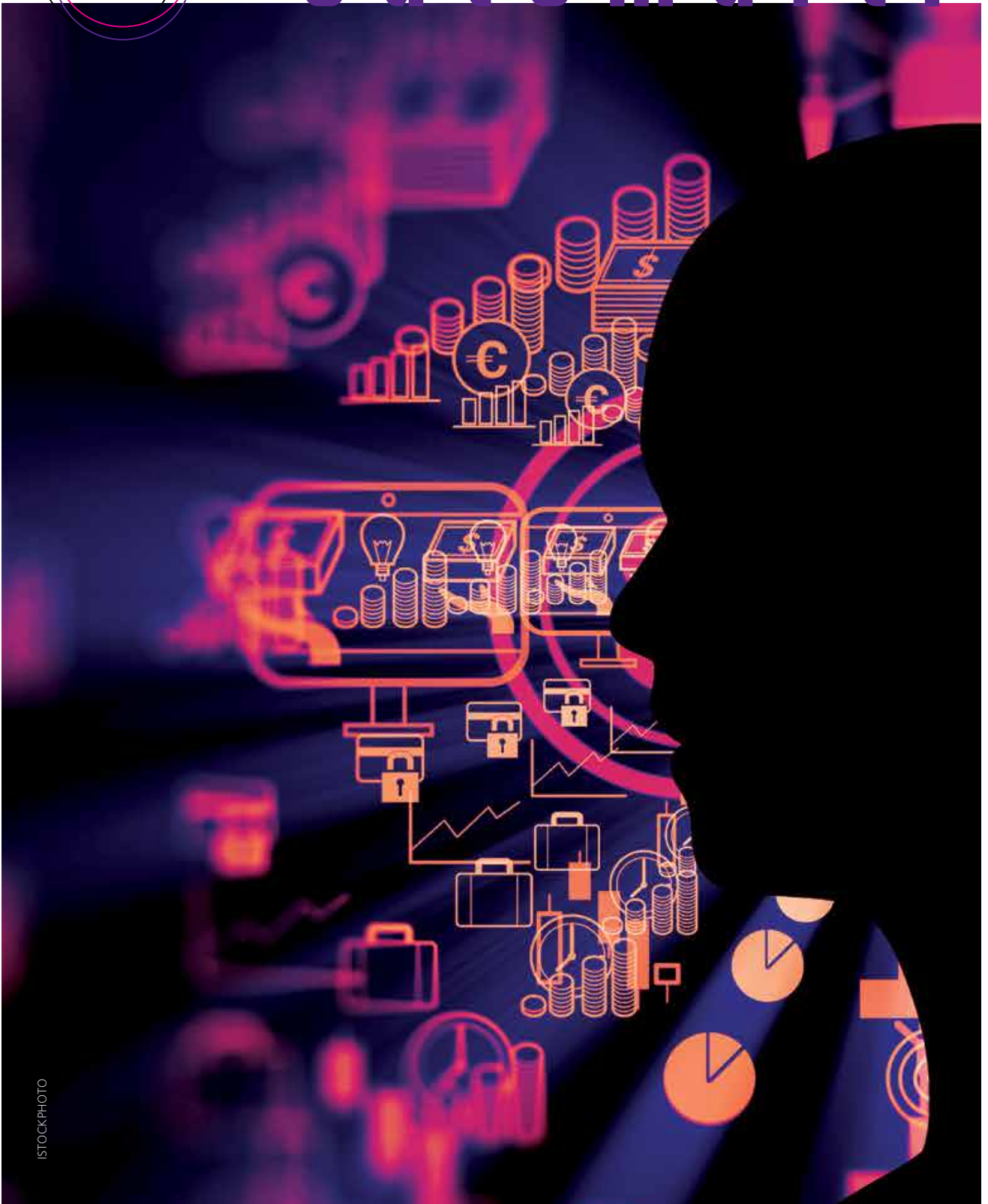# AGENTS OF CHANGE

Outsmarti

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n g the Enemy

SparkCognition aims to best hackers with artificial intelligence. Step one: Build cognitively diverse teams and let them innovate.

BY SAMUEL GREENGARD

A mir Husain is going to war. But instead of putting boots on the ground, he has assembled an army of experts to develop smart machines that far exceed the capabilities of the human mind.

Mr. Husain's enemy is clear: the seemingly never-ending—and increasingly sophisticated—barrage of hackers and cyberthieves intent on compromising digital systems. Today, most security solutions depend on whitelists, blacklists and signature-based methods. The problem with this approach is that, as new kinds of threats appear, what worked yesterday often does not work today. Malicious code can evolve to make detection difficult, if not impossible, using conventional methods. These polymorphous viruses, along with far more advanced phishing gambits, have ratcheted up risks exponentially. Cyberthreats and malware are now capable of spreading in hours or even minutes—hence the term "zero-day attack."

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As founder and CEO of SparkCognition, Mr. Husain is determined to defuse these growing cyberrisks using the company's artificial intelligence (AI) technology. "There is an underlying trend that has been in place for the last few decades where physical things are morphing into virtual things," he says. As these physical objects and mechanical things are increasingly monitored, controlled and powered by software, and as the internet of things takes shape, the data points become too vast and complex for humans to manage.

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founder and CEO,
SparkCognition

Spotting impending mechanical failure or cyberthreats, therefore, becomes next to impossible. "The security community does not have sufficient time to reverse-engineer extremely sophisticated malware fingerprints and put the information into databases," Mr. Husain adds.

SparkCognition's AI-powered cyber-physical software, however, can sift through unprecedented amounts of data and use predictive capabilities and cognitive learning to help organizations protect their systems and information from endpoint threats, suspicious behavior, and potential cyberattacks or IT system failures. "The ability to embed machines and software with thinking opens the door to a world where the 7.4 billion minds we now have contained within human craniums becomes the equivalent of 100 billion minds or a trillion minds. It's a transformative event in the course of human history," Mr. Husain says.

And so far, it is a transformation that the company is helping organizations around the world lead. SparkCognition's four cloud-based tools—DeepArmor, DeepNLP, SparkPredict and SparkSecure—are currently being used by a wide variety of organizations, including BP, Honeywell, Duke Energy, the Chicago Mercantile Exchange, the U.S. Department of Defense and the London Stock Exchange Group. In July, the company received $32.5 million through a Series B funding round led by Boeing's HorizonX and Verizon Ventures, a venture capital arm of Verizon Communications. And since launching in 2014, SparkCognition has attracted an impressive array of partners—including Google, HP, IBM and National Instruments—as well as a slew of positive press. The tech company has been lauded as one of the world's most disruptive and innovative by the likes of Red Herring, CNBC, CB Insights and The Edison Awards.

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But Mr. Husain's true goal is to create more than a leading business. He wants to harness AI's full potential to leave the world a better place.

"I don't believe that the world we live in right now is the best we can do," he says. "I want to make it a better place. I want my grandchildren to live in that world and feel that this old man that has them sitting on his knee had a small role in building [it]."

Mr. Husain is well aware of the expectations he is setting. To deliver, he says Spark-Cognition must develop game-changing machine learning and AI technologies by disrupting the usual makeup of tech teams and creating an environment where the journey is just as important as the destination.

Automatic Threat Detection

The seeds of Mr. Husain's mission were sowed at the age of 4. While he was growing up in Lahore, Pakistan, his family visited a friend with a Commodore 64 computer that connected to a television. "It blew my mind," he says. "There was this thing you could interact with. It made me realize there are smart ways to solve problems. In a single evening, I had

been exposed to two important concepts: the notion of programmability and algorithms."

A fascination with behavior and processes has dominated Mr. Husain's interests ever since. He continually explores cognitive biases in order to put AI to work more effectively. "Society is based on decisions that aren't always grounded in logic and science," he says. "Sometimes, people make bad decisions simply because they don't have enough glucose in their blood."

The repercussions ripple through the business world and extend into cybersecurity. "There are studies that show that when we are tired, hungry, bothered or stressed we do not make good decisions," Mr. Husain says. This is a long-standing challenge; the problem is that humans have not evolved to handle the world we now live in. "Many decisions in business and cybersecurity are based on sifting through reams of data and making an informed decision. If we aren't fully engaged, we make the wrong deduction. When you apply these risks to things like infrastructure, manufacturing, medicine, utilities and transportation, the stakes are extraordinarily high."
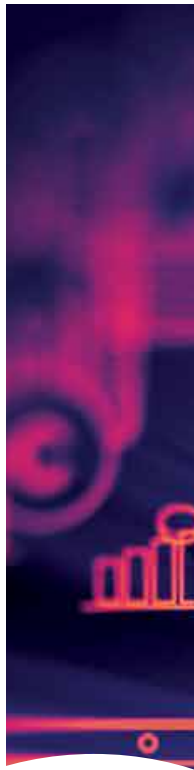
SparkCognition is trying to address this challenge with AI. Take, for example, its work with ExamSoft. The company depends on a software-as-a-service application to deliver e-learning tools to students around the globe. But the application was under constant attack from malware and hackers intent on stealing intellectual property—or cheating on exams. "To detect threats, the company's small security team examined tens of thousands of log files … and manually researched solutions," says Mr. Husain. "It was a tedious and time-consuming process that gave hackers a head start."

SparkCognition's application automatically responds to evolving security threats via cloud-based security analytics. The system navigates and scrutinizes the threat landscape to uncover emerging trends, patterns and anomalies and accelerates threat detection and resolution from potentially hours to minutes. "The solution saves 20 to 50 percent of [the] time previously spent on security tasks, freeing staff for more business-critical initiatives," he says.

Diversity in Action

To develop and implement AI solutions with the breadth and depth needed to solve current and future challenges takes a different kind of team—one dominated by more than just the tech experts, Mr. Husain says. He has purposefully worked to employ a deep and varied bench that includes data scientists, academics

and other experts from an array of fields, including neuroscience, linguistics, computer science, economics, sociology, anthropology, chemistry and astronomy. In August, for example, the company brought Wendy Anderson—a former aide at the Pentagon—on board as general manager for U.S. defense and national security to lead SparkCognition's growing defense and aviation business.

With its growing portfolio of businesses, cognitive diversity remains vital for SparkCognition. "There are some basic principles at work in the universe, and every area, every science, every discipline approaches these truths from a different angle," he says. "When you put these people together that have that appreciation, the shared product of that intellectual diversity ends up being very rich. If you don't have that insight, and if you don't build organizations this way, and if you see poor results, you really can't blame the individual."

These assembled voices would quickly be stifled in the hands of a highly regimented, oppressive culture, however. Instead, Mr. Husain has focused on creating an innovation-first culture in which accountabilities support ideation instead of hindering it.

"You want to have accountable processes and an accountable organization. But I think you have to separate the outcome from whether the process was followed in letter and spirit," he says. For example, he says, if an employee working in the research organization cannot come up with an algorithm

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they have been tasked with developing, that should not reflect poorly on their capabilities. "Along the way there are always other findings and other knowledge that's gained. We might have been asking them to work on a problem that's not going to be solved for the next 10 years and might be unsolvable. If you have people that are failing at the task, failing at achieving the stated aim, that might just be by design. That's OK."

Accountability, he says, is for the intent, effort and support of running the organization the way it is designed. It is not accountability for whether an employee did or did not do a task. "In complex things, you can't just transport something like that into a binary," he says. "There's no scorecard that we're keeping on employees because we're inventing stuff that hasn't been invented before. You can have a rough patch. You can have somebody that really doesn't come up with something novel for nine months, and then the 10th month they'll do something amazing. It's about [whether or not] you are supporting the organization and [if] you are a part of the organization running the way it should. If that's the case, even if you're individually not able to deliver results in a short period of time, it's OK [because] you'll eventually come out all right."

Risky Business

Breeding this innovation-first culture does leave SparkCognition open to failure—especially in a rapidly developing industry like AI. But Mr. Husain says business leaders cannot come to work everyday with the mindset of, "What if I fail today?" Instead, the driving force should be, "What do I need to do not to fail?" he says. "How do I build the infrastructure to guard against this risk-reward ratio? What we do is look at that from the point of view of risk management."

Mr. Husain says he subconsciously runs various scenarios—with different risk factors and opportunity costs—through his head. "I think a lot of leaders in positions where they have to make a large number of decisions develop some intuition around this," he says. "It's not good or bad, it's about what the present value of that risk is to me. Life is a stochastic process, and to the extent that you understand probability you can manage risk."

That risk of failure, however, will only continue to grow given today's expanding technological and digital sphere. Business leaders must recognize that virtually every organization is on a trajectory to eventually become a software company—and AI will play a role in determining their fate. Those that do not dial into this concept are destined to breathe the digital exhaust of competitors passing them by.

"Companies such as Amazon, Google, Facebook, Microsoft and Apple now apply their core strengths to virtually any industry or market, and they make a major impact," Mr. Husain says. "Those with digital prowess will emerge as the 21st century's economic powerhouses." **IQ**