiate a systemic change effort.

The facilitator assesses and enhances his or her level of readiness to guide a systemic change effort in a school district. The facilitator begins to establish a relationship with a school district, and determines whether the district is at a sufficient level of readiness for a systemic change effort. If both the school district and the facilitator are at a sufficient level and are committed to working with one another, then they negotiate a formal agreement that stipulates expectations for all stakeholders involved, including the role of the facilitator.

Phase II. Prepare a Starter Team.

Once a formal agreement has been signed, the facilitator guides the school district in forming a "Starter Team" to initiate the change process. The Starter Team should be small, preferably with the most powerful leader from each of the major stakeholder groups (e.g., the superintendent, a new board member, a parent, the teachers' association president and a non-teaching staff member). The primary role of the Starter Team is to assess the district's capacity for systemic change, develop an understanding of the need for and nature of systemic change and develop a systems-design culture on their team, in preparation for expanding into a larger Leadership Team in which that culture and understanding will be cultivated.

Phase III. Develop a district-wide framework and capacity for change.

The Starter Team expands into a Leadership Team of about 25 people, comprised of highly respected opinion leaders in all the various stakeholder groups. The Leadership Team provides political support for the change process and is entrusted with making the decisions, with much stakeholder input, about the change process and the changes. It creates a framework of shared vision, mission and beliefs for an "ideal" (but conceivably eventually workable) learner-centered, information-age system for their community. It also creates and develops a Central Support Team (Schlechty, 2001), made up of central office personnel, to work with school-based Design Teams in Phase IV.

Phase IV. Create designs for new schools.

The Leadership Team and Central Support Team help each building to enhance its readiness for design and form a Design Team of about 10 well respected creative thinkers from all the building's stakeholder groups. They work with all their stakeholders to design and implement an information-age, learner-centered school consistent with the district-wide framework. Large schools often create multiple design teams for smaller schools-within-the-school. The Leadership Team later forms a district design team to redesign the district-level administrative and governance systems, with strong participation from each School Design Team.

Phase V. Implement and evolve the new system.

Once a school's design has been approved, it is implemented and continually refined through formative evaluation. Eventually, the process will begin anew.

The Schlechty Center For Leadership In School Reform

Monica Solomon

The Schlechty Center for Leadership in School Reform (www.schlechtycenter.org) was launched in 1988 by Dr. Phillip C. Schlechty as a means to provide high-quality and responsive support to those who are leading school reform efforts across the nation. The Center, a private nonprofit corporation, works with public school districts and their leaders to transform the existing system of rules, roles and relationships that govern the way resources are used in schools to a system that is focused on the quality of work provided to students.

Two theories undergird the activities of the Schlechty Center for Leadership in School Reform: the Theory of Engagement and the Theory of Change (http://www.schlechtycenter.org/psc/philosophy.asp).

- The Theory of Engagement focuses attention on student motivation and the strategies needed to increase the prospect that schools and teachers will be positioned to increase the presence of engaging tasks and activities in the routine life of the school.
- The Theory of Change focuses on transforming schools *from* organizations based on the assumption that the core business of schools has to do with producing compliance and attendance *to* organizations where the core business focuses on nurturing attention and commitment.

In support of these theories, the Schlechty Center has developed frameworks to help district and school leaders to bring about this transformation. To accomplish the transformation called for by the Theory of Change, schools and school districts will need to undergo systemic change as well as introduce innovations that are disruptive and threatening to many of the interests that are served by the present arrangement of schools. The following is a brief introduction to the Theory of Change.

According to Christensen (1997), there are two kinds of innovations: *sustaining* and *disruptive*. *Sustaining innovations* are those innovations which are congruent with existing systems and which existing systems have the capacity to support and sustain over time. Sustaining innovations can be introduced through strategies that are quite similar to the strategies used in improvement efforts, since such innovations do not require much in the way of systemic change. In other words, sustaining innovations can be introduced through well-articulated, codified and pre-packaged projects and programs of action.

Disruptive innovations are those innovations which are incongruent with existing systems and/or which are beyond the capacity of the present system to support and sustain for a long enough time to demonstrate their effectiveness. Improvement can result from actions intended to enhance or improve the skill with which persons employ the present technology (the means of doing the job). These actions are properly viewed as training activities, and are sometimes referred to as staff development. They are also frequently associated with the introduction of sustaining innovations. Sometimes, the improvements needed go beyond the technologies that the present system has the capacity to support. These require the introduction of innovations that require supportive changes in systems as well as changes in the orientations and performance capabilities of individuals. Such disruptive innovations cannot be introduced through programs and projects. These innovations and the systemic changes that are needed to support them can only be introduced through leaders who understand the nature of systems and systemic change. Such leaders must possess the courage and fortitude to bring about changes in the structure and culture of the school to enhance the possibility of success.

The *structure and culture* of the school gain expression through systems of *norms*. Both structure and culture determine the capacity of the school to accept and incorporate new technologies. (The *structure* of the school refers to existing systems of rules, roles and relationships. The *culture* refers to the values, commitments, tradition, lore and shared meanings of the school).

The *normative system* is organized around functional areas that are critical to the life of the school district and school:

- the Recruitment and Induction System
- the Knowledge Transmission System
- the Power and Authority System
- the Evaluation System
- the Directional System
- the Boundary System

The Theory of Change is the basis for the Center's 10 District Standards (http://www.schlechtycenter.org/psc/10standards.asp). For schools to be able to support and sustain the systemic changes needed to introduce disruptive innovations, they must possess the following capacities:

- the capacity to focus on the future
- the capacity to maintain direction in the face of adversity
- the capacity to act strategically

A Professional Development Approach to Systemic Change

Geoffrey Caine

In the view of the Caine Learning Institute, the systemic change process is first and foremost a professional

development process, because the key to systemic change is a shift in the mental models of stakeholders.

Our foundation: Process learning circles

Process learning circles are action-based, reflective study groups for teachers, non-teaching staff, administrators, parents and other stakeholders. They build a sense of community and trust among participants so that they get beyond the fear of looking ignorant and begin to genuinely examine their own ideas and practices.

To be successful, participants must be able to listen well. One building block, therefore, is a strategy that we call an "ordered sharing." This process only takes about 15 minutes of a 90-minute meeting. Group members silently examine some core material, and then each person in turn shares a thought or personal story about the material out loud. Everyone else listens without interruption and, as much as possible, with a mindset of "isn't that interesting?" When one person is finished, the next one continues, and so on around the circle. Because the direction of sharing is fixed and there is a limit to how long anyone can speak, there is no competition for time. And because there are no interruptions, people begin to feel free — over time — to reveal what they *actually* think and believe.

The direct experience of a good field of listening helps to trigger a shift in educators' awareness of what a really good learning environment looks and feels like and can be like in a classroom.

Stage one: Creating more complex direct instruction

The first step in moving from direct instruction to a more learner-centered and constructivist approach is to make it more complex and creative. Our frame is our 12 brain/mind learning principles (Caine et al., 2005), such as "the brain/mind is social" and "the search for meaning is innate." Group participants examine one principle a month in their process circles. They discuss it, reflect on personal experiences as learners and brainstorm ways to use the principle during the following weeks. When possible, we or colleagues also visit each teacher in the classroom once a month for coaching and feedback. During this phase, reflection is partly guided in terms of three elements that can ultimately work as an organizing frame for sophisticated instruction. These are the creation of an optimal climate for learning, immersion of learners in experiences in which the standards are embedded and continually guiding learners to process experiences through artful questions.

This process typically takes about a year.

Stage two: The jump to simple constructivism

For educators who already appreciate the multi-dimensionality of students, we introduce a more complex model of instruction based on the three elements mentioned above (creation of an optimal climate, immersion in experiences, and guiding learners through questions). The focus is always on creating a classroom climate where students feel competent, confident and interested. The essence of the instructional model is for a teacher to construct a "global experience" as the basis for introducing students to a new topic. After this 10- to 20-minute event, there is time for students to describe what they found interesting and to formulate questions of their own. These questions become the basis for subsequent student research and teacher guidance. Thus, the teacher retains substantial control and at the same time begins to hear and work with authentic student voices.

This instructional model is developed by teachers through the process learning circles. Again, it is a matter of guided study, experiments by teachers in their classrooms and reflection on action in the learning circles.

Over time there is a major shift in the way that teachers see the classroom, students and themselves. At that point authentic student choices and decisions become the focus for all that a teacher does. Thus, teachers need to have a fluid approach to time, space and content.

… Then there's the system

Moving the system is difficult, but our philosophy is the same. While there are many other critical factors, paradigm shift requires a change in the mental models (perceptual orientation) of enough stakeholders. Our goal, therefore, is to support the shift of as many adults in a school as we can until there is the critical mass that enables a constructivist philosophy to prevail.

User-Design for Systemic Change

Alison A. Carr-Chellman and Luis Almeida

User-design is a relatively new phenomenon that was first introduced to the Instructional Systems/Educational Technology field by Banathy (1991). It is difficult to say if user-design is more of a philosophy or an approach to systemic change. Either way, user-design can have a powerful impact on a systemic change process. It empowers users, the people nearest to the ground, nearest to the front lines. It allows stakeholders to design their own systems of human learning, and it gives them a responsibility to do so. Banathy used to tell us that it is immoral to design for another. We agree.

This brief introduction to user-design only offers a basic outline of the approach in the hopes that the reader will seek more information. User-design is founded on systems theory and thinking and can be concisely defined as "an authentic empowerment of a particular set of stakeholders, the users of any innovation, such that they are creating their own systems of human learning." (Carr-Chellman, in press). User design takes as its central assumption that users should be responsible for creating their own systems and that professionals who have design expertise should be responsible for helping users in that process.

User-design is a difficult process akin to design by committee. Those who advocate for user-design make no pretense that the process is easy, but they recognize the inherent value of engaging users, and they also see the return

on investment that comes during the implementation, adoption and sustaining phases of the change process. Benefits of user-design include the reduction of resistance during adoption, improved quality of ideas and designed solutions, greater relevance of ideas to the context, smoother diffusion and sustainability of innovations and several other areas which improve effectiveness if not efficiency.

It can be said that many excellent, professionally designed solutions have failed miserably when they "hit the ground." This is often the case because of a lack of user empowerment and decision-making. While the users may have been *consulted* (although, often not) in the design process, they are too often not *empowered*. Lack of ownership typically results in users having a higher resistance to an innovation. Also, design flaws that might have been uncovered during user-design are not eliminated before implementation, resulting in "unexpected" future costs.

In order for user-design to be effectively employed, a major shift in power dynamics (Carr, 1996) must occur. User-design is distinct from user-centered or learner-centered design (in which users are consulted but not empowered), emancipatory design (in which the goals of social reformation tend to overshadow the goals of good design) and participatory design (which is commonly associated with Scandinavian forms of human computer interface design). User-design draws heavily from these roots, from the foundations of stakeholder participation and from systems theory and thinking.

While the value of including the users in the creation of their own systems of learning may seem obvious, such inclusive efforts have a history of incomplete implementation. Meeting the challenge of shifting power dynamics, empowering stakeholders and educating for design must, at some level, fall to the leaders of any organization undergoing systemic change. Thus, user-design is inherently political. It requires careful decision making around who will be involved (everyone, representatives of groups?), how leadership will be involved (fully, partially, consulted?), what aspects of the project will be user-designed, how to overcome apathy, how to secure leadership support and user-engagement – and the issues go on and on.

The basic stages in the user-design process cannot be captured in a bulleted list or a linear step-by-step model. This would be antithetical to the nature of user-design and what it seeks to accomplish. However, for the designer interested in facilitating user-design, the process does approximate the following rough stages: readiness, team selection, process design/tool selection, capacity building, process engagement, trials of innovations, iterative assessment of process and product innovations and evaluation of user-design systemic impacts. Naturally this represents an oversimplification, but more can be learned about the user-design process by studying the work of Banathy (1991; 1992; 1996) and Reigeluth (1993; 1996) on the subject and examining Carr-Chellman's (in press) text on the application of user-design for instructional design.

A Chaos Theory Approach to Systemic Change

Charles M. Reigeluth

The process of transforming a school system is highly complex and difficult to predict or control. Chaos theory (Kellert, 1993; Wheatley, 1999) was developed to help understand highly complex systems. It recognizes that beneath the apparently chaotic behavior of a complex system lie patterns that can help one to understand and influence its behavior. Some of the key features of chaos theory are described next.

Co-evolution

A system changes in response to changes in its environment, and its environment changes in response to its changes. As we evolve deeper into the information age, the need for co-evolution in education has become ever more urgent (Banathy, 1991).

Disequilibrium

Co-evolution is fostered by disequilibrium, which Prigogine characterized as the necessary condition for a system's growth.

Positive feedback provides information about opportunities for a system to change the goals it pursues. Thus, it helps a system to co-evolve with its environment. Often it takes the form of perturbances. A perturbance is any change in a system's environment that causes disequilibrium in a system.

Transformation

Disequilibrium makes a system ripe for transformation, which is reorganization on a higher level of complexity. Transformation occurs through a process called "emergence," by which new processes and structures emerge to replace old ones.

Fractals and "strange attractors"

Transformation is strongly influenced by "strange attractors," which are a kind of fractal (Wheatley, 1999). Fractals are patterns that recur on all levels of a system. In educational systems, they are "core ideas" and values or beliefs (Banathy, 1991, 1996) that characterize the system. These recurring patterns strongly influence, and are influenced by, complex system dynamics and structures (Senge, 1990). One example of a fractal in education is autocratic control. On the district level of an educational system, the school board typically controls the superintendent, who controls the principals. On the building level the principals control their teachers. And on the classroom level the teachers control their students. Another example is uniformity or standardization, and there are many other fractals that characterize our factory model of schools.

A strange attractor is a kind of fractal that has a powerful influence over the processes and structures that emerge in a system undergoing transformation. One example in

education is empowerment, which entails providing both the freedom to make decisions and support for making and acting on those decisions. On the district level this takes the form of the school board and superintendent empowering each building principal to experiment with and adopt new approaches to better meet students' needs and to make other important decisions (hiring, budgeting, etc.). On the building level the principal empowers each teacher to experiment with and adopt new approaches to better meet students' needs and to participate in school policymaking and decision making. On the classroom level the teacher empowers each student to make decisions about how to best meet her or his needs. Other examples of strange attractors include customization/differentiation (or diversity) and shared decision making/collaboration.

To become an effective strange attractor for the transformation of a school system, the core ideas and values (or beliefs) must become fairly widespread cultural norms among the stakeholders most involved with making the changes. Once this happens, very little planning needs to be done for the transformation to take place. Appropriate behaviors and structures will emerge spontaneously through emergence and self-organization.

Self-organization

Self-organizing systems are adaptive; they evolve themselves; they are agile (McCarthy, 2003). They require openness, self-reference and freedom (Wheatley, 1999). To be open with its environment, a system must actively seek information from its environment and make it widely available within the system. Self-reference refers to the ability to remain consistent with the core ideas, values or beliefs that give the organization an identity. Freedom for people to make their own decisions about changes, as long as it is guided by sufficient self-reference, will allow changes to occur before a crisis point is reached in the system, thereby creating greater stability and order.

Chaos theory can help us to understand when a system is ready for change and the system dynamics that are likely to influence individual changes and their effects, as well as to understand and improve the transformation process as a complex system. It tells us that we cannot hope to *control* the transformation process, but we *can* hope to influence the process through the use of strange attractors and leverage points, and that we must constantly adjust and adapt the process to the emerging, ever-changing reality of a particular educational system and its environment.

A Leveraged Emergent Approach to Systemic Transformation

Charles M. Reigeluth

The process of transforming a school system is a far more complex and difficult endeavor than is piecemeal reform, because it entails designing and implementing an entirely new paradigm of education, rather than changing a piece within the existing paradigm. The primary approach to systemic transformation that has been offered in the literature is the Idealized Design Approach pioneered by Russell Ackoff (1981) in the corporate sector and adapted by Banathy (1991) to educational systems.

The central difficulty with the Idealized Design Approach is that much time and energy must be invested to design the new system in some detail before any attempt is made to transform the current system to the new one. Problems with this approach include: (1) the large amount of time without visible results can cause considerable loss of motivation for change, and (2) key personnel (school board members, superintendents, principals and teacher leaders) frequently move on to other positions before the process has a chance to play out.

The Leveraged Emergent Approach is an alternative approach that arose out of the district-wide K-12 systemic transformation effort that is still underway in Decatur, a township of Indianapolis. The Leveraged Emergent Approach is based on the following principles:

- Leverage. In transforming an existing system to a new paradigm, it is hard to change everything at once. When you change one part of the system, it will become incompatible with the rest of the system, which will then work to change it back. Therefore, you must first change a part or parts of the system that can exert powerful leverage on the remaining parts of the current system — more powerful than the leverage that the rest of the current system will exert on changing the new parts back to what they were. Starting with a few high-leverage changes can make the whole systemic change process considerably quicker and easier.
- Emergent design. It is difficult to design a new system from scratch, because it is difficult to predict what will work best (see previous blurb in this section). In an emergent approach, a few guiding principles or beliefs ("strange attractors" in Chaos theory) are selected, a few high-leverage changes are implemented, and the remaining changes occur through creativity, trial, and error — they gradually emerge over time.
- Visible progress. It is important for participants in a systemic change process to be able to see progress often. This sustains motivation and wins over skeptics.

This approach begins with establishing a district-wide framework of "ideal" mission, vision and beliefs that are learner-centered and in other ways consistent with the educational needs of the Information Age. Then, school-level design teams are charged with building consensus (mindset change) on a few high-leverage, structural changes of their choice, as long as they fall within the district-wide framework. They might include such changes as:

- replacing the current report card with an inventory of attainments whereby each student must reach a standard of attainment before progressing to the next one,
- requiring a personal learning plan for every student whereby each student can progress to the next attainment immediately upon mastering the current one,
- requiring a change in the teacher's role to a coach or facilitator, and
- requiring active parent participation in setting and attaining their student's goals.

Such structural changes are offered to help participants understand what a high-leverage structural change is, and schools then choose different structural changes that they believe will provide more leverage or be more consistent with their further elaboration of the district-wide beliefs. However, there must be broad stakeholder consensus on the structural changes before a design team is allowed to implement those changes.

The process of reaching broad consensus on the changes must focus on mindset change (beliefs or "strange attractors"), which becomes the impetus or motivator for change. The high-leverage structural changes serve as the enablers and sources of leverage. Together, these provide sufficient motivation and leverage to gradually change all other aspects of the system to be compatible with them. Unlike the Idealized Design Approach, no long-range ideal design is created by each building to gradually evolve towards. This is a much more emergent approach with the district-wide beliefs and values about education ("strange attractors") guiding the emergence, consistent with a Chaos Theory perspective. Hence, there is still some ideal thinking involved in the district-wide framework (a "fuzzy" ideal vision).

Systemic Change: Get Ready, SET, Go! – Where?

Theodore Frick, Kenneth Thompson and Joyce Koh

Many well-intentioned people want to improve education. So do we. We believe that education could be far more effective, efficient and satisfying than it is in our current educational systems — not only K-12, but higher education as well. The questions are: "Change what?" and "Change how?"

As an analogy, consider an old bridge that is failing — it is structurally weak and is impeding the flow of traffic. If the bridge is not fixed, it will collapse and vehicles will plunge into the river. When engineers design a new bridge, they utilize adequate scientific and praxiological theories. No one in modern times would consider designing a new bridge by trial and error. Yet, when we attempt to improve education, we have no *valid* way of predicting that new educational system designs will work any better than what we now have.

The "what" is the *new design* of the bridge. The "how" is the *process* of getting from the old design to the new one. Many researchers have focused on the change *process*, including Reigeluth, Duffy and other authors in this special issue of *TechTrends*. We believe it is also extremely important to focus on the outcomes of change — i.e., how well the new system is predicted to work. We need both approaches (which are complementary), since a change process can be effective but the resulting new system may not work well. To continue the analogy, we could successfully build a new bridge, but it might collapse during a heavy wind.

We propose the *Get Ready, SET, Go!* model to predict educational system outcomes to guide the change process. This is an inquiry-based approach that utilizes *SimEd Technologies* (*SET*). The model is outlined below:

Phase 1: Get Ready

- Identify the specific current education system to be improved.
- Over some interval of time, measure system properties (e.g., input, regulation, complexity, strongness) with *Analysis of Patterns in Time and Configuration* (*APT&C)*, which is a methodology for measuring system dynamics and structure.
- Use *Predicting Educational Systems Outcomes (PESO)* software to predict future outcomes based on observed system properties under existing conditions (e.g., complexity increases, decreases, or remains constant). *PESO* is a computer modeling tool, based on a well-defined Axiomatic Theory of Intentional Systems (*ATIS)*, that will predict what *future* outcomes will occur as a result of *current* system conditions. These predictions are based on how the system is currently designed and operates under existing conditions, before any new design is implemented.
- If these outcomes are what are wanted, then do not modify the system; otherwise, proceed to Phase 2.

Phase 2: SET

- Use PESO software to model newly envisioned educational system designs — i.e., the changes desired that are feasible.
- Run PESO predictions far out enough in time to make sure all the consequences of the newly designed system would be acceptable. Are these the wanted outcomes? If yes, proceed to Phase 3. If no, continue to use PESO and try different changes until satisfactory outcomes are predicted.

Phase 3: Go!

- Implement the new design chosen in Phase 2.
- Over some interval of time, measure system properties with APT&C.
- Verify that the measures confirm the predicted system outcomes. If not, then analyze both the Phase-2 and Phase-3 processes to determine what modifications are required. For example, why did the changes not produce the predicted result?

> The first analysis would be a Phase 3 analysis to determine if the validation parameters were accurate, and if the changes were implemented properly. Most problems concerning outcomes will be a Phase 3 problem. Phase 2 problems are concerned with the design of the theory and cannot be evaluated as a part of the empirical analysis. If the problem cannot be resolved in Phase 3, then it must be transferred to a theoretician familiar with *ATIS*.

SimEd Technologies consist of *APT&C* and *PESO* software programs that are currently under development. *APT&C* is a mixed-mode research methodology and software tool to help create knowledge of education that is directly linked to practice. *APT&C* bridges the gap between traditional linear models in quantitative research and qualitative research findings that lack generalizability (Frick, 1990; 2005).

PESO is a software tool that makes predictions for a specific educational system, based on current conditions. One must first observe properties of that system and determine how the values of those system properties change over some time period — e.g., increase, decrease, remain constant, increase to some value then decrease. When those changes in system property values are entered into *PESO*, the software finds relevant axioms and theorems which match those conditions and then executes the logic of the Axiomatic Theory of Intentional Systems (*ATIS:* Thompson, 2005). *PESO* effectively applies relevant parts of *ATIS* in order to make predictions of what will happen in the system. For further information, see: http://simedtech.com.

Work remains to be done before the strategy we recommend can be utilized in practice. *APT&C*, *PESO* and *ATIS* are currently under development. Empirical research is needed to validate theorems in *ATIS*. *APT&C* and *PESO* promise to be powerful tools to facilitate this research. Then *Get Ready, SET, Go!*

A Corporate Reengineering Approach to Systemic Change

Christopher D. Ryan

> If managements want companies that are lean, nimble, flexible, responsive, competitive, innovative, efficient, customer-focused, and profitable, why are so many businesses bloated, clumsy, rigid, sluggish, noncompetitive, uncreative, inefficient, disdainful of customer needs, and losing money?

Michael Hammer and James Champy pose this question in the 2003 update to their seminal 1993 work on business process reengineering, *Reengineering the Corporation: A Manifesto for Business Revolution*, a book that presents exciting ideas and holds valuable lessons for systemic change in business, government, and education.

The treatment of their subject, the systemic reorganization of business firms, offers strong parallels to changes that are being called for in education systems. Key to Hammer and Champy's argument is the idea of throwing out existing business practices and starting from scratch — a powerful, if daunting, approach to aligning the way business is conducted under the requirements of the information age.

Reengineering focuses on dismantling the industrial-age model originally imposed on business organizations in the 19th and early 20th centuries. This view held that work should be broken down into its smallest parts, with workers and their products controlled by a highly centralized management. Hammer and Champy argue that this model is outdated and inappropriate for today's business environment; it fragments work, undervalues workers and management and creates a cumbersome system plagued by miscommunication, redundancy and excessive overhead costs. The authors advocate synthesis rather than fragmentation: an approach to organization built around the fundamental business processes that serve customers, rather than around non-value adding internal checking and control systems.

How to reengineer

The authors begin the "how to" section of the book by explaining *who* will do the reengineering. At the organizational level, they identify the *leader*, a senior executive who "owns" the organization's overall reengineering effort; a *steering committee* of senior managers, responsible for oversight of the organization's overall effort; and a *reengineering czar*, responsible for the organization-wide development of reengineering tools and techniques and achieving synergy across multiple efforts. At the process level they identify the *process owner*, a manager who maintains responsibility for a given process both during and after the reengineering effort; and the *reengineering team*, which critiques the existing process and develops and implements the reengineered process.

The authors next examine *what* should be reengineered. Mapping an organization's business processes, which can be obscured by organization charts and business units, is the first step. Once processes are mapped, reengineering efforts must be prioritized, typically based on three considerations: 1) degree of dysfunction, 2) importance of the process and 3) feasibility of successfully reengineering. The authors recommend looking for "broken" processes first, and provide several examples of how to identify "diseases" afflicting processes by recognizing "symptoms." When a process has been selected for reengineering, process reengineers must build their understanding of the process and determine how it "should" look, primarily by focusing on the needs of the ultimate process customer.

Hammer and Champy next tackle the *experience* of process reengineering by providing a fascinating look at what a redesign session is really like, and introducing tools and techniques from their consulting practice.

These include identifying and questioning all assumptions associated with a process, and using information technology to radically change how work is done. The authors identify information technology as one of the fundamental enablers of the reengineering movement, but they emphasize that using technology to try to fix existing processes is not a valuable solution; only the transformative power of technology can achieve radical breakthroughs in performance.

Lastly, the authors offer advice on *succeeding* in reengineering. A key to success is anticipating, and dealing with, the change management issues associated with reengineering. They emphasize the importance of strong, committed leadership and clear communications, from the outset, throughout the organization. They recommend introducing reengineering efforts through a "case for change," explaining clearly why reengineering must be done, and following this with a "vision" of how the reengineered organization will function.

Conclusion

Hammer and Champy's work is required reading for those who would effect systemic change in organizations, because it moves so far beyond theory and into the applied practice of reengineering. While they focus on business firms, Hammer and Champy's arguments and ideas are applicable to any organizational setting, such as government or education, where there is a complicated bureaucracy and hierarchy that can obscure the needs of the ultimate customer (think taxpayer or student).

Leaning the System: Adding Lean Thinking to Systems Thinking

Shane DeMars

In the early 1990s business jargon started to become increasingly international. As folks learned the lessons of Toyota's production system *kaikaku, kaizen, muda,* and *poka-yoke* became familiar terms. In 1995 James P. Womack and Daniel T. Jones synthesized the principles of Toyota and other lean production systems, in their book, *Lean Thinking*. Their revised 2003 edition brings the ideas up to date and provides a longitudinal look at the status of the organizations depicted in their many excellent examples. Here's a quick primer on lean thinking and how it relates to systems thinking.

Lean Thinking describes five principles that are at the core of lean thought.

1. *Value* — This is the heart of lean thinking. Creating and sustaining the value that only the customer defines. Once value is defined, all efforts are aimed at identifying and eliminating *muda,* or waste.
2. *Value Stream Mapping* — This activity follows a product (which may be a service) from inception to delivery. It is scalable, and may stretch from raw material to final product or only from in house concept development to ultimate delivery. The idea is to gain a greater understanding of the entire value stream so that muda can be identified everywhere and eliminated. There are activities that directly produce value, those that produce no value but which cannot be currently eliminated (type 1 muda) and those which add no value whatsoever (type 2 muda).
3. *Flow* — There is no value in an idle product, one that is transported unnecessarily or one that is not really needed. When products continue to flow through a system, they continue to acquire value. When the flow is interrupted, by backlogs, stoppages or even by over production, then muda takes form.
4. *Pull* — This concept can be summed up in a simple phrase: Make nothing until the customer wants it, then make it very quickly. If followed, most storage and nearly all over-production are eliminated.
5. *Perfection* – In quality terms this relates to continuous improvement. Perfection can never be attained, but must be pursued relentlessly. The key to perfection is transparency. Everyone knows what is going on, so everyone at any level can identify ways to improve.

In addition to the principles, Womack and Jones offer an "action plan" (process) for conducting systemic change.

After identifying the value stream, most type two *muda* can be quickly eliminated. In nearly all cases, a process is redesigned for maximum efficiency. Called *kaikaku* (radical improvement) this lean activity may resemble reengineering, but this is where the similarities end. In the pursuit of perfection, employees, not just managers, practice *kaizen* (continuous improvement) to continue eliminating *muda* and increasing quality. Furthermore, lean thinking inherently incorporates more systems thinking. Here are some examples of how:

- Value stream mapping is a way of looking at all the systems that act on a product.
- The ideas of flow and pull are interdependent elements of a lean system. Indeed, an organization can be only maximally effective through lean thinking if both their suppliers and their customers understand the processes.
- In the democratic and collaborative spirit that undergirds the pursuit of perfection, *Lean Thinking* advocates and describes how many lean organizations help the customers and suppliers by teaching them these principles and aiding in their lean transformation.
- Relationships are emphasized and the system becomes stronger through transparency. Different functional areas begin to realize the interdependent nature of their activities.

You may say, "Gee thanks, but I'm not in manufacturing." While this may be true, any process, product or service can benefit from the application of lean principles. Here are a few examples of how knowledge of lean can be applied in ISD, training, and education.

- *Instructional design and production* — Instructional Systems Design (ISD) has long been lambasted for its *muda*. While several alternative instructional development models exist, lean thinkers Womack and Jones would likely laude benchmarking, but caution that it may not be appropriate everyplace. Instead apply the principles and banish *muda* in *your* system.
- *Lean training* — As the popularity of the lean movement increases, more and more organizations are searching for the best way to learn the lean techniques. The Lean Enterprise Institute (http://www.lean.org/) is one nonprofit organization with this aim in mind.
- *Higher education* — The Lean Education Academic Network (http://www.teachinglean.org/) is a recently established organization of educators interested in increasing the incorporation of lean thought in university education. As these skills become increasingly valued, so too will graduates of programs that incorporate these lessons.

Author Information and References for Section 5

Step-Up-To-Excellence: Protocol for Navigating Whole-System Change in School Districts

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A Professional Development Approach to Systemic Change

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User-Design for Systemic Change

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A Chaos Theory Approach to Systemic Change

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A Leveraged Emergent Approach to Systemic Transformation

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Systemic change: Get ready, SET, go! – where?

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Leaning the system: Adding lean thinking to systems thinking

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Section 6

New Systems Produced by Systemic Change

Systemic Changes in the Chugach School District

Wendy Battino and Jo Clem

The 200 students in the Chugach School District (CSD) are scattered throughout 22,000 square miles of remote area divided by glaciers, mountain ranges and icy seas in South-central Alaska. Some village and school sites are 100% Aleut (Native Alaskan), while other sites include heterogeneous groups. Students receive educational services in one of three villages accessible by small aircraft, or from itinerant teachers who regularly visit wilderness homes in the Valdez and Fairbanks regions through the District Extension School Program.

The new system

A comprehensive systemic change effort was initiated in 1994. Using input from our schools, communities and businesses, CSD realigned its curriculum to create performance-based standards in 10 areas: mathematics, science, technology, reading, writing, social sciences, service learning, career development, cultural awareness and expression and personal/social/health development. Individual Learning Plans (ILP), Student Assessment Binders (SAB), Student Learning Profiles (SLP) and Student Lifeskills Portfolios support and document consistent progress toward proficiency in all standards for each learner. CSD developed performance standards continuums for all content areas. These continuums of standards are a working document for our students, parents and teachers and provide a roadmap of clear expectations towards success for our students.

In order to break away from traditional modes of education, CSD applied for a waiver from the Alaska Department of Education and Early Development to