decade after its launch, SFI's Business Network has taken on a life of its own, acting as an agent to disseminate the theories and research of SFI researchers to the business community and, in turn, bringing back information to SFI. That is why a group of money managers meeting this fall in Newport, Rhode Island, have added the phrase “complex adaptive systems” to their financial dialogues; why a research director at one of the nation's premier-funds management firms is reading evolutionary theory at night after she puts her children to bed; and why SFI’s External Faculty member David Stark’s name and theory of “explore and exploit” are surfacing in a presentation given by a pharmaceutical executive.

Network members are an elite group of self-selecting, open-minded business people from some of the world's largest and most forward-thinking companies. It has grown from an initial complement of five companies in 1992 to a current membership of over 45 companies and government research groups, each of whom contributes $30,000 or more annually to support SFI's basic research agenda.

In return, Business Network members are invited to participate in SFI conferences and workshops, giving them the opportunity to network and interact with SFI scientists and look for ways to use SFI research at their own companies, while SFI benefits from the influx of new ideas. This is a concept Michael Mauboussin considers daily. As Chief U.S. Investment Strategist of Credit Suisse First Boston (CSFB), Mauboussin is charged with the task of absorbing and digesting data and information at record pace, and then sculpting it into information the bank's investment team and clients can use—not for their own edification or to impress their friends—but to simply beat the market and make money.

Mauboussin is also known for his annual “Thought Leader Forum” during which he draws on the work of SFI researchers. This year, the event, held in Newport, Rhode Island, featured Harvard-based geochemist and SFI External Faculty member Dan Schrag, who spoke about climate change. As well, Eric Bonabeau, former SFI postdoctoral fellow and founder and chief scientist of Icosystem Corporation, and Alpheus Bingham, a vice president with Eli Lilly and a member of the SFI Business Network, spoke at the Forum. In the past, SFI-affiliated speakers have included W. Brian Arthur, J. Doyne Farmer, John Holland, Duncan Watts, and Geoffrey West, among others.

Mauboussin remembers fondly the moment he learned about the Santa Fe Institute. “I was at an Orioles baseball game with Bill Miller (chief executive officer of Legg Mason Funds Management Inc.) in 1995,” he says. “He told me I must be involved with SFI.”

Mauboussin joined the Business Network in 1997, and additionally, the company supports the research of J. Doyne Farmer, McKinsey Research Professor at SFI and founder of the Prediction Company. But Mauboussin, in his own work, is leveraging core concepts from SFI into his research, beginning with thinking of capital markets as complex systems. He began by studying W. Brian Arthur’s theories on increasing returns, but continues to widen his scope absorbing what he can on evolutionary biology and network theory and more.

After the 2003 East Coast blackout, Mauboussin put in a call to Columbia University and SFI External Faculty member Duncan Watts, who is an expert in network theory, to get his thoughts on the outage. “The blackout was essentially caused by a cascading failure in a large network,” Mauboussin said. “I wanted to see what we could learn from that failure about networks and see how we could apply it to the financial markets.”
One ant will run off to the side and look into a different spot, adding to the colony’s overall robustness. When we do our own research, we keep in mind that we need to look everywhere.

Bill Miller is a catalyst for many members to join the Business Network. Baltimore-based Legg Mason has been a member since the early 1990s under his leadership. A tireless advocate of the Institute and a vice chairman of the SFI Board of Trustees, Miller has embraced many of the theories imparted by SFI researchers. His own staff has followed suit.

Lisa Rapuano, director of research at Legg Mason Funds Management Inc., was somewhat confused when Miller first started sending her home evenings with books on evolutionary biology and network theory. But then she started attending the Business Network meetings at the Institute, and the disparity between finance and science began to wane.

When asked, Rapuano is initially hard pressed to come up with concrete anecdotes in which the firm has used research and information garnered from their time at the Institute. “You can’t think of it in linear terms,” she says. “What we have learned is to look at the market as an adaptive mechanism. We need to look for tools than aren’t conventional. We need to develop a pool of alternative mental models to think about the market, companies, and economies.”

Rapuano explains their strategy this way: “When we take our people out to SFI for the first time, they usually say, ‘O.K. That was interesting, but what am I supposed to do with the ideas on Monday?’ We tell them, ‘Nothing.’ We tell them to absorb the ideas and let them enlighten their thinking.”

For one example of how participating at SFI has enlightened Legg Mason’s research theory, Rapuano points to the concept of “Random Search.” “If you think about the way ants behave, they have a set of simple rules to go out and look for food,” Rapuano says. “But one ant will run off to the side and look into a different spot, adding to the colony’s overall robustness. When we do our own research, we keep in mind that we need to look everywhere. It might be as simple as a situation where you’ve typed in the wrong ticker, and instead of moving on, you stop and take a look at that company.”

Similarly, Rapuano says the firm has incorporated the theory of “weak links” into their philosophy. “Research has shown that people get jobs through social networks—not usually through their friends, but through their friend’s friends,” she says. “So, this is called a ‘weak link.’”

“We try to look for what kind of connections make things happen,” she says. “We go to conferences that aren’t investment conferences.” Making an even bigger commitment based on the “weak links” theory and network theory in general, the firm decided to sublet some space to a Baltimore hedge fund, betting they might garner something valuable from the liaison.

Perhaps the most important idea the researchers at Legg Mason have embraced is one of the most simple, yet fundamental to the work at the Institute: “We believe the market is a complex adaptive system with zillions of agents, with selfish objectives and excess,” Rapuano says. “Return is difficult. You have to have a constant philosophy, but you must have an adaptive strategy. We need to be adaptive.”

Rapuano, who tries to attend the Business Network meetings every year, says that she now looks for information not just from the SFI researchers, but also from her Business Network peers. “There are really smart people at the meetings,” she says. “You might sit next to the guy from Lilly and learn something you didn’t know about pharmaceuticals.”

Indeed, if that person is Alpheus Bingham, then you are most certainly likely to learn a great deal about pharmaceuticals. Bingham, a vice president of Eli Lilly and Company, has a way of putting a face on the otherwise intractable industry. In turn, Bingham has sifted through the myriad of information he gathers from the Institute and incorporated it into his work at Lilly.

Over the five years Bingham has been active in the Business Network, he believes it has helped him to reshape the structure in which corporate problems and challenges are framed. “It’s allowed us to see alternatives that may have been less visible if stuck in traditional viewpoints,” he says.

On the practical side, through connections made at SFI, Eli Lilly has incorporated agent-based modeling into its R&D processes, partnering with Eric Bonabeau’s Icosystem to build modeling software, which helps the company track the progress of its research, and better understand its revenue flow. On the theoretical side, Bingham has been influenced by the theories of SFI-affiliated scientists such as Stuart Kauffman and David Stark.

A scientist himself, with a Ph.D. in organic chemistry from Stanford University, Bingham is an ideal executive to be involved with the Business Network. He has long been incorporating technology into the research process; he is a visiting scholar at the National Center for Supercomputing Application at the University of Illinois, and former Chairman of the Board of Editors of Research Technology Management Journal. He believes the challenge for SFI’s Busi-
ness Network members is to find broader applications of complexity principles, to tap into the potential of the science. “Companies need to develop applications beyond simply using agent-based modeling programs,” he says.

Perhaps no one, or no one company, has garnered as much from its affiliation with the Institute as Roger Burkhart, technical consultant to Deere & Company, who has graced the halls of the Institute for more than a decade.

Deere & Company joined the network in 1992. “We had begun developing the use of genetic algorithms for assembly line scheduling and had developed an interest in adaptive techniques for both manufacturing and investment trading,” Burkhart explains.

Two years later, Deere & Company “lent” Burkhart to SFI to participate for more than half-a-year on Chris Langton’s Swarm Simulation team, which was developing the now well-known agent-based modeling and simulation platform Swarm, for modeling interactions of adaptive agents. Burkhart continues to help administrate the independent non-profit Swarm Development Group (www.swarm.org).

Having become somewhat of a computer-based modeling evangelist, Burkhart’s own projects explore the use of shared computer models across people and organizations, in such areas as product design and agricultural production. “One example,” Burkhart explains, “would be integration of geospatial data from machines with agricultural production records to develop crop plans for a farmer. Many partners help collaborate with the farmer to develop and execute the plans, from input suppliers—seed, fertilizer, and chemicals—to agronomic consultants to output marketing channels.”

Of late, the Business Network has become increasingly more reciprocal in nature. Many of the members gathered at the Institute last June for a topical meet-

ing at which the Network members, not the scientists, had the microphone, addressing how they are applying research and information from SFI to their businesses.

Speakers represented a variety of industries—pharmaceutical, aviation, manufacturing, automotive, national laboratories, and, of course, high-tech— but were united in one goal of learning to harness the tools of complex adaptive systems research to help them with their own businesses.

Presenters included Bingham and Burkhart, as well as representatives from Intel, Sandia National Laboratory, Argonne National Laboratory, The MITRE Corporation, and Alidade Inc., among others.

Recently appointed SFI President Bob Eisenstein was impressed with the exchange of ideas. For the success of the program he credits the work of SFI staff members Suzanne Dulle and Susan Ballati. “Many problems studied at SFI are also problems of interest to the business community,” he says. Eisenstein plans to make no major changes in the Business Network except to focus on bringing in more international firms. “We already have a significant foreign presence,” he says. “But we want to connect to businesses in countries such as China and India as well.”

One aspect of the Network Eisenstein wants to continue to emphasize is that the exchange is mutually beneficial. “We learn from the members just as they learn from us. Their input is valuable to us. In fact, sometimes there are problems they want to solve that turn out to be interesting problems for us. It’s really a two-way street.” Visiting SFI Researcher José Lobo, who has been affiliated with the Institute since 1993, attended much of last spring’s topical meeting, listened to the Business Network members’ presentations, and participated in much of the dialogue. “There is a growing awareness among SFI researchers and the leadership of the Institute that the Business Network represents a great intellectual source that has remained largely untapped,” says Lobo. He cites examples of intellectual exchange between Network members and SFI researchers. One notable one is in the area of biologically inspired software design, a project involving SFI Researcher Walter Fontana and physicist Ann Bouchard from Sandia National Laboratories.

Lobo also describes a new working group on Organizational Design, which was started by Bingham, Roger Burkhart, and SFI Researchers John Miller (also of Carnegie Mellon University), Jim Rutt, and Lobo. The group plans to host a session at the next Business Network meeting and has written a paper on the topic. “We hope that this group can evolve into a full-fledged research project at SFI,” Lobo says.

Ultimately, SFI and its Business Network are very young organizations. Central to the Network’s continued growth is an acceptance of complexity theory as a valid tool for business applications. In an odd way, the Internet boom and bust and ongoing sluggish economy has opened a door for new ideas and cutting-edge research like that coming out of the Institute.

CSFB’s Mauboussin echoes this when reflecting on his tenure in the Network. “Since I first joined the Business Network, I have seen my peers open up to new ideas and begin to search for new formulas,” he says. “The point is that we can’t think about things in the same way anymore. I’m not saying SFI has the answers. I don’t know. But I think there are potentially important ideas in the study of complexity.”

Janet Stites is a freelance writer based in New York. She has written for OMNI Magazine, Newsweek, and The New York Times.