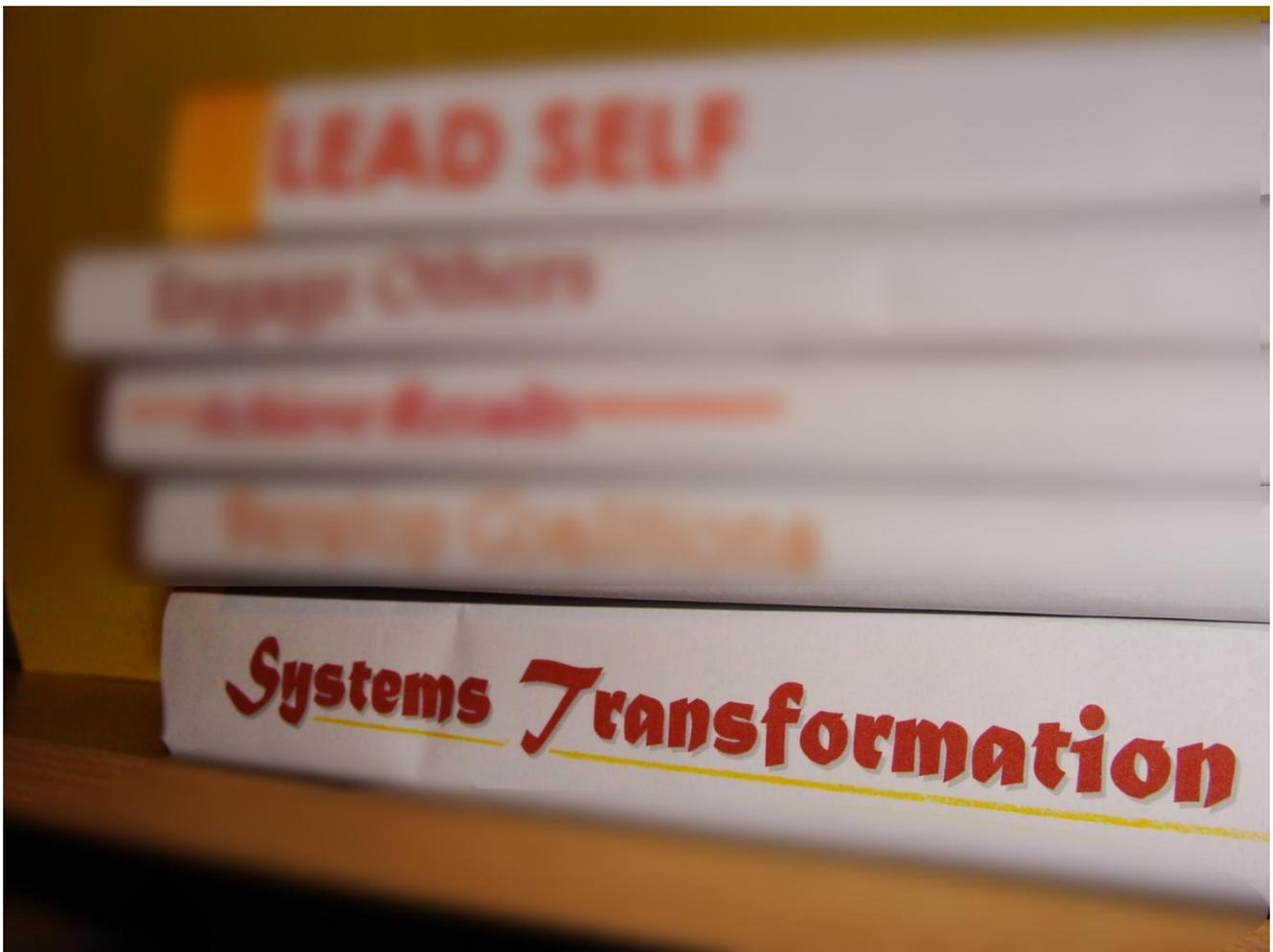


## *Systems Transformation (Byte 17)*

### **Demonstrate Systems/Critical Thinking**

The benefit for leaders demonstrating systems/critical thinking is that they perceive the system as a whole and understand that there are interrelationships among key components. These components include attitude, perceptions, and the ways in which decisions are made.

Senge (1994) contends that leaders should not drive a system but develop personal learning strategies and understand the context in which they work.



## SYSTEMS TRANSFORMATION (Byte 17)

### *E-mail Question: What is the implication of combining systems thinking with strategic leverage?*

In his *2007 Report of the President*, Lee S. Shulman, President of the Carnegie Foundation for the Advancement of Teaching, demonstrates systems thinking as he describes the interrelationships between people, programs, practice and policy. He uses the discussion topic of pathophysiology and management of sepsis coupled with the image of a cascade or waterfall to describe the system. Shulman contends that the idea of a cascade can be perceived from two points of view. It can be viewed in a negative, loss of control way as when the human body's systemic over-response to infection leads to complications. Or it can be viewed in a positive way when cascades reach tipping points where the momentum creates opportunity for change. He explains that the reason that the Carnegie program is designed to extend from the primary school through to the doctorate level is that they believe that they must look upstream to understand the nature of current problems. They then design practices and initiate policies to address



these issues. Shulman believes that all organizations need to look upstream instead of downstream in problem situations and certain questions need to be answered in order to solve problems effectively. Where is upstream? Where does the cascade begin? And which points in the cascade are most promising as sites for intervention and change? At the Carnegie Foundation, the leadership, research teams, nurses and teachers are interdependent: the programs are interacting with one another in a fruitful and mutually enriching manner and they are constantly seeking strategic points of intervention where the momentum of those cascades lead to new practice and policies.

Senge, P.M., Kleiner, A., Roberts, C., Ross, R.B., Smith, B.J. (1994). *The Fifth Discipline Fieldbook*. New York, NY: Doubleday.

Shulman, L. (2007). *Cascades: Report of the president*. The Carnegie Foundation for the Advancement of Teaching. (See Appendix I.)

## Appendix I

### Cascades Report of the President Lee S. Shulman, President

*“Our topic today is the pathophysiology and management of sepsis.”*

*It was 9 a.m. on a Wednesday in February. I sat in a small, somewhat stuffy lecture hall at the School of Nursing at the University of California, San Francisco, where Professor Lisa Day was addressing the topic of critical care in the intensive care unit. To my left were seven colleagues who were part of our site visit team for the Carnegie study of nursing education. There were 32 students in the room, four of whom were men. As the instructor began to describe the character of a condition called “sepsis,” the students were riveted, attention focused on the highly animated instructor. These students were already spending substantial amounts of time in clinical rotations—in the community, in the teaching hospital, in institutions for the elderly or chronically ill—and they understood that sepsis mattered. It was a condition that could lead to very serious illness and death. Its diagnosis and management was a central feature of the responsibilities of nurses. As Lisa Day put it succinctly, it was, for nurses, among the “things we still own” in the clinical team setting of the ICU.*

*The core definition of sepsis was straightforward, if not particularly comforting: “Severe sepsis results from the body’s systemic over-response to infection. This over-response disrupts homeostasis through an uncontrolled cascade of inflammation, coagulation and impaired fibrinolysis.” If the cascade is permitted to progress through a continuum of severe sepsis and septic shock, it can lead to multiple organ dysfunction and death.*

I was intrigued by the analysis and discussion of sepsis that developed over the next couple of hours, and especially by the vivid portrayal of the variety of ways in which these “uncontrolled cascades” could develop and become more serious. The human body was clearly so interactive and interdependent a system that a breakdown in one sector would rapidly lead to breakdowns in others, and eventually to total system shutdown. Moreover, sepsis was caused by an over-response, by too much of a good thing. The nurse’s responsibility was to identify and control those events, forestalling the uncontrolled cascade, or interrupting it once it had begun. Yet, the nurse—like the organs of the human body—did not function independently. The nurse was also part of an interactive interdependent system, a team, on whose efficacy the survival of the patient depended.

Only two weeks earlier, I had been on clinical rounds with medical students and residents as part of our studies of medical education. In previous years I have joined our research teams at theological seminaries and schools of law, at engineering programs and at teacher education centers, at elementary schools where math was being taught to first graders and at doctoral seminars where Ph.D. candidates were discussing the newest developments in neuroscience. I try to participate, even marginally, in most of the field work undertaken at Carnegie, better to understand our work so I can both explain it to the outside world in speeches and articles, and better to coordinate these efforts within the Foundation itself.

The composition of the research team was also characteristic of the way such studies are engaged at Carnegie. My colleagues at the nursing school were a typical Carnegie team, diverse in disciplinary backgrounds and drawn from not only the nursing study but from several other Foundation programs as well. It was the second day of observations, and one of the few times when nearly all members of the team would be in the same place. Among those present were Patricia Benner, the distinguished Professor of Nursing and department chair at the University of California, San Francisco, whom we had recruited for the next three years to lead this study; Molly Sutphen, a medical historian who is the research scholar in the study; Anne Colby, life-span developmental psychologist and senior scholar who co-directs all our studies of professional education; Bill Sullivan, philosopher and senior scholar who joins Anne in co-directing these studies; both David Irby and Bridget O'Brien from the team conducting the study of medical education; and two additional nursing educators, former students of Benner, now teaching nursing at two other schools in the area. After sitting together in this particular class, members of the team would fan out into other courses, clinical rounds, focus groups of faculty members and students, and other settings where we would be collecting the data on which this work is grounded.

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*The idea of a “cascade” of consequences is particularly provocative. Through diagrams and narratives, using flowcharts and clinical cases, Professor Day repeatedly emphasized the concept of interdependence. These dangerous cascades could be initiated by the infection or trauma that had led to the patient’s presence in the ICU in the first place. But just as often, the cascade began with a medical intervention, with an aspect of the treatment itself that exacerbated the seriousness of the patient’s condition. These “iatrogenic” problems, new conditions caused by the very care designed to heal, were of particular concern to these students of nursing. Their responsibility was not only to heal; it was to heal in ways that did not, in turn, make the patient more seriously ill. Thus, running a “central line” through an artery is necessary to carry out diagnostic tests, as well as to introduce nutrients and medications rapidly into the system. Similarly, patients are “intubated” to ensure that their airways remain open and they can keep their bodies oxygenated. But every time you introduce an unnatural pathway into the body, you also open it up to invasions of dangerous micro-organisms like staph infections. These are among the most frequent causes of the “uncontrolled cascades” that produce severe sepsis and its complications.*

The metaphor of a cascade is also quite compelling. A cascade is a waterfall, and it conjures up the image of an object caught in the power of the current as it rushes inexorably by, tossed and buffeted by the flow, unable to regain control once the momentum is achieved. The etymology of cascade is instructive, since the old meaning of “cas” is something that falls (as in waterfall). Thus, the pedagogical methods used for so much professional education, the many variations on “case method,” are all about things that “befall” us, that occur unexpectedly, without intention and by chance, with which we then have to cope.

I found the analogy to the education system itself hard to avoid. How many serious educational problems have been created by the very educational policies and interventions designed to help students achieve? How much of the controversy over No Child Left Behind is no longer about the original goals of the program, but around the cascade of consequences that the program prescribes, from excessive testing to punitive policies for enforcement?

The image of a cascade also reminds me of a story I heard long ago from school reform leader Phil Schlechty. He describes a scene in which people have gathered along the banks of a swiftly flowing river to find helpless folks caught in the current and in danger of drowning. The spectators courageously jump into the water to rescue the victims one at a time. Finally, one exhausted rescuer observes, “Shouldn’t someone go upstream and find out who is throwing them in?” The major reason why we have crafted a program of studies here at Carnegie that extends from the primary school through the doctorate is our belief that one must always look “upstream” to understand the nature of current problems, and thus to design policies and practices necessary to address them. In the world of education, however, it is important to acknowledge that nearly every sector of the educational system can be simultaneously viewed as both upstream and downstream.

Are the problems of mathematics learning in our nation to be attributed to the quality of primary-grades arithmetic instruction, where Senior Scholar Liping Ma is investing her time and energy? Or in the community college programs in developmental mathematics designed to rescue those who have been drowning at the elementary and secondary level, where our Hewlett partnership now focuses? Or in the preparation of elementary and secondary math teachers and those who direct those programs, as is the focus of our QUEST program in teacher education? Or in the doctoral preparation of mathematicians and educators where those who teach the teachers are educated and socialized? Where is “upstream?” Where does the cascade begin? And which points in the cascade are most promising as sites for intervention and change?

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*As the discussion of sepsis and its management continued through the session, the pathophysiological complexities increased. When cascades begin, they get complicated quite quickly. And as soon as you begin to intervene, the complexity grows even more. We had reached a point in the class where Professor Day was explaining why intubation to maintain oxygen flow into the lungs was critical, and was showing slides that illustrated the process of inserting the intubation device into the trachea. She suddenly stepped back, looked out at her nursing students and asked, “How will the patient feel at this point? What is the patient’s experience in the ICU as these procedures are undertaken? What is our responsibility for how and what the patient feels? If we don’t concern ourselves with this question, is there anyone else on the team who will advocate for the patient?”*

*As we observed the discussion that followed her questions, we were reminded once again of our tri-fold conception of professional learning as comprised of three interacting apprenticeships—a cognitive apprenticeship, where a novice learns to think like a doctor, nurse or lawyer; an apprenticeship of practice, where one learns to perform like a teacher, engineer or priest; and a moral apprenticeship, where the neophyte learns to “be” the kind of human being entitled to serve others in these ways. As soon as Lisa raised these questions, she was focusing students on their moral apprenticeship, their obligation to serve as advocates for their patients, as those who care about how their clients feel and what they experience.*

This was a perspective that echoed other aspects of the Foundation’s programs. The notions of moral, civic and political engagement as necessary facets of an undergraduate experience are reflected here. The focal concept of the Ph.D. as a “steward of the discipline and profession” captures the complex interaction of the intellectual and moral/civic in the preparation of scholars. It also reminded me of how each of our programs at the Foundation speaks to one another even as they necessarily pursue their own strategic and programmatic paths.

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I have written about cascades as necessarily problematic, as a loss of control when events become complications and descend into disaster, whether within an organism, an organization, or a policy system. But we should not forget that cascades can work in our favor, as well. In our programs at the Foundation, we are constantly seeking strategic points of intervention in a system that can create cascades of positive change. We imagine reaching “tipping points” where the momentum of those cascades leads to new practices and policies on the ground. When we evaluate the impact of our older programs, such as Carnegie Academy for the Scholarship of Teaching and Learning (CASTL), we look for evidence that the cascade is taking on a life of its own. In our partnerships with other organizations, such as Association of American Colleges and Universities, the American Association of State Colleges and Universities, the disciplinary and professional societies, and others, we seek to increase the flow of our work so that its power increases and spreads.

My sense of Carnegie as an institution at this point in its century-long history can also be characterized by an organizational equivalent of “flow.” Individual programs are proceeding beautifully, whether in their infancy, such as QUEST, the nursing and medicine studies, and the community college project, or in their maturity, such as Political Engagement Project, the Carnegie Initiative on the Doctorate, or CASTL. Our technology efforts are gaining increasing visibility and utility nationally and locally. And most important, our programs are interacting with one another in a fruitful and mutually enriching manner. If this is what it feels like to approach one’s 100th birthday, we need not fear old age.

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