emerging

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Plexus Institute

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State of Fear

A white-knuckle plotline; A controversial peek at the science behind global warming; A knowing look at the psychology of the "true believer." Put them all together, and you have the masterful new novel from bestselling author Michael Crichton. See it reviewed here.

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Healing Families in the Inner City

A family is a complex adaptive system. So what might an application of complexity have to offer to family therapy? Dr. Norbert Wetzel is blazing some new trails. And inner city families are the beneficiaries.

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Winning the War on Strokes

The work of the Stroke unit at Saint Luke's Hospital in Kansas City, Missouri, is a nationally recognized model for stroke care. Now we're giving you an up-close look at how this amazing team, led by Dr. Marilyn Rymer, is saving lives.

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plus

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emerging: book review

State of Fear

In his new bestseller, author Michael Crichton takes a look at global warming and the politics of science. Whether you like the book may depend upon your own convictions.

I was recently at an international meeting in Bled, Slovinia. The topic of the meeting was complexity and how the coupling among different scales within a phenomenon lead to the richness of structure observed in experiments. At one of the evening's dinners I found myself in the company of a group of European academics. As a group they wanted me to defend what the United States had done and was doing in Iraq. Not sensing any sympathy with my government's position and being an Army Chief Scientist I declined to get into a political discussion and made some lame joke.

The conversation drifted for a while and eventually I was asked my opinion of the *Kyoto Protocol* and global warming, a topic much closer to the theme of the meeting. I felt on much firmer ground. After all one could have diverging scientific opinions and still have a civilized discussion. I responded with what I thought was a cautious observation. I said: "There is little scientific evidence for what has caused the observed increase in the average global temperature." The response of this group made me regret not having discussed the war in Iraq. My position was dismissed as being uninformed and I was made to feel that anyone who did not share their overriding concern for what humanity was doing to the planet must be a foil of business and/or the government. It was irrelevant that I was the only person in the discussion who had ever done any research in the area. The conclusion was self-evident for anyone to see.

I relay this anecdote because it is my experience of what happens when a scientific problem becomes confused with a political agenda. Consequently when I returned to the states and read Michael Crichton's new book, *State of*

Fear (HarperCollins Publishers, New York, 2004), I found myself resisting the impulse to send copies of the book to all my dinner companions. This somewhat malicious reaction stems from the fact that Crichton had marshaled all the arguments I was groping for during that dinner.

State of Fear is no doubt a thriller, taking the protagonist "from the glaciers in Iceland to the volcanoes of Antarctica, from the Arizona desert to the deadly jungles of the Solomon Islands". Each encounter peels away another layer protecting the identity of the antagonists, who in most novels are the good guys, the ecologists and environmental scientists. The intellectual driver of the novel is the scientific evidence for global warming and its consequences. But the subtler driver is the psychological makeup of the "true believer," whether that belief is theological or scientific.

"The intellectual driver of the novel is the scientific evidence for global warming and its consequences. But the subtler driver is the psychological makeup of the 'true believer.'"

Crichton takes us through the labyrinth of the complexity of climate change using the device of an environmental lawsuit as the context in which a lawyer, who is sympathetic to the environmental cause, but ignorant of the science, learns that things are not as they appear. The lawsuit is a class-action suit taken for some island dwellers who fear their homes will be covered by the rising of the earth's oceans due to the melting of glaciers. The science on which this suit is based is discussed from a multiplicity of angles at various points in the novel, always including the actual research papers referenced from such journals as *Science* and *Nature*, as well as from the more specialized climate research journals, with citations as recent as 2004.

Crichton has that rarest of writer's abilities, that being to tell a tale with a moral and to do it well. He enables the reader to suspend disbelief with regard to the story line (which can sometimes stretch credulity, such as the protagonist surviving multiple attempts on his life), while at the same time engaging the reader's intellect with sharply reasoned arguments and scientific literature citations. The selection of characters in the novel is all-important, because the motivation for an action and a description of that action require more than average explanation. For example, there is the philanthropist, who is suspicious of how his investment in environmental science is being spent. He dies in an automobile accident (very suspicious). His lawyer, the protagonist, must find out, after the fact, what the suspicions of his ex-client were and if they contributed to his "accident". The antagonist, another lawyer, heads an environmental charity that is carrying out the class action lawsuit, and is deeply offended by the suspicions of his ex-benefactor. (He is also upset at the loss of a multi-million dollar donation).

The protagonist soon encounters the only scientist in the book, a geo-engineer from MIT who also works for an intelligence agency. The scientist is properly skeptical of the assertions being made by lawyers on all sides and repeatedly returns the protagonist to the scientific literature for guidance on what is true about our state of knowledge regarding global warming and its consequences, even whether it is a bad thing in and of itself.

In case one misses the point of the book — that there is a real honest-to-gosh scientific controversy regarding the causes of global warming, with evidence on both sides of the debate — the book includes an appendix. In this appendix Crichton points out that for over a century there was a scientific discipline that was supported by Noble Laureates, United States Presidents, and hundreds of reputable scientists from around the world. This was the pseudo-science of eugenics, supported in the first half of the 20th Century by such organizations as the Carnegie and Rockefeller Foundations. It is not that Crichton believes that global warming is in the same scientific category as eugenics, but it is in the same political category. When scientific decisions are made based on a political agenda, the investigation ceases to be science and becomes pseudo-science.

After reading to my wife what I had written so far she pointed out that I had not mentioned how much I liked the book. So let me correct that. The novel is an excellent read, fast-paced and sufficiently complex that one is kept guessing. But it is much more than that, in part, because the science is so well done. I suggest you read it with a friend and then take the weekend off to discuss it.

By: Bruce West, *Senior Research Scientist, U.S. Army Research Office, Research Triangle Park, NC*

Healing Families in the Inner City

Through the groundbreaking *Family Intervention and Empowerment Program*, Dr. Norbert Wetzel is extending opportunities to the families who need it most.

Health and illness are relational phenomena that reach deep into the past and far beyond the physical and biophysical organism of the individual, says family psychologist Dr. Norbert Wetzel.

"Whenever you meet somebody as a patient you are really dealing with an incredibly complex and highly responsive process system called the family," Dr. Wetzel says. "And when I use the word family, I mean the intimate relational network of the person…. the people who are intimately related, living with, connected to, the person. That includes, by the way, previous generations… I see not just the family, not just the couple, but the ancestors. I see the ghosts of the past."

The family is a powerful complex adaptive system, he observes, and health and adaptability are a function of relational connections and the complexity of the relationships. The complexity of the relationships, in turn, depends on the health and adaptability of the individuals forming the system.

Dr. Wetzel and family therapist Hinda Winawer founded the Center for Family, Community and Social Justice, in Princeton, NJ, and initiated the groundbreaking *Family Intervention and Empowerment Program* (FIEP), which is bringing family therapy to troubled inner city adolescents in New Jersey. The center has teams of professionals in middle schools and high schools in Camden, Trenton, Lakewood, Irvington and Elizabeth. In addition to helping individual teens and their families, a program goal is to train a cadre of highly qualified young professionals from inner city communities in state-of-the-art family therapy.

Dr. Wetzel addressed the Plexus Institute conference *Improving Health of the Chronically Ill: Insights from Complexity Science* in December. In introducing Dr. Wetzel, Plexus President Curt Lindberg described the center's com-

plexity-inspired work as "an elegant, exquisite model and a wonderful contribution to this whole field."

Youngsters can be referred to FIEP by school officials, teachers or families, or they may come to the school-based offices themselves. When a team starts working with a youngster, the beginning interview is geared toward reaching the family.

"We have interviews and visits in homes. We go to prisons, we go to hospitals, we go anywhere we can to encounter missing parts of the family household the kid belongs to," Dr. Wetzel explains. "We include foster families, we include the coach. We include a birth mother or birth father who may never have seen the kid, if we can find them. So some of this is detective work. The health system typically neglects fathers, so one of our most important functions is to reconnect fathers with the families."

"The family is a powerful complex adaptive system, and health and adaptability are a function of relational connections and the complexity of the relationships."

Youngsters often are referred because they appear as "troublemakers", he notes, but Dr. Wetzel wants to know what's happening in the context of the school, family, or neighborhood that sheds light on the reasons for the trouble.

A rigorous contextual and systemic perspective gives the therapist choices of responding in different ways, Dr. Wetzel observes: it might be helpful to work with the family, the peer group, with housing, or perhaps helping parents organize to combat gang violence. Intervention on multiple levels is important, he says, because families are often stressed by factors outside their immediate milieu.

He spoke of his own professional ancestors—whom he described as being as important as family ancestors—noting the innovative work of Gregory Bateson, author of *Steps to an Ecology of Mind*.

He touched upon the philosophical concept that people are related prior to cognition. Western tradition has taught us to think in terms of individuals, he explains, so we suppose that an individual exists, then develops cognition of other individuals, and eventually individuals develop relationships with one another. Rather, he says, it is crucial to recognize that relationships exist before any other experience and precede cognition. "It's not 'I think therefore I am'," he asserts. "It's 'I find myself in relationships, and from relationships come my own identity as an individual and my recognition of others.'"

This idea has enormous implications.

"Development—genetic expression, biophysiological differentiation, brain differentiation, the cognitive, social and emotional maturation of the individual, individuation, all of that grows together and is reciprocal," he says. "It is a reciprocal and expansive process, with the evolution of relational complexity and depth. Individuation and relationship grow together. The more you

become an individual, the more you are related, and vice versa: The more related you are, the more you become unique as an individual."

Focusing on relational connections, the therapist becomes a relational consultant to the family rather an expert issuing directives. "The process is collaborative, respectful, curious, and innovative, and relies on bringing out the resources that the family has and connecting them," Dr. Wetzel says.

To restore health, a person has to be connected with family and community.

"Societal conditions such as the daily insults that blacks experience in our culture, or the traumatic violence that children experience, or malnutrition, run down housing, joblessness, those all contribute to illness," he says. "They constitute 'social relational illnesses'. For blacks, there is often high blood pressure as a consequence. For children compromised immune systems are a consequence of trauma."

"The more you become an individual, the more you are related, and vice versa: The more related you are, the more you become unique as an individual."

Even serious mental illnesses, schizophrenia, depression, and bipolar disorders, he says, have to do with serious breakdowns in relational health. They have to do with loneliness, terror, loss of control, and extremely restricted functioning in one's relational systems.

Dr. Wetzel pointed to the contribution of David Reiss, author of *The Relationship Code: Deciphering Genetic and Social Influences on Adolescent Development*, in bridging the space between the biological world and relational therapy. Reiss explains that genetic factors are mediated through family experiences, and that family interactions powerfully influence whether adverse genetic factors will develop into serious disorders. Even a person who is disturbed may function successfully with the right combination of supportive relationships.

Dr. Wetzel directed his audience to the work of two others scholars. William McFarlane is a therapist whose use of family therapy and education has helped children at risk for schizophrenia and bipolar disorders maintain health. Martha McClintock, director of the Institute for Mind and Biology at the University of Chicago, has researched the biology of interaction and is currently studying possible correlations between loneliness and hypervigilence and pre-menopausal breast cancer in African American women.

For more on the work of Dr. Wetzel and Ms. Winawer, visit www.cfcsj.org

By: Prucia Buscell, Plexus Institute

An Advance in the War on Strokes

How did Saint Luke's Hospital in Kansas City, Missouri, develop one of the most innovative and acclaimed stroke centers in the country? Through relationships, networks, and a dash of complexity.

A clot-busting drug that can reverse the devastation of strokes was approved by the federal Food and Drug Administration eight years ago, but fewer than four percent of American stroke victims are treated with it.

Internationally renowned neurologist Marilyn Rymer knows why, and she has strong ideas on how more people can get treatments that can save lives and protect the quality of living.

"That's my message with complexity theory," she says. "The systems of organization, the regional networks, are really key to this."

Dr. Marilyn Rymer, Director, Stroke Center at Saint Luke's Hospital

Dr. Rymer is medical director of the Stroke Center at Saint Luke's Hospital in Kansas City, MO, a center that opened in 1993 and has since evolved into the MidAmerican Brain and Stroke Institute, a comprehensive program dedicated to improving outcomes of patients with diseases of the spine and nervous system. Dr. Rymer, who is also a Plexus Science Advisor, spearheaded the creation of the stroke center by bringing together a multidisciplinary group of health professionals committed to treating stroke victims. She addressed the Plexus conference *Improving Health of the Chronically Ill: Insights from*

Complexity Science in December at the Agency for Healthcare research and Quality, Rockville, MD.

She pointed to daunting figures compiled by the American Heart Association: More than 750,000 stroke patients each year show up in US emergency rooms. Stroke is the third leading cause of death—more than 162,000 Americans died in 2002—and the leading cause of long-term disability and nursing home admission. The numbers are increasing because more people survive heart attacks and cancer. However, Dr. Rymer stresses that 40 percent of the patients seen at Saint Luke's are under age 60, so it's not just a problem for the elderly.

Nor is it cheap. She says stroke care costs more than $50 billion a year in direct and indirect costs.

There are two types of strokes. Some 85 percent are ischemic stokes, in which a clot in the brain or somewhere else in the body disrupts the flow of blood to areas of the brain. About 15 percent are the more immediately deadly hemorrhagic strokes in which a blood vessel bursts inside the brain.

> "The window of opportunity for stroke treatment is only about six hours. Dr. Rymer wants treatment to begin within three hours of symptoms."

Timing of treatment is critical. Clot busting treatment has to be administered as soon as possible after the onset of stroke symptoms to work its modern magic. The National Stroke Association explains that when blood flow to the brain is interrupted, cells in the immediate area of deprivation die. When brain cells die, they release chemicals that set off an "ischemic cascade", or chain reaction, which endangers brain cells in a larger surrounding area where blood supply has been compromised but not stopped. Because of the rapid pace of the cascade, the association says, the "window of opportunity" for treatment is only about six hours. Dr. Rymer wants treatment to begin within three hours of symptoms.

A Networking Approach

Emphasizing the essential need for networks, Dr. Rymer explains that across the country, medical care is organized around urban and suburban centers. People who suffer strokes don't go directly to Saint Luke's—they go to emergency rooms like the ones at hospitals in Clinton, MO and Warrensburg and Oceolo, Kansas. So getting the best treatment to the most people requires a network of professionals who can make a fast, accurate diagnosis and tap into fast, efficient channels of communication and transportation.

She described how Saint Luke's has worked to develop those networks. The program has become a national model, featured in *Time* magazine, *The New York Times* and other national news magazines and medical publications as one of the best stroke centers in the country. Saint Luke's rate of intervention with

innovative treatment, through June of last year, was 31 percent, eight times the national average. Dr. Rymer said 69 interventions were done in the first six months of the year, meaning the center is on track to do 140 interventions for the whole year, an exponential increase over the 80 interventions done the year before.

The first step, says Dr. Rymer, is education. Patients, families and first responders have to recognize stroke symptoms. "Heart attacks hurt. It feels like an elephant is sitting on your chest," she says. "So the patients know something is wrong, and often they are able to call 911 themselves. With a stroke, it's a different deal."

Most of the time, she says, there is no pain, and since the brain is the affected organ, patients don't always realize what has happened to them.

She tells the story of John Kelly, a 57-year-old ex-Marine from Leavenworth, Kansas who had a stroke the day he was scheduled to leave for Ethiopia to train troops. As Mr. Kelly described it, he jumped out of bed, jumped into his pants, and fell over. When his wife found him on the floor, he said, "Help me get my shoes on. I have to go to work." Mrs. Kelly knew better. She called an ambulance. Mr. Kelly was treated in time and recovered.

"Rymer and colleagues noticed that one of the worst places to have a stroke was in the hospital somewhere other than the neuroscience center."

Changes in stroke treatment have been dramatic. In 1996, the FDA approved the use of t-PA (for tissue plasminogen activator), which is a drug administered intravenously that can break up the clot and reverse the stroke. The MERCI (Mechanical Embolus Removal in Cerebral Ischemia) Retriever is another clot buster—it is actually a micro catheter with a guide wire that is threaded from the groin area into the arteries of the neck, and then into the brain. It's one of the innovations that doctors and nurses at Saint Luke's helped test, and it was the MERCI retriever that helped save Mr. Kelly. Another patient saved was a 28-year-old mother with young children whose unexpected stroke was caused by a previously undetected heart condition. Dr. Rymer explains that the device, when deployed into the clot, turns into a corkscrew.

"You twist it just the way you would a wine cork," she says. "You blow up a balloon in the carotid artery so you don't have blood rushing by that clot, and then you gradually suck that clot back by pulling a syringe at the groin until you get it out. This is really amazing for me. I took care of people with strokes for 15 years without any way to reverse the damage, and now we are yanking huge clots out of patients' brains."

A Paradigm Shift in Stroke Treatment

That observation reflects what some knowledgeable observers call a remarkable contribution by the stroke team at Saint Luke's—a paradigm shift in the medical view of strokes.

"One of the fascinating things about that team is that it has undergone tremendous evolution since its inception," says Jeffrey Goldstein, a professor at Horace Hagedorn Hall of Enterprise, at Adelphi University's School of Business. "If you go back ten years, neurologists—who usually treat stroke patients—didn't want them because there was no real treatment. The patients would usually have some mental or physical deterioration, and there wasn't anything you could do. So health care workers were frustrated with stroke patients. Now it's a treatable disease, and they look at it as an entirely different entity."

A SWAT nurse evaluates a patient for possible stroke symptoms.

Next, the nurse obtains the patient's history.

The SWAT nurse then notifies the on-call neurologist. Only 20 minutes have elapsed since the process began.

The attending nurse quickly notifies the attending physician of the neurologist's recommendation.

Patient receives a CT. Time elapsed: Only 40 minutes.

Nurse is congratulated for early identification of a stroke.

Dr. Goldstein, an expert in complexity and organizations, says developments at the Mid-American Brain Institute at Saint Luke's have been a major factor in changing perceptions in the US and international neurological communities. "They weren't the first, but they seem to have become among the paramount stroke centers in the world," Dr. Goldstein says. In past research, Dr. Goldstein has written about how complexity principles—including an open, nurturing environment, positive, respectful relationships and self-organization—have allowed Saint Luke's to develop into a center where medical and organizational innovation thrive. Many successes were rooted in history.

In 1995, Dr. Rymer and colleagues noticed that one of the worst places to have a stroke was in the hospital somewhere other than the neuroscience center. "Lets say you are on the orthopedic floor. They are used to taking care of the skeletal system," she says. "And everybody is tuned in to casts, and they know how to deal with diseases of the bones. And suddenly, a patient with a broken hip suffers a stroke. You really need a different team to take over." So the neurological team created a stroke SWAT team staffed by stroke team nurses, in operation since 1996, that is now called from different parts of the hospital three or four times a week to evaluate patients with possible strokes. The symptoms noticed aren't always strokes, but Dr. Rymer says that's OK: "We'd rather be called than not called."

> "There is a tremendous amount of medical innovation going on. Saint Luke's is set up to take an innovation, to be a testing ground, then incorporate it... When they try new things, there is a feedback effect that improves everything else there."

An Intuitive Application of Complexity

About five years after her work to begin the stroke center in 1993, Dr. Rymer became involved in the VHA complexity initiative, Dr. Goldstein recalls, and she realized that much of what she had been doing—nurturing connections, conversation and cross-fertilization of ideas—was a reflection of complexity principles. "Complexity's theoretical material made explicit what had been done implicitly," Dr. Goldstein recalls, "and once it is explicit, a person can do it consciously."

Dr. Goldstein was among a dozen scholars and practitioners who participated in a "site visit" at Saint Luke's co-sponsored by Plexus Institute, last summer. "A regular part of their job now is educating people who come from all over the world to learn about stroke care," he observes. "People see how to set up a center, and reflect on the changes they have gone through. Saint Luke's team also learns from visitors. There is no feeling that 'we're the best and we'll dole out information to you.' The team is very open to learning from more fledgling groups."

As for trials of new things, the MERCI Retriever is not an isolated case, Dr, Goldstein says. Pharmaceutical companies and medical engineering companies have often used Saint Luke's as a site to try innovations. "There is a tremendous amount of medical innovation going on there," he says. "Saint Luke's is set up to take in an innovation, to be a testing ground, then incorporate it. They have a core team, but they also make changes, and when they try new things, there is a feedback effect that improves everything else there."

The team's respectful and inclusive working relationships have also been entwined with innovation. Dr. Rymer says that when the small start-up company that invented the MERCI wanted to give a luncheon for the Saint Luke's staffers who had helped lead toward the device's FDA clearance, 180 people showed up. And in fact, she adds, every one of them did have a part.

The focus by Dr. Rymer and her team on community education and transportation also has been critical. She notes that 70 to 80 percent of Saint Luke's stroke patients come from 47 referring hospitals within a 150-mile radius. There is no formal organization, she says, adding, "This has just grown up, and continues to grow and emerge and change in shape and numbers."

"The principle of connectivity has been tremendously important—the practice of reaching out to the community, creating new linkages among people, so that the networks are more connected and wider in scope, has made a huge difference," Dr. Goldstein says. "The site visit itself, and conversations with the people involved in stroke care, strengthened connectivity. Distributive control and self-organizing were apparent in the way the team functioned, but it's even more than that. The team itself is egalitarian in terms of climate and mutual respect, regardless of title. It's true that doctors have more training and make more money, but the importance of all jobs is recognized, and everyone has a feeling of significance. It's the whole group that is in charge.

"They allow people to run with their own specialties, and let them develop that in creative ways," he continues. "One of the nurses with expertise in computer work helped establish a data base that could be used in treatment and in rapid communication throughout the network."

The Stroke team at Saint Luke's

Communication without Boundaries

The communication network that covers Missouri and the northeastern part of Kansas, in fact, is one of the major achievements of the center. When someone has a stroke in a rural area, the first responder might be a police officer, who has been trained to get the patient to a hospital fast. Emergency medical technicians also have been trained to identify stroke symptoms, and local hospitals now have the resources to do treatment or get the patient by helicopter to Saint Luke's. Specially trained nurses at a stroke triage center at Saint Luke's are available around the clock, and emergency room doctors with suspected stroke patients at other hospitals are guaranteed a call back in five minutes. A neurologist at Saint Luke's talks to the ER doctor and family members, and finds out what tests are available, and what need to be scheduled. Then comes what Dr. Rymer calls her favorite part: the patient is flown to Saint Luke's by helicopter and met by the stroke team, and the collective expertise and energy coalesce for saving a life.

James Palmer, who also participated in the site visit, is director of the Caldwell Palmer Group, a Denver, Colorado consulting and research firm. He specializes in communities of practice and complexity, and the implications of that combination for health care practice and organizational effectiveness. He has been researching the organization and effectiveness of stroke centers around the world, and he and colleagues have designed a research project involving complexity and communities of practice concepts as they relate to the organization and delivery of stroke treatment services. What struck him about Saint Luke's was overall world-class excellence. "I have not found another stroke program yet anywhere in the world that achieves such a high level of performances as does Saint Luke's," he says. "They are excellent at what they are doing, and they have achieved excellence in working relationships with other health care providers in the region, and with the community of patients and their caregivers."

Mr. Palmer suggests the ability to provide high quality regional treatment in an efficient and compassionate manner stems in large part from the quality of interactions among professionals, patients and members of the community. For instance, he says, Saint Luke's has given tours of the center to emergency medical service crews, and the EMS flight crews have given demonstration flights to Saint Luke's personnel to foster a shared appreciation of the collaboration necessary to save patients. Dr. Rymer emphasizes that among people who work at the center, there are no doctor-nurse barriers and commitment to common goals takes precedence over hierarchies. As she sees it, having 180 people show up for the MERCI luncheon is just one example of how egalitarianism and professional enthusiasm have permeated the organization.

By: Prucia Buscell, Plexus Institute

New Members

Meet the most recent theorists, practitioners and learners to become part of the Plexus journey.

Paul C. Barnette

I have a professional, five-year Bachelor of Architecture and a Masters of Education in administration. I completed post-graduate work toward a PhD at the University of Texas, Institute of Urban Studies focusing on organization change and behavior, before being transferred and moving from Dallas to Washington, DC. I also have a post-graduate professional certificate in organization development from Georgetown University.

My professional focus is on strategic visioning, planning and change management for organizations and their facilities. Using my thirty-five years of experience in design and consulting, I currently work as an organization and facility strategist for Gensler, the 2000 AIA Design Firm of the Year. This year the firm again ranks tops among *Interior Design*'s Giants for the 24th consecutive time. Gensler is the third largest architecture firm in the world and third best by income in the North American regional sector.

Most of my interests involve writing and reading. I love the ocean and can spend hours watching and listening to the waves. I also enjoy traveling with my wife, Marcie (who I happened to first meet in the 4th grade). We found experiences together as Peace Corps volunteers in Kenya a highlight of our 38-year marriage.

As a registered architect and an organization and facility strategist, I work with organizations to ensure the built environment supports organization business strategies as they continue to change. I am especially interested in increasing participation by facility users in the strategic facility planning process. I believe the facility can be a major contributor to the sustainability of organization change processes and in the recruiting and retention of employees. I work with organizations in creating strategic plans, and facility programming and space planning documents, for both classified and unclassified, public and pri-

vate sector facilities. My career includes work for consulting firms, real estate developers and brokers, large public agencies including numerous U. S. government headquarters, as well as various global organizations.

As designers we are catalysts striving to focus our expectations and understanding of outcomes within a continuum of potentials. Perhaps we should consciously acknowledge the purpose of sustainable design might better be to facilitate change, or the sustainability of innovation itself. Could Sustainable Innovation for the Creation of a Better World provide a more appropriate professional vision for sustainable design?

Computers have improved our ability to model complexity and complex adaptive systems. So far we cannot successfully deal with the emerging events in nature or the built world in a consistently logical or predictable way all of the time. We accept that about nature. We must also accept that about other living organisms – including our families, communities, organizations – and the built world "bodies" that house them. We must reframe our perceptions of the built world, and like nature see it as living.

"We must reframe our perceptions of the built world, and like nature see it as living... When designing with purpose – be it a building, a painting, a sculpture, a book or an idea – both the process and emerging outcomes *live.*"

Few people outside the design professions think of "design" as a living system. Designers routinely deal with people, organizations, space, technology, brand and their relationships, within a constantly changing social, political, economical and global environment. We deal with complex adaptive systems. Viewing design through the lens of complexity may allow a deeper, richer insight into the potential range of outcomes that might emerge from the designer's conscious, purposeful intent. Can designers lead efforts toward a better world by facilitating built world outcomes that encourage Sustainable Innovation? Sustainable Innovation is not for every design, but at the edge of innovation it should be part of our understanding and research as we strive to lead in the practice of sustainable design.

When designing with purpose – be it a building, a painting, a sculpture, a book or an idea – both the process and emerging outcomes *live*. This has major implications for the choices we make and how we communicate about those choices. As collaborating, interdisciplinary teams we must make choices together and communicate those choices through sustainable design.

Through the lens of complexity, sustainable design has even wider meaning and purpose. Art and architecture are more than built world commodities. Sustainable design must focus on the architecture of the system – the architecture of the organism. Organization Architecture is not limited to the built world bodies, but is more holistic encompassing all aspects of the system and its relationships including: people, organizing structure, purpose, operations,

products/services, and the physical body with its supporting infrastructure systems. The purpose of sustainable design must evolve to encompass this larger whole. When that happens, designers will be closer to reframing the purpose of sustainable design. Through the lens of complexity, the purpose of sustainable design should be to facilitate Sustainable Innovation within the innate complexity defining the architecture of the system.

I met Lisa Kimball, a Plexus Institute Trustee, over ten years ago as I first immersed myself in organization development. Through the years, as I strived to incorporate values and principles of OD into my built world consulting practice, our paths continued to cross and then drift apart again and again. Lisa thought of me when the DC Fractal was beginning and I joined. I am a member because I want to better understand complexity and focus that understanding in the built world that encompasses my consulting practice. But most of all I want to share with others who see the world in a similar manner, the emerging outcomes our futures hold.

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Kenneth Cliffer

My formal professional training was as a neuroscientist. After completing a PhD and some postdoctoral research, I worked as a neurophysiologist for a pharmaceutical company, developing and implementing preclinical neurophysiological tests in animal models of neuropathy.

A layoff and an opportunity to use my analytical skills in a new context (in a family business) led to a shift into developing analytical software for financial planners. I worked with D. Allen Cohen, PhD, a recognized expert in modeling of systems, including human factors and complex systems. During this time, I learned about the systems approach to organizational management (Peter Senge; *Fifth Discipline*) and about interaction design using personas to focus attention on goals of the users (Alan Cooper; *The Inmates are Running the Asylum*). Our interface and program received high praise from a self-described financial software "junkie" who reviews such programs professionally. However, despite some success, we did not obtain adequate funding to continue employing ourselves.

My search for sustaining employment led me to one of my early passions, education. I engaged as a science content specialist with a company developing curricula for elementary and middle school students in home-schooling environments. To foster my ability to function effectively, I made suggestions for improving our processes. I realized that developing curriculum with a team is a creative process that requires a conducive structure. I read Donna Shirley's exploration of this topic (*Managing Creativity*) based on her work developing

space probes. Hers was, like the curriculum work, a highly creative process under restrictive time and budgetary constraints. She draws substantially on insights from complexity theory. In addition, I recognized that our interactive educational systems could benefit from adept application of Cooper's approach to interaction design. I helped with strategic choice and development of personas.

After a crunch-induced layoff in October of 2004, I sought networking contacts that could help me pursue my interest in creative process improvement. I came across the Plexus Institute site, saw the meeting for health care and chronic disease coming up in my vicinity, and arranged to attend (November, 2004; thanks, Curt).

In the meantime, I realized that formal credentials in process improvement could foster realization of my goal to engage in such work. I am taking a course from Villanova on Six Sigma, and will take the ASQ Six Sigma Black Belt certification exam in March.

I am now a consultant for a company developing supplementary classroom materials for math education, again as a content specialist. I continue to learn and apply principles and practices conducive to effective, efficient, collective creativity, and seek to develop opportunities to leverage these skills in a broader context of creative process improvement

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Margaret Miller

I advocate for the ethical use of information and information technology (IT) in a federal government agency, the US Agency for International Development (USAID.) As a Senior Policy Advisor I advocate for the protection of personal data used and maintained by the Agency, the use of information created by our Agency to benefit the public, and the effective development of IT systems, which can be very costly to create and maintain. I also assist in the development and use of performance measures for the management of administrative functions, such as human resources, financial management, facilities management, IT, and records management.

I am quite interested in my own and others' reactions to paradoxical conditions and metaphors. (I understand "paradox" to mean two mutually exclusive conditions which are present at the same time.) For example, a person in the workplace might perceive herself as a 'cog in a wheel' while acting as a discerning consumer of the company's products at the same time, exercising free

will. I am quite interested in the implications of unearthing such paradoxical perspectives to my own and others' effectiveness.

As a student in the DMan Program with the Complexity and Management Centre (CMC) at the University of Hertfordshire, I am exploring my reactions to such paradoxical conditions and the social construction of values which matter to me (such as privacy, by which I mean "the freedom to choose when and what to reveal about myself.") I am also exploring the relationship between traditional methods of information system development (such as systems engineering methodologies) and the ongoing negotiation of social relationships when they are affected by technology (such as the use of biometric identifiers in the workplace.) As a result, I am reading books by Norbert Elias, Kenneth Gergen, George Herbert Mead, and Douglas Griffin as well as books by systems engineers and systems thinkers to strengthen my exploration.

I found Plexus when I searched the web in 2002 looking for more information about Ralph Stacey's work on complex adaptive systems (CAS.) I learned that he had changed his thinking to develop a theory of complex responsive processes, and that through the Plexus Institute I could participate in programs with others who are applying such perspectives to their work and personal lives. Specifically, Curt Lindberg introduced me to the use of a terrific Plexus resource, the "Discussion Area," where groups can hold online discussions and post documents on topics of mutual interest.

I would be delighted to receive suggestions or have discussions about the topics I have mentioned.

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Senem Guney

I am an Assistant Professor at the State University of New York at Albany. I teach in the Department of Communication. I am also part of an interdisciplinary program of teaching and research—IT Commons, which is housed in the School of Information Science and Policy at SUNY, Albany. I spend most of my time learning the ropes of being a new faculty member and creating publications out of my dissertation project. My research is on the interplay between organizational identity and sensemaking in collaborative activity—specifically in the development of technological innovation.

I conduct ethnographic research in organizations. I am very interested in the parallelism between ethnography as a method for investigating and complexity theory as a framework for interpreting interaction patterns in and of organizations.

I found out about the Plexus Institute when I attended one of their conferences at my alma mater, The University of Texas at Austin. It was a great experience to meet different scholars and professionals from very diverse disciplines and perspectives and to engage in discussions with these individuals about complexity. I became a member, because I wanted to stay connected with and to become a more active participant in this community.

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Tona Leiker

I am currently the Chair, Tabor College Wichita, Nursing Department. I administer and teach in an RN-BSN nursing program. We have approximately 40 RN-BSN students in a program that is very new. My professional commitment is to create learning environments where nurses thrive and love the work of nursing.

I also am a full-time student in the Nursing PhD program at the University of Kansas. As a doctoral student, I am interested in the opportunity for rich, diverse dialogue with a research interest. I am interested in emerging middle-range nursing theories in complexity sciences.

I am interested in complexity's historical development, it's use in healthcare and academic environments, how it might help us create interventions to reduce nursing workforce shortages, and improve patient outcomes.

I was invited and attended the Plexus Institute Conference, *Creating Nursing Environments Where Nurses Thrive*. I left the conference exhausted but energized. Since September, each complexity sciences discussion I have held with my faculty and students has sparked wonderful enthusiasm in these practicing RNs. I chose to become a member to further my understanding of complexity and to have the opportunity to dialogue with interdisciplinary members and nursing's complexity scholars.

The website for Tabor College is www.tabor.edu

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Maria Nemeth

Maria received her PhD in psychology from UCLA and her Master Certified Coach credential from the International Coach Federation. Her book, *The Energy of Money*, is a spiritual guide to personal and financial fulfillment, and has been published in six languages worldwide. She is currently

penning a new book, *Luminosity: Bringing Clarity, Focus, Ease, and Grace to Everyday Living*.)

I am Founder and Program Director of the Academy for Coaching Excellence, one of twenty-seven internationally accredited coaching schools through ICF. Based on twenty years in the field, we train people to develop excellence in those with whom they interact. We also offer a certification program for executive or personal coaches as well as organizational coaches in a variety of fields, with students from Shanghai to Bristol. We have courses especially designed for health and mental health professionals.

What interests me most about complexity is that it's principles and approaches resonate with our approach to coaching. Chaos theory teaches us to find order in seemingly random environments by widening our observational lens; complexity shows us how to apply the organizing principles of nature to complex adaptive systems in human organizations. We have psychological reactions of disorientation to chaos and complexity that impel us to take precipitous action. At the Academy we train professionals to hold their seat in seemingly random or disorganized environments long enough for emergence and co-evolution to take place. We then show them how to bring emerging ideas into fruition. The result of this is richer relationships, greater satisfaction, more ability to improvise, improved interactions with patients, and retention of staff.

Three of the organizations we've most recently had the privilege to work with are Alegent Healthcare, Sutter Health Group and Hunterdon Medical Center.

I found Plexus Institute through Board Member Rita Saenz, and became a member from reading *Edgeware* and attending the conference in Rockville. The intelligent, good-hearted people who are members of Plexus Institute are dedicated to using complexity principles to improve patient care. What's not to like?

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News from the Fractals

Complexity is about community and connection. That's why the Fractals were created. Find a Fractal near you – or help to start a new one – and take your learning to the next step!

New Fractals in Formation

Rocky Mountain Fractal. Contact James C. Palmer, director of Caldwell Palmer Froup, Denver, Colorado.
e-mail: caldwellpalmer@aol.com

New York Fractal Annemarie Colbin is interested in applying complexity theory to health, nutrition, and medicine. Anyone who'd like to do explore these subjects can perhaps get in touch with her to set up a NY Fractal.
e-mail: colbina@foodandhealing.com
website: www.foodandhealing.com

Washington Fractal

The DC Plexus fractal meets on the second Wednesday of the month from 6:30 to 9 PM at the Van Ness East Social Room, 2939 Van Ness Street, NW, Washington, DC. Bring a snack, and join the group for networking at 6:30 PM. The program starts at 7 PM.

For future plans and descriptions of exciting past happenings, check www.plexusdc.org, or contact Lisa Kimball at lisa@groupjazz.com.

The Ontario Fractal

Starting in January you need to join the Plexus Institute to attend a fractal meeting and until March 2005 we are extending an invitation to join at par for 100.00 CDN.

To create some incentives to join we have come up with a series of sessions that will be both formal with a specific agenda and informal for sharing your

work and ideas and networking. The informal sessions are the ones normally offered for free to Plexus members. We are always open to organizing speakers or topics for these sessions so if you have a suggestion please let us know and we will do our best to arrange something during one of the scheduled networking sessions.

In responding to what people are asking for we are also going to offer some additional sessions for a small fee to members.*

After the October conference on Social and Organizational Transformation many people have expressed an interest in spending some time learning more about the basics. I have teamed up with Ruth Armstrong to offer a half day session as an introductory to complexity science and organizations. Ruth and Linda Mollenhauer, consultants specializing in the nonprofit sector, will describe some of the characteristics that distinguish highly accountable nonprofit organizations.

All sessions will be at the Gladstone Hotel - Art Bar - 1214 Queen Street West.

- *Networking Meeting March 17, 2005 – 3-5*
  Bring your experiences, challenges and ideas to share with others.

- *Complexity Inspired Facilitation: Part I – Concept and Design**
  April 1, 2005 – 9:30-12:30

- *Networking Meeting May 5, 2005 – 3-5*
  Bring your experiences, challenges and ideas to share with others.

- *Complexity Inspired Facilitation:* Part II – Experimenting and Peer Coaching*
  June 3, 2005 – 9:30-12:30

- *Networking Meeting July 7, 2005 3-5 Fall Planning Session*
  Bring your experiences, challenges and ideas to share with others.

*Please Note Additional Costs: *Intro to Complexity* is open to all – Free with Membership of 100.00 CDN otherwise 125.00 per person. Two session series on *Complexity Inspired Facilitation and Meeting Design* – 150.00 or 50.00 for members. Participation in the Intro session and the facilitation sessions requires registration and payment. Sessions are open to non-members on a full fee basis. Visa and Mastercard accepted

If you are outside the Toronto area and have an idea for a local meeting we would pleased to help you plan something locally.

Contact: Liz Rykert, Meta Strategies, and Vice-Chair Plexus Institute
e-mail: liz@metastrategies.com
416-340-6382

PlexusCalls Spring 2005

Bringing People Together in Conversation

If you would like to listen to these provocative conversations:

- Dial (641) 594-7500
- Enter the access code 85392, followed by "#"

Please check www.PlexusInstitute.org for further details, additions or changes to the schedule.

Friday, April 8:
Educational Resdesign for Health Care Leaders

Our next PlexusCall features Sholom Glouberman, adjunct professor at McGill University in Montreal, Canada, and the University of Toronto, and Dr. Henry Mintzberg, an internationally known management scholar and Cleghorn Professor of Management Studies at McGill. Together, they will discuss the need for change in health management education and present the outlines of a new masters program they are leading at McGill that starts next fall. Dr. James Begun, professor in the Department of Health Care Management at the University of Minnesota will join the conversation. The new course at McGill is being introduced by the faculties of medicine and management and will give students a deep understanding of the complex field of health care as well as a sophisticated knowledge of the arts of management.

During recent decades, health care has expanded to give greater emphasis to population health, which focuses on longevity, the incidence of disease and

the causes of mortality as they apply to groups rather than individuals. At the same time, aging populations and advanced technology have vastly increased the numbers of individuals for whom medical intervention is necessary. Difficult economic, social and political realities, and spiraling medical costs add to the challenges today's health leaders face. The new International Masters Program for Health Leadership combines new thinking about health care and business that the designers hope will provide the best tools for improvement at the population and individual levels of care.

Some background about the featured conversationalists:

In addition to his university affiliations, **Dr. Glouberman** is philosopher in residence at the Baycrest Centre for Geriatric Care in Toronto, and Associate Scientist at the Kunin-Lunefield Applied Research Unit and a fellow at the Change Foundation. He holds a doctorate in philosophy from Cornell University, and has worked in health care policy and research in Canada and the United Kingdom. Learn more about his work at www.healthandeverything.org

Dr. Mintzberg, author and scholar, has asserted that conventional MBA programs overemphasize the science of management "while ignoring its art and denigrating its craft." He encourages managers to learn from their own experiences, and he believes a thoughtful approach to education can use those experiences to restore the art to management and improve its practice. Learn more about his work and writings at www.mintzberg.org

Dr. Begun, the James A. Hamilton Term Professor and Chair of the Department of Healthcare Management at the University of Minnesota's Carlson School of Management. He is widely known for his scholarship on complexity science and health care management, education and research. His publications include the book *Strategic Adaptation in Health Professions: Meeting the Challenges*. He also is a member of the Plexus Institute Science Advisory Board.

Friday, May 20:
Uncovering Solutions to Intractable Problems Through Positive Deviance

Conversationalists will be Jerry Sternin, a pioneer in the uses of positive deviance, Jeffrey Goldstein, professor at Adelphi University, John Tobin, president and CEO of Waterbury Hospital Health Center, Waterbury, CT, and Dr. Anthony Cusano, a member of the medical staff at Waterbury. The discussion will feature an exploration of positive deviance and quality improvement in heath care settings.

Dr. Jerry Sternin founded the Positive Deviance Initiative at the Freidman School of Nutrition, Science and Policy at Tufts University. He has worked for

more than a decade developing and refining PD concepts for use in behavioral change initiatives all over the world. His PD initiative in Vietnam alone resulted in sustainable reduction in childhood malnutrition in communities with 2.2 million people, and other PD initiatives have sustained reduction in childhood malnutrition in 41 countries around the world.

Dr. Jeffery Goldstein, professor at the Horace Hagedorn Hall of Enterprise at Adelphi, has researched and written about complexity and business.

John Tobin is president & CEO of Waterbury Hopsital in Waterbury, CT, and is a graduate of the doctorate of management program at the Complexity and Management Center of the University of Hertfordshire, UK,. where he studied under scholar and author Ralph Stacey.

Dr. Anthony Cusano is an internist and nephrologist.

From the Inside Out: Sustainable Solutions to Intractable Problems through Positive Deviance

A Plexus Institute workshop hosted and cosponsored by Tufts University Friedman School of Nutrition Science and Policy

June 28-29, 2005, Boston, MA

This event begins with a special pre-conference: An Introduction to Complexity Science: Implications for Organizations, Communities, Healthcare, Business & Leadership. (June 27, 2005.)

- What enables some individuals/institutions, with access to no special resources, to find sustainable solutions to far ranging issues such as HIV/AIDS, childhood malnutrition, marketing strategies, obesity, health care quality, and poverty?
- Why is it that solutions offered by experts are so often wrong or rejected?
- Can you name an elegant, successful, management practice whose use was pioneered in Vietnam?
- Could you or someone you know be a Positive Deviant?

Plexus invites you to explore these questions with Jerry and Monique Sternin, the world's leading Positive Deviance (PD) authorities, and join with others who are searching for solutions to some of the critical challenges and seemingly intractable social and organizational issues facing the world.

The PD approach builds on successful but "deviant" (different) practices that are identified from within an organization or community. It is based on the

belief that in every community there are certain individuals or entities whose uncommon, but demonstrably successful practices or behaviors enable them to find better solutions to problems than their neighbors or colleagues who have access to exactly the same resources. Its use was pioneered in developing countries and led to sustainable improvements in such seemingly intractable social issues as childhood malnutrition in Vietnam and trafficking of girl children in Indonesia.

Understanding and interest in PD is now starting to be appreciated in other contexts such as business organizations, hospitals, and government, as evidenced by an upcoming Spring 2005 feature in the Harvard Business Review and a PD educational session at the January 2005 World Economic Forum in Davos.

This workshop will provide an overview of how and where PD has been successfully used to address problems requiring social or behavioral change and allow all participants to learn the 4 steps of the PD process design to nurture PD–based change on issues of importance to them. Come with colleagues and develop a PD approach for your organization or community.

Workshop Faculty:

Jerry Sternin

Director, Positive Deviance Initiative

Jerry Sternin founded the Positive Deviance Initiative in 2001. It is located at Tufts University School of Nutrition, Science and Policy. He has worked for more than a decade refining the concept of PD for application in diverse settings all over the world. He has served as country director for Save the Children (US) in Bangladesh, Philippines, Viet Nam, Egypt and Myanmar. He has also been a Peace Corps Volunteer and country director in Rwanda, Mauritania, Nepal and the Philippines as well as Assistant Dean and Student Advisor at the Harvard Business School.

Monique Sternin

Technical Director, Positive Deviance Initiative

Monique Sternin has broad experience throughout the world with the use of Positive Deviance. Her work spans such areas as advocacy for condom usage for commercial sex workers in Myanmar and improvement in maternal newborn care in Pakistan

Arvind Singhal, PhD

Presidential Scholar and Professor, School of Communication Studies, Ohio University

Arvind Singhal is one of the world's leading authorities on social change. His scholarship involves diffusion of innovation, mobilizing for change, and strategic communication and is focused on challenging issues in the developing world. He is author of numerous scholarly articles and several books, including *Combating AIDS: Communication Strategies in Action, Entertainment-Education: A Communication Strategy for Social Change* and *India's Communication Revolution: From Bullock Carts to Cyber* Marts (all co-authored with Everett Rogers).

Henri Lipmanowicz

Chair, Plexus Institute

Henri Lipmanowicz is Chair of the Plexus Institute Board of Trustees. His work with Plexus followed a distinguished career at Merck, where he was President of the Merck Intercontinental and Japan Division, and a member of the Management Committee. During this tenure he promoted some of the early AIDS treatment and prevention efforts in Africa.

Curt Lindberg

President, Plexus Institute

Curt Lindberg helped found Plexus Institute and has served as its President since its incorporation. He has played an important role introducing complexity science into management practice and health care. Among his many publications is the highly regarded book *Edgeware: Insights From Complexity Science for Health Care Leaders*, which he coauthored with Brenda Zimmerman and Paul Plsek.

On the Verge: Complexity Science and its Applications

Hermann Haken Joins World-Class Faculty for 2005 Plexus Summit

September 12 - 13, 2005, Boca Raton, FL

Plexus Institute and the Center for Complex Systems and Brain Sciences are joining forces to cosponsor the 2005 Plexus Annual Summit *On the Verge: Complexity Science and its Applications*, to be held September 12 – 13 in Boca Raton, Florida. This international symposium will explore the forefront of the science, foster learning across disciplines, and examine important real-world applications. A stellar line-up of complexity scientists will participate.

Hermann Haken

Professor Emeritus, Department of Physics,
Center of Synergetics, University of Stuttgart

Dr. Haken, a seminal figure in the creation of the science of complexity, founded the interdisciplinary field of research called synergetics in 1969. Synergetics deals with complex systems that are composed of many individual parts (components, elements) that interact with each other and are able to produce spatial, temporal or functional structures by self-organization. In particular, synergetics searches for general principles governing self-organization irrespective of the nature of the individual parts of the systems. Dr. Haken has received numerous honors, including the Max Planck Medal and the Max Born Prize, for his many contributions to science. His present research activities focus on brain theory and psychology. He is a prolific writer, author of twenty textbooks and monographs on atomic and molecular physics, quantum field theory, solid state physics, brain function, information theory, and computing. Dr. Haken is also editor of the Springer Series in *Synergetics*.

Scott Kelso, PhD

Glenwood and Martha Creech Chair in Science, Florida Atlantic University

Dr. Kelso, an international leader in complex systems research and neuroscience, founded one of the world's first institutes devoted to complexity science, the Center for Complex Systems and Brain Sciences at Florida Atlantic University. Dr. Kelso's scholarship is exemplified in his 1995 path-breaking book *Dynamic Patterns: The Self-organization of Brain and Behavior*. In this widely respected work he shows how the human brain is fundamentally a pattern forming dynamical system, poised on the brink of instability and that self-organization underlies the cooperative action of neurons that produces human behavior in all its forms. For his many distinguished intellectual contributions Kelso was recently elected a Fellow in the American Association for the Advancement of Science. Dr. Kelso is Editor of the new series from Springer, *Understanding Complex Systems*. Dr. Kelso serves on the Science Advisory Board of Plexus Institute.

Leon Glass, PhD

Isadore Rosenfeld Chair in Cardiology and Professor, Department of Physiology, McGill University

Dr. Glass is an internationally recognized scholar and among the first to understand health and disease from a dynamical and complex systems perspective. He work has been instrumental in moving nonlinear dynamics from the fringes of science in the 1960's to the center of science in the 21st century. He is a Fellow of the Royal Society of Canada and the American Physical Society. He is the author or co-author of a number of books including *Understanding Nonlinear Dynamics, From Clocks to Chaos: The Rhythms of Life,* and *Nonlinear Dynamics in Physiology and Medicine*. He has written well over a hundred articles, book chapters, reviews and short essays. Dr. Glass is a leader at the Centre for Nonlinear Dynamics in Physiology and Medicine.

Many other fine scholars will be participating in symposium. Read more about them in future announcements.

- **Reka Albert, PhD**, Assistant Professor, Department of Physics, Pennsylvania State University

- **Reuben R. McDaniel, Jr., EdD**, Charles and Elizabeth Prothro Regents Chair in Health Care Management, Professor of Management Science and Information Systems at The University of Texas at Austin

- **Melanie Mitchell, PhD**, Professor, Computer Science Department, Portland State University and Member of the External Faculty, Santa Fe Institute

- **Thomas Petzinger, Jr.,** Chairman and CEO, Launchcyte

- **Eliot Smith, PhD**, Professor, Department of Psychology, Indiana University

- **Olaf Sporns, PhD**, Associate Professor, Department of Psychology, Programs in Neural Science and Cognitive Science, Biocomplexity Institute, Indiana University.