Two sabbaticals dedicated to better power grid science

A British power plant operator watches a popular sitcom in his control center. As soon as the show ends, he will need to dial in more power from plants from France to Scotland to meet a surge in demand from a million viewers who suddenly turn on their tea kettles.

“In energy, the interaction between physics and social systems is quite pronounced,” says Paul Hines, a professor of engineering and computer science at the University of Vermont. He is spending his sabbatical at SFI with his colleague Seth Blumsack, who teaches energy policy and economics at Penn State University.

Q&A with President Jerry Sabloff

Continuing an Update New Year’s tradition, Institute President Jerry Sabloff offered his thoughts on SFI in 2014 and its outlook for 2015 and beyond.

Update: During 2014, SFI’s 30th anniversary year, we looked back on the Institute’s history and its contributions to science, but we also spent a good deal of time looking forward, imagining the next 30 years. What do you see as the biggest opportunities and the biggest challenges in SFI’s future?

Jerry Sabloff: I believe, and I think everybody in this building believes, that the biggest opportunity in the general sense is that complex, nonlinear thinking can help scientists and our policy makers and planners solve some of the biggest challenges we face in this country and the world. I think it’s clear that when we try to solve really difficult problems, one-dimensional, near-term, linear thinking is only going to result in more of the same disappointing results we’ve seen in the past. And even though concepts like Black Swan and Long Tail and other complexity-related ideas are now more commonplace in the vernacular, in practice we still aren’t seeing really deep complex systems thinking.

State of the Institute 2015

Q&A with President Jerry Sabloff

David Krakauer, an evolutionary theorist and director of the Wisconsin Institute for Discovery (WID) at the University of Wisconsin-Madison, has been selected as the Santa Fe Institute’s next president.

Krakauer served as the WID’s first permanent director and has led WID since fall 2011. He plans to join SFI on August 1, 2015.

“I feel both energized and privileged to be returning to SFI,” Krakauer says. “I am convinced that the social, technological, research, and educational landscapes of the 21st century need an institute like SFI. It is the one place I know where collective brain power is limited only by the questions that it dares to ask.”

Krakauer spent nine years at SFI as a faculty member and chair of faculty prior to leading WID, a major transdisciplinary research center at UW-Madison. He will take the reins from retiring SFI President Jerry Sabloff, who has led SFI since 2009, to become SFI’s seventh president.

“David was selected following a rigorous 18-month presidential search that included some of the top scientists and science administrators in the country,” says Michael Mauzousain, Chairman of SFI’s Board of Trustees, which made the selection. “He distinguished himself as having the right leadership experience, the needed breadth and rigor, and an abundance

Why modeling in evolutionary biology matters

Despite their important role as “proof-of-concept” tests in evolutionary research, mathematical models are commonly misunderstood in the biology research community. In a recent article in PLoS Biology, SFI Omidyar Fellow Caitlin Stern and former Omidyar Fellow Jeremy Van Cleve explore the role of mathematical modeling in evolutionary biology.

Abstract mathematical models, they argue, test the logical validity of verbal hypotheses. These hypotheses have long...
Inheriting riches or: Wealth transfer and inequality

Getting rich and keeping your family wealthy depends on more than wise investing. Conversely, poor families face historical and poverty-induced restrictions to gaining wealth. Such constraints are among the drivers of increasing and wealth inequality today, says SFI Professor Sam Bowles, head of SFI’s Behavioral Sciences Program.

Human societal structures influence the heritability of wealth, and some aspects of wealth matter more than others depending on the type of economy, he says. Among foragers, for example, material things are not very heritable: objects tend to be shared, and thus matter far less than an ability to physical strength and ability to hunt.

“Types of wealth differ markedly in how they are passed from one generation to the next,” says Bowles, adding that wealth in this context is defined as anything that helps someone make a living. “Cows and land are highly correlated between generations. A dad with many cattle can leave his sons with many cattle, whereas a father who hunts well can have sons indifferent to hunting.”

To investigate the drivers of disparity, Bowles and Monique Ronforter Muñoz, a professor of anthropology at UC Davis, began in 2008 to hold the annual Dynamics of Wealth Inequality workshop at SFI. Some 30 researchers, representing ethnographers, historians, economists, and statisticians—meet annually to examine how things change, and share their insights from recent research.

In addition to the highly interdisciplinary group of attendees, another unusual feature of the workshop is its investigative approach. Most socioeconomic studies quantify research using big datasets that cover broad factors about a society in general, such as level of policing and percentage of food from hunting. “We’re the first to collect large cross-cultural data, where the units are families,” says Bowles.

“We believe that, rather than studying the rise of inequality in the past, it’s better to emphasize what is happening today and see how things change, not just how things are, to give insight into today’s capitalism and what’s to be done with modern injustices,” he says.

This year’s workshop, funded by the National Science Foundation, will consider the relationship between polygyny (a form of marriage in which a man marries more than one wife) and wealth inequality, and, conversely, the impact of such inequality on family structure.
A special issue of the Proceedings of the IEEE, guest-edited by SFI External Professors Jessica Flack and Raisa D’Souza, examines how digital technologies and the increased social connectivity they enable are changing our social networks and dynamics. Inside the issue, SFI Professor Luis Bettencourt argues that “the dynamics of informational networks in complex systems are the physiological manifestations of processes of evolution, inference, and learning, from natural ecosystems to cities and online environments.” He presents a framework for understanding how networks transition from initially static and information-poor states to dynamic, diverse, and interconnected ones.

Which predictive method best suits a given system? In a new paper for Physical Review E, SFI External Professor Liz Bradley and colleagues Joshua Garland and Ryan James quantify predictability, with a strategy for determining which predictive method best suits a given system. The authors use techniques from information theory to construct a strategy for evaluating whether a given time-series prediction method fits a given set of data. They demonstrate their strategy on a variety of synthetic and real-world datasets. Bradley says the paper was nucleated at SFI.

How multicellular life emerged and persisted In Science, SFI Omidyar Fellow Eric Libby and co-author William Ratcliff explore how early multicellular life might have persisted amidst the evolutionary tug-of-war between single-celled and multi-celled living arrangements, as “cell-level selection can easily overwhelm the generally slower process of group-level selection,” they write. “One solution to stabilizing multicellularity is the evolution of traits that increase cell-level fitness in a group context, but come at a cost to free-living fitness.” Accumulation of (such) traits would ratchet cells into a group lifestyle, ultimately preventing unicellular reversion. One such trait, they suggest, is elevated rates of programmed cell death, called apoptosis, that in experiments allow large clusters of cells to break apart into smaller, more manageable formations.

Studying ecosystem responses via trait spectrum To better predict the effects of climate change on ecosystems, SFI External Professor Brian Enquist and co-authors argue in PNAS that “rather than classifying plants, animals, and bacteria as separate species – a ‘functional biogeography’ approach that models living things along a continuous spectrum of their traits might bring new insights.”

Paper makes case for ‘blue-skies’ eco research In Trends in Ecology & Evolution, SFI External Professor Michael Hochberg and collaborators advocate for more fundamental ecological research motivated by curiosity rather than by immediate applications and offer several ways to promote basic research in the future. The paper’s co-authors include SFI VP for Science Jennifer Dunne and SFI Science Board member Robert May, among others.
Scientists usually study primates for their physiological and social similarities to humans. This month, mathematical modelers and primatologists are coming together at SFI to discuss monkeys and gorillas, not so much because of their likenesses with humans, but because of how much we know about some of them.

“The overarching goal is to understand how primate contact patterns reflect disease risk, and then to leverage that to develop a richer theory of disease,” says SFI Omidyar Fellow Sam Scarpino, who is co-organizing the mid-January working group with Margaret Crofoot of UC Davis and Damien Caullaud of the Dian Fossey Gorilla Fund International.

Among the questions the researchers have is how groups of primates that seem too small to sustain disease outbreaks can nonetheless help us understand types of changes that correspond to changes in disease risk. How the number or the variety of contacts for a given primate individual affect its risk of contracting a disease is difficult to measure in traditional disease models, and Scarpino’s group employs some novel network techniques developed at SFI to meet the challenge.

“SFI’s rich history in applied network theory, animal cognition, group dynamics, and sociality make it ideal for this kind of interdisciplinary work,” Scarpino says. “You can make more progress in a week-long working group than you can make in a year of emailing.”

“What we learn about these primates will help us understand what types of changes are most important to disease risk,” he adds, “and develop a richer theory of disease that will translate to humans as well.”

consistently applied to our biggest challeng- es with the greatest opportunity. The Institute is to continue to bring that kind of thinking into the mainstream and to show how it can be applied in a practical way to decision making. I think we’ve had some success, but we can do a lot more.

Then I think there’s the whole area of complexity education. We’ve had tremendous success over the last 30 years, most of it offline, but we have a real opportunity, I think, to build on private philanthropy. So we have to build a nonbureaucratic place to do research, even when we can’t offer the same size of grants that universities can offer. And a challenge – is SFI’s environment. The Institute is to continue to bring that kind of opportunity is that as you see universities, and now into classrooms nationwide, and also with – through Melanie Mitchell’s vision and effort – the expansion of the GUTS programs into local classrooms, I think the Institute has begun to redefine science education. I also think, given the unprecedented changes our society faces, it is almost a moral obligation for SFI to serve as a role model and pioneer in complexity education.

Another – and this is both an opportunity and a challenge – is that SFI’s environment for the opportunity is that as you see universities, and in particular large research universities, becoming more bureaucratic, more bound by all kinds of rules and constraints, we can offer scientists a nonbureaucratic place to do research in a highly intellectually stimulating environment. So the opportunity is we should be able to attract the really top scientists at both the postdoctoral and faculty levels. The challenge is making that happen, because the universities obviously have tremendously more resources than we have. So we have to figure out how to get people, who I think are tempted by this incredible environment, to see how coming to SFI would help their careers and their research, even when we can’t offer the same in terms of salaries and resources that the universities can offer.

The other big challenge is clearly the Institute’s fiscal status. That was the situation the day I arrived, and it remains so today. We’re on better footing now than we were a few years ago, but our finances are still much too tight, and there are just too many factors that we do not control that can impact our budget. One is the economy and how that influences private donations. Another is the mean size of grants is coming down across the board, not only for government grants but for grants from the private foundations. In that sense we’re in the same boat as other nonprofits, and what it suggests is we really have to build on private philanthropy. So that’s a major challenge that’s going to continue for the foreseeable future. Related to that is the challenge of meeting the goal the Board of Trustees set last year of raising $100 million in endowments over the next ten years. That, of course, would vastly improve the financial security of the Institute, both in terms of year-to-year budgets and also by providing a cushion for when we have budgetary crises caused by external factors.

Update: After six years at SFI’s helm, including a three-year extension as president, you’re stepping down this summer. What do you see as the Institute’s major accomplishments since 2009, and how has SFI changed?

Sabloff: Right. I came out on a three-year contract, with the understanding that if the Board wanted, and I wanted, to stay for a three-year extension, I would, and they did ask, and I did stay. So it wasn’t exactly unplanned, but it was seen as the best course of action all around given all the uncertainties the Institute was facing.

I think our major accomplishment, which I’ve said many times before, has been keeping SFI thriving through the recessions. I said to the Board at last May’s meeting that my SFI epitaph will read, “He kept the doors open.” (laughs) You know, on one hand, that’s not the stuff of headlines. But on the other, obviously it’s important that we’re here, that we’re still thriving, and that we’re on a significant upward trajectory in a number of ways, and that in terms of science we’re back to pre-OCTOber 2008 levels of activity. That’s probably one, two, and three on the list of SFI’s accomplishments given the economic climate over the last six or seven years.

Related to that is the strengthening of the Institute’s assets, with one major step being the acquisition of the marvelous property in Tenques, which in the short-term doesn’t directly impact the budget, but in the long-term is a major asset that will really strengthen SFI’s financial position. Another achievement is, with the timely advice of the Board’s Finance Committee, paying off the mortgage on the Cowan Campus. Another is obtaining the funding from George Cowan when I first arrived to establish the Cowan Chair, which has brought in major scientific figures like Mahzarin Banaji of Harvard, MIT.

Mitchell, a professor of computer science at Portland State University, will spend a week at SFI every five or six weeks beginning January 20. She has had a long association with SFI’s education programs, including her recent development of the Complexity Explorer and a series of five massive open online courses (MOOCs) offered through complexityexplorer.org.

Ginger Richardson, former McKinney Family Vice President for Education and Outreach, retired December 31 after 29 years at SFI.

“Education and outreach are fundamental to SFI’s mission and to its success,” Mitchell says. “I’m looking forward to continuing Ginger’s work in strengthening SFI’s many education programs and in linking these programs more closely with ongoing science at the Institute.”

> New president

Mitchell to head SFI education programs
insider sf\i

asu-sfi agreement establishes new center for biosocial complex systems

sfi and arizona state university are launching a research and education collaboration that focuses on problems at the intersections of complex biological and social systems.

the new asu-sfi center for biosocial complex systems will build a deeper theoretical understanding of the interconnections between these systems and apply that knowledge to questions in both science and policy.

"the synergy of two intellectual powerhouses such as sfi and asu can accelerate how our community and nation tackle questions such as disease patterns and healthcare delivery," says asu president michael crow. "we can generate tools to better understand how decision-making systems work, when scaled up, to the level of the urban metagospel."

the collaboration pairs researchers from asu, a leader in sustainability research, and sfi. this is sfi's first formal collaboration with a university.

sfi president jerry sabloff says he hopes it leads to additional partnerships. "this new asu-sfi collaborative venture has immense potential for the advancement of complexity science at both institutions," he says.

crow and sabloff are to formally establish the center during a january 16 signing ceremony in tempe, arizona.

two areas of focus for the partnership are the dynamics of innovation, and urbanization and scaling in cities. as cities grow they face new dilemmas and challenges, especially as they strive to be more sustainable. phoenix is one such city, and asu hopes to gain insights that are useful both locally and globally.

asu will provide support for faculty and postdoc hiring to support joint research and education activities at both institutions. sponsored activities include workshops, working groups, graduate and postdoctoral fellowships, faculty appointments, faculty seminars, and small grants and other joint projects and proposals between asu and sfi.

the partnership is the latest in more than 200 new transdisciplinary schools and initiatives developed at asu since president crow joined the university in 2002, according to asu's announcement.

asu president's professor manfred laubichler and asu foundation professor sander van der leeuw. [see photo]

sfi president jerry sabloff delivered the 2014 stanislaw mazur memorial lecture in september, showing how scientists and social scientists are learning about the implications of network thinking, and that can shape prevent and future human societies.

end of 2015, the full $75 million pledge by pierre and pamm omidyar, which will allow the program to function at this strong level for at least another 25 or 30 years. also, i think, securing the large "principles of complexity" grant from the john templeton foundation, which has been finished and which helped mobilize the whole building — faculty, postdocs, and visitors — on our core mission of developing a general understanding of complex systems, was an important accomplishment.

finally, a major accomplishment is the agreement we are signing on january 16 with arizona state university to establish a joint asu-sfi center for biosocial complexity — fulfilling a long-term vision of sfi external professor sander van der leeuw. [see "asu-sfi agreement establishes new center for biosocial complexity" above.] this is clearly a major event that the foundation for science [funds by asu president jen dunne and i think has huge potential if it's successful, not only for what it will do in terms of exciting research through our collaboration with asu, but also for the potential it has in serving as a model for agreements with other research universities in the future. we generally have not entered into these kinds of agreements with universities before, but we think this one has particular promise because of the similarities of our interests with asu's. asu president michael crow has been among the most innovative university presidents in the world in terms of establishing new centers of excellence, particularly in complex systems. at sander's urging, i first visited with president crow in 2012, several years after he came to santa fe in 2013, then i had dinner with him and his wife during that visit, which eventually grew into this agreement — after lots of hard work by jen, asu president and sfi external professor manfred laubichler, sander, and their asu colleagues.

we've already hosted a great workshop together in october on the origins of innovation across systems of many kinds and scales, and the center's first postdocs have been appointed. we're talking with asu about faculty exchanges and other arrangements that are mutually beneficial, so this is just a great arrangement for both institutions.

president crow has long been interested in sfi, and asu provost rob page, a former sfi external professor who we've recently re-appointed, is excited about the center, too, and wants to explore new ideas for collaboration. so i strongly believe that this new partnership really will enhance the capabilities of both institutions and lead to some exciting joint research. there's much more to come.

update: has the institute changed in any fundamental ways since 2009?

sabloff: i don't think it has changed fundamentally, but there have been a few significant changes. one of the obvious ones is we've added and strengthened sfi's work in the social sciences, in particular archaeology and anthropology. that strength can be seen in the "emergence of early states" project that was funded by the templeton foundation, in which we took a broad comparative look at the formation of states. that project involved the participation of a range of faculty including paula sabloff, henry wright, tim köhler, and peter peregren. postdocs like marcus hamilton, scott ortman, charles ferrelau, and paul hooper; and research associate eric rupley, among others.

in addition, of course, the exciting research of sam bowles and his colleagues in cultural evolution and human behavior has been growing more productive year by year. so i think that's been a significant change. in fact, i was gratified when murray gelf-mann mentioned to me a couple of years ago that he'd always hoped the institute would one day have this sort of social science research in a fuller historical dimension. these interests have always been there, but the templeton-funded project really connected those longstanding interests and helped take them further.

at the same time — and this is not new — we've been able to strengthen research in pure math, computer science, and physics that the institute has always held at its core. we've been able to have cris moore and luis bettencourt join us full time, and we've added scientists like sid redner and nihat ay and postdocs like josh gneckow, yova kallus, and pan zhang. the other area where sfi has been an innovator is in network studies and the implications of network thinking, and we've been able to significantly strengthen our efforts in this area as well.

these are not fundamental changes, but they are areas where we've added and strengthened our portfolio over the last several years.

update: the board of trustees recently announced the selection of david krakauer as the institute's incoming president. what are your thoughts about his selection?

sabloff: like everyone in the building, i'm excited about david returning to head the institute. [see "david krakauer selected as sfi's new president," sabloff:] "for sfi, it's a new model for collaboration that might pave the way for partnerships with other academic and research institutions in the future.

the collaboration supported an october 2014 workshop on the origins of novelty in biologically, social, and technological systems, co-organized by dunne, laubichler, sfi external professor andreas wagner [eth zurich], and frequent sfi collaborator josé lobato (asu). [see photo]

in earthquake-related tweets.

in addition to their findings, the authors describe a novel framework for investigating the dynamics of communities in social networks that can be used to study any kind of social change.

"although we would never wish living through a natural disaster on anyone, when disasters do occur, we can learn a lot about how social systems adapt and change during stressful periods by looking at how people's interaction patterns change," says brelsford, herself a survivor of the 2010 earthquake in Haiti. "communication on twitter can be accessed from both before and after an unexpected event, providing an accurate and detailed record of how interaction patterns change and how that influences whole communities."
Among the last uncontacted indigenous people in the world are roughly 70 Amazonian tribes who live in isolation, deep in the forests of Brazil. Each of these present a dire conservation challenge, as they face deforestation and encroachment from the civilized world.

Where and how they move, many people they represent, and their daily modes of subsistence are not well known to governments, and this basic demographic information is essential for developing policies to protect them.

In a paper published in Royal Society Open Science, SFI-ASU Postdoctoral Fellow Marcus Hamilton and colleagues at the University of Missouri at Columbia and the University of New Mexico use satellite tracking and imagery to understand the demographics and movements of people in five indigenous groups in the forests of Brazil. Thiers is the first attempt to scientifically study isolated Amazonian tribes from space.

The study offers the five tribes’ population estimates and their living areas and weights the challenges and beneﬁts of using remote-sensing technology to study uncontacted people. The researchers compare their data with those obtained from overﬂights, which can be costly and invasive compared to remote sensing.

“We are probably the last generation to see indigenous subsistence cultures existing in this way, and one of the key pieces of ecological knowledge we need about these groups is how they utilize their landscapes on a daily basis,” Hamilton says. “These data are very hard to get at without making potentially harmful contact, but if we use current technology to track populations as they move across the landscape, we can ﬁnd the best way to preserve the habitat.”

Can remote sensing help protect indigenous people?

Understanding how nature maps sequences of amino acids onto the physical structures of the proteins they form is an old problem in biology, and a solution could open new doors to understanding the earliest forms of life – and even help engineer new proteins.

In a recent paper in PLOS Computational Biology, SFI Omidyar Fellow Evandro Ferrada argues that the key to this problem doesn’t lie simply in decoding nature’s chosen map. Instead, it’s in the underlying architecture that shapes and constrains such maps in the first place.

“This is a problem with a very long tradition,” Ferrada says, and it has very broad implications. A better knowledge of the biological architecture underlying sequence-structure maps, for example, could help evolutionary biologists reveal the “primordial” amino acids present at the dawn of life.

But first, researchers need to grasp the architecture. According to Ferrada, efforts until now have been somewhat piecemeal, though they do point to the interactions between a protein’s amino acid sequences as playing a central role.

To investigate, Ferrada randomly generated a range of possible interactions, called potential energy functions, to see how they shape what sets of proteins are viable, how diverse the sets are, and how robust a set of proteins is to mutations.

The most interesting result: Ferrada was able to predict what interactions of interfaces are most likely to result in biologically promising architectures.

In the future, Ferrada’s techniques could help others identify not just which proteins are present at earlier stages of the evolution of life, but also what constraints those put on life as we know it – or as we might someday engineer it. ■

Life’s underlying architecture shapes creation of proteins

The ancient Maya didn’t merely dabble in numbers, they wrestled with big numbers – some so signiﬁcant they gave them names. And they applied those big numbers, sometimes in the form of bar-dot notations on stelae – to everything from tribute and commerce to divination.

A mid-February working group at SFI, Maya Materialization of Time, History and Prophecy in Long-term Perspective, will explore how the Maya used numbers for more than just calendrical and codexic purposes.

The meeting, originally inspired by SFI Trustee Jerry Mundock, who wanted to know how the Maya materialized the study of the stars, included two groups of SFI working groups left off. Those two meetings examined Maya E Groups and the origins of Maya complexity and identiﬁed key time and calendar reckoning as important reasons for the establishment of ceremonial centers.

“Numbers are fundamental to complexity, period,” says Maya iconographer and Washington University professor David Freidel, who is organizing the 2015 working group. “And big-number information is vital for harnessing social energy – which the Maya did.”

“I thought, let’s revisit Mayan numeracy. We have things to say about it.”

Why is the question vital today? “We’re in the middle of a big data revolution in which numeracy has gone completely viral,” stresses Freidel. “By looking at big numbers in the way the Maya managed society, we might ﬁnd useful parallels for modern times.”

Freidel and the group will also be looking for patterns leading to complexity, and how the Maya concept of time inﬂuenced their decision-making.

“The materialization of time,” Freidel says, “is about how you materialize your sense of the future based on your sense of the past. It’s the same today.”

How the Maya used numbers to manage

The SFI Journalism Fellowship sponsored by Bill Miller, now in its second year, has brought in some really top-notch journalists and has been a great addition to the intellectual environment – in particular serving as a reminder of how the general public often views scientists and scientiﬁc issues, and I think this perspective helps make us all better science communicators and advocates. And then the Miller Scholars have really added signiﬁcant excitement to the lunchtime and teatime discussions, and I truly talented ﬁeld of candidates. We’ll be working with all of them through the next several months to make sure we have a smooth transition.

In addition, having Jessica Flack rejoin us as a resident professor, with her expertise in the enterprising, ever-changing world of biological and social systems, is also going to add a great deal of depth to SFI’s research program and put us in a position to chart a very bright future for SFI. [See “Flack to rejoin SFI’s resident faculty” on page 3.]

Update: SFI said goodbye to one of its longest serving and most successful leaders, Ginger Richardson, who pioneered and led SFI’s education and outreach programs for nearly three decades. What is the status of education at SFI at this turning point, and where do you see it headed?

Sabloff: I think SFI’s education program is a very strong enterprise with a great future. We owe Ginger our deep gratitude for really building a program from scratch. If you look at the program, from the community lec-}
Author Hampton Sides selected as 2015 SFI Miller Scholar

Hampton Sides, a best-selling narrative historian, is an SFI Miller Scholar for 2015. He will be in residence at the Institute for four months this fall and plans to drop in at other times during the year.

The Miller Distinguished Scholarship is the most prestigious visiting position at SFI, awarded to highly accomplished, creative thinkers who make profound contributions to our understandings of society, science, and culture.

Scholars are internally nominated and may have backgrounds in the humanities, arts, or sciences. Miller Scholars are free to devote their time at SFI to scholarship on any topic. They are encouraged to interact and collaborate with resident and visiting scientists, with the goal of catalyzing and crystallizing research at SFI.

Sides is known for his gripping nonfiction adventure stories set in war and his depictions of epic expeditions of discovery and exploration. He is the author of the best-selling histories Ghost Soldiers, Blood and Thunder, Hellbound on His Trail, and, most recently, In the Kingdom of Ice, which has received favorable reviews in The New York Times, The Washington Post, The Wall Street Journal, and other news media.

His journalistic works have been anthologized and have twice been named finalists for the National Magazine Awards. He is an editor-at-large at Outside magazine and a frequent contributor to National Geographic. He is also a partner of Atalaya Productions, an independent film company that develops nonfiction and historical stories for the screen.

Sides divides his time between Santa Fe and Colorado Springs, where he teaches narrative nonfiction and serves as Journalist in Residence at The Colorado College.

He will be the fifth Miller Scholar since SFI Board of Trustees Chair Emeritus Bill Miller conceived and underwrote the appointment in 2010. The previous Miller Scholars are philosopher of science Daniel Dennett (2010), quantum physicist Seth Lloyd (2010-2011), actor-director-playwright Sam Shepard (2010-2011), and philosopher-author Rebecca Goldstein (2011-2012).

State of the Institute

Together, Blumsack and Hines study the interconnected social and physical variables that influence whether people get electric energy services when and where they need them.

Electric power networks share many traits with other complex adaptive systems. The sizes of blackouts, for example, follow power-law distributions. The number of outages in a power grid can be diminished by adding new transmission lines resembles an emergent phenomenon observed in the study of street traffic. Further, the potential for local changes to ripple across the grid at multiple temporal and spatial scales is a classic complex system phenomenon.

There is still much to learn, though. Hines and Blumsack observe, for example, that as more consumers install solar panels on their homes, power sources are becoming less centralized – and more complex. They point out that electrical utilities will soon face a rapid and extreme change in the patterns of demand for their product.

*For these networks to continue to perform in the way that we want them to, they’re going to have to become much more adaptive,* Blumsack says.

One way is to change consumer behavior. Hines and Blumsack are analyzing data from incentive programs to assess whether new policies have changed the way we purchase power. They hope their findings will help to siphon off of that creativity as we move forward.

“Andrew and Remi have shown exemplary leadership, initiative, and insight in their professional careers,” says Michael Mau- bousson, the Board’s chairman. “Their guidance will no doubt contribute to SFI’s future success as a leading research institute for complexity science.”

Remi Barbier is founder, chairman, and CEO of Pain Therapeutics, Inc., a firm developing novel drugs in pain management and oncology, which he founded in 1998. Previously, he helped in the founding and/or growth of Exelixis Inc., ArQuile, and EnzyMed and served as a top executive of Xoma Corporation, Mendell Biotechnology, Inc., and Poetic Genetics, Inc. He is a trustee of the Carnegie Institute of Washington and is on the advisory board of the California Institute for Quantitative Biosciences.

Andrew Feldstein is CEO and co-CIO of BlueMountain Capital Management. He spent more than a decade at J.P. Morgan where he was a managing director and headed several divisions. He is a member of the board of directors of PVC Financial Services Group Inc.; a trustee of Third Way, a prominent centrist think tank; and a member of the Harvard Law School Leadership Council.

Also in November, SFI bid farewell to three longstanding trustees: Dan Lynch, Henry Lichtstrein, and Stewart Greenfield retired from the Board, with SFI’s gratitude for their many contributions.

SFI’s Board of Trustees, which has the fiduciary responsibility for the Institute, oversees SFI’s operations through its biannual meetings and its active committees that offer advice and support to SFI’s leadership.

> State of the Institute

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know Jen has lined up two great new Miller Scholars for this coming year including well-known author Hampton Sides. [See “Author Hampton Sides selected as 2015 SFI Miller Scholar” above.] So the quality of the incoming contributors has really been a bright spot over the last 12 months or so.

Update: What is being done to help the Institute more fiscally stable?

Saffbloc: The most important is our effort to successfully complete our $30 million 30-by-30 capital campaign this year and to begin to raise $100 million in endowments over ten years, which the trustees have challenged us with, and to not rely so heavily on the trustees for donations. However, we do need to rely on our trustees more than ever for access to the people in their social and professional circles and look to them to open doors to other potential donors and their friends who are excited about complexity science. Through the efforts of [VP for Advance- ment] Nancy Deutsch and her team, the Board’s Advancement Committee, and the full Board, we are seeing these doors opening to a greater extent than ever before. [See “Barbier, Feldstein elected to SFI’s Board” above.]

Another important effort is to increase the number of Business Network members from where we are now, at around 40 members, to 50 or 60. The WiNet, under [VP for Administration and Director of the Business Network] Chris Wood’s leadership, has been extremely valuable in terms of giving us a venue for interacting with people who want to apply complex systems thinking to real-world problems. It also plays an important role in SFI’s fiscal health, and adding a dozen or so members would be highly impactful. This is a priority for Chris and Casey Cox.

And then the breakfasts and other events Nancy and her team have been holding in places like New York and Palo Alto and Austin – talks by our scientists often hosted by trustees – are very important in terms of getting people energized about complexity and SFI, and we hope to expand those events into other cities.

These activities all have impacts in planting the seeds for fiscal health, and so the question is how do we use these activities to position ourselves to be more resilient in those times when we face new fiscal challenges.

Update: What are your post-SFI plans?

Saffbloc: My number one plan is to have more time to write. Clearly the demands of this job have made it difficult to take on some of the writing projects I have been planning. But I also don’t want to spend all my time behind a computer, so I plan to continue to serve on some of the academic advisory boards I’m on and possibly do some consulting. I’m also looking forward to sleeping through the night and not lying awake thinking about all the challenges of running this place. We’re staying in Santa Fe, which we love, and both Paula and I will become external professors on August 1, so we’ll be around SFI regularly. So I have a general idea of what my retirement will be like, but nothing specific. This is the second time I am retiring (Jerry retired from the University of Pennsylvania in 2009 and is the Christopher H. Browne Distinguished Professor of Anthropology Emeritus there), so we’ll just have to see what happens. Who knows?!
Margaret and David Alexander: SFI ‘gives back to the world’

The SFI library at the heart of the main campus serves daily visits from researchers seeking all manner of information related to complex systems. SFI Librarian Margaret Alexander helps them find what they need and keeps it all in order.

Like many Institute employees and spouses, she and her husband David are SFI donors, too.

“The couple gives to SFI, she says, because SFI gives back to the community – and to the world.

“When I first moved to Santa Fe, I marveled how the world. SFI gives back to the community – and to the world. I found out about the Santa Fe Institute, and of the science they are working on?’ Then I asked: ‘Is there anything happening because it seemed so troubled,” she says. “I in our state, and yet it seemed so poor, and “When I first moved to Santa Fe, I marveled to complex

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Facts about the Omidyar Challenge Campaign

- Gifts are matched dollar for dollar by Pierre and Pam Omidyar.
- Since 2007, the Omidyar Fellowship has supported the appointments of 31 creative early-career researchers at SFI.
- To support the Campaign, visit www.santafe.edu/omidyargive or call 505.946.3678.

In Reality Mining: Using Big Data to Engineer a Better World (MIT Press, 2014), Jana CEO and former SFI Omidyar Fellow Nathan Eagle argues that the data generated through everyday web browsing, commuting, mobile phone use, and credit card transactions can be used to inform infrastructure projects that improve our human condition at both the global and community levels – especially for emerging markets and underserved regions.

White House ceremony honors New Mexico teachers

At a December 8 White House ceremony celebrating Computer Science Education Week, four New Mexico teachers were recognized for teaching computer science and imparting lifelong skills to New Mexico students.

All four are part of the New Mexico Computer Science for All program led by SFI Learning Lab Director Irene Lee and collaborators from the University of New Mexico. Here, Elisa Cundiff of Las Cruces High School poses with Havi Parton of code.org during the event.

“My story

Caitlin Stern
SFI Omidyar Fellow

“I grew up in a Southeast Alaskan community in which potlucks were frequent and people co-owned expensive equipment such as wood-splitters and snow-blowers. This background contributed to my strong interest in how the social environment in which people or other animals live affects the extent to which they cooperate with each other, and the evolution of cooperative behavior over time. Social environments are in turn the product of decisions individuals make about where to live, and my research also addresses the evolution of these decisions. I am tremendously excited to be conducting this research in another highly cooperative community: SFI.”

Don’t miss these application deadlines

- Undergraduate students - Research Experiences for Undergraduates summer internship program, June 7 - August 15, 2015 in Santa Fe. Apply by February 7, 2015.
- High school students - Summer Complexity and Modeling Program (CAMP), July 12 - 24, 2015 in Groton, Massachusetts. Apply by April 21, 2015.

More information at www.santafe.edu/education

Upcoming community events

SFI Community Lecture, Wednesday, January 14, 7:30 p.m., James A. Little Theater (1060 Cerrillos Road) – Eating Our Words: What the Language of Food Says About Us. The words we use to talk about food offer surprising insights about history, economics, psychology, and even evolution. Daniel Jurafsky explores the relationship between food and language around the globe, from the origins of America’s national condiment as a Chinese fermented fish sauce to the reason crispy food brands tend to have different vowels than their creamy counterparts. Jurafsky will also look at the stunningly complex language of restaurant menus and reviews and what they tell us about our culture and society. Jurafsky, a 2002 MacArthur Fellow, is professor and chair of linguistics and professor of computer science at Stanford University. He recently published The Language of Food: A Linguist Reads the Menu. To watch a lecture as it happens, visit SFI’s YouTube page; participate in the discussion live on Twitter at #sfilive.

Education News

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SFI’s 2015 Community Lectures are made possible through the generous support of Thornburg Investment Management. Lectures are free and open to the public, but seating is limited. To watch a lecture as it happens, visit SFI’s YouTube page; participate in the discussion live on Twitter at #sfilive.