IDEAS + ACTION = THE NORTHEASTERN EFFECT
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We often say that Northeastern makes an impact on the world because it is a university engaged with the world. But what does that mean? The stories that follow offer some insight—of impact grounded in a willingness to take issue, a refusal to let well enough alone, a preference for the road less traveled, and a conviction that getting in over your head is how you rise up. In short, the stuff of leadership.

Photography by Brian Bresnahan, Michael Hemberger, and Mary Knox Merrill
Bernie Gordon, H’07, is on a mission to develop the next generation of engineering leaders. Extending well beyond the ability to conduct research projects, these individuals need the right mix of knowledge, skills, and attitudes to lead companies and drive U.S. innovation.

Out of this vision was born the transformative Gordon Engineering Leadership Program at Northeastern University. Gordon’s $20 million gift, the largest single endowment in university history, established a rigorous and innovative master’s degree program that brings together promising engineers across a broad range of disciplines and industries.

Gordon, a member of the National Academy of Engineering, knows something about leadership and problem solving. He pioneered the conversion of analog signals into the digital domain, founded three high-tech companies, and was awarded the National Medal of Technology. Along with a distinguished advisory board of fellow engineering leaders, Gordon draws on his experience to continually refine the content of this flagship program.
By focusing on core capabilities that reside at the intersection of engineering and leadership, the graduate program provides a unique alternative to traditional engineering or management degrees. Upon completion, Gordon Fellows emerge with the confidence, vision, and technical dexterity to drive positive change within their organizations.

Students are chosen for their potential—occasionally, a potential they don’t even recognize themselves. Gordon compares the process to his own selection for Naval officer training as a young man. “I wasn’t confident that I was an appropriate candidate to become an officer,” he says. “But by the time I finished, that’s how I defined myself.”

The program prepares students to invent, innovate, and—most important—implement technical projects by providing effective leadership to teams and the organizations in which they operate. To deliver on these ambitious objectives, Northeastern combines the experience of engineering faculty and professors of practice who have decades of experience leading engineering teams in industrial and military settings.

Leveraging Northeastern’s century-long commitment to experiential learning, students directly apply the skills and techniques learned in the classroom to a Challenge Project that provides significant value to their organizations. Throughout the project, they receive intensive mentoring from a faculty advisor who is a technical expert in the field and from a Gordon Mentor who has experience in industrial project delivery, greatly amplifying the impact of the project to the company.

“Bernie’s ongoing support enables us to deliver a truly transformational curriculum for emerging engineering leaders—by accelerating their capabilities and career development, the experience is a win-win for both the student and the company,” says Simon Pitts, director of the program.

As the program enters its sixth year, Gordon expects the growing number of graduates will continue to make a positive impact in companies vital to U.S. competitiveness. “What other group is as necessary for the creation of jobs and societal wealth as the engineering profession?” he asks.
Each year, industry and science develop several thousand new chemicals. Each year, these compounds are blindly released into the environment, with no understanding of how they affect the earth’s water supply, because economically feasible and reliable testing methods don’t exist.

April Gu is, quite literally, shedding light on the problem—one that the assistant professor of civil and environmental engineering finds potentially disastrous, given that the lack of potable water is already a life-or-death issue for nearly 900 million people around the world.

Working in the emerging field of toxicogenomics, she and her interdisciplinary team of engineers and biologists from U.S. and Chinese universities have developed a portable, fast, and inexpensive way to monitor water quality using light-emitting environmental biosensors.

“Our researchers are using bioengineered bacteria with a fluorescence protein that makes them like tiny light bulbs,” Gu explains.

Penny-sized containers known as arrays, each holding thousands of bacteria engineered to respond to a different toxin, are exposed to a water sample. This triggers an on-and-off pattern of light—a unique “fingerprint” that indicates the potential toxicity effects, as well as which compounds the water contains, says Gu.

Her team is conducting tests with wastewater samples, and in Chinese and U.S. waterways. A patent application is under way.

This is just one project in Gu’s portfolio of research aimed at preserving the planet’s water. She is motivated by the fact that the National Academy of Engineering considers access to clean water one of the profession’s highest global priorities.

And also by something more personal. “I’ve always loved the water,” Gu says. “That gives me a passion for research focused on solving water problems.”

Civil and environmental engineer April Gu on what drives her pioneering clean-water science.
As an avid fisherman, Alan McKim, MBA'88, wants safe waters. As the founder, president, and CEO of Boston’s Clean Harbors, he helps keep them clean. In fact, his company has played a significant role in every major North American disaster-recovery effort during the twenty-first century, providing remediation after the BP oil spill in the Gulf of Mexico, debris removal and anthrax decontamination after 9/11, and wide-ranging environmental and operational support following Hurricane Katrina.

McKim, a university trustee, took Clean Harbors public as a thirty-two-year-old student in Northeastern’s executive MBA program. Today, the company is the leading environmental-services and hazardous waste-disposal firm in the United States.

“Our motto,” McKim says of the company, “is ‘safety first.’” It’s an overarching philosophy that puts protection at the top of the company’s to-do list—protection for Clean Harbors customers and employees, for the communities the company serves, and for the environment.

Clean Harbors is also dedicated to protecting the environment from future damage. The company uses solar power to run its management facilities. It’s developing wind farms, and recycles solvents, chemicals, batteries, and precious metals. It serves as an environmental consultant to businesses engaged in fracking projects in the United States and Canada’s western provinces.

Thanks to McKim’s spirited commitment to health and safety, Clean Harbors treads lightly on the earth, even as it seeks to protect it.
Dennis Shaughnessy, MBA’94, started Northeastern’s Social Enterprise Institute (SEI) five years ago, with just twenty students, for a simple reason: to address global poverty with innovative solutions. “Our mission is to use business to empower the world’s poor to build healthy, productive lives,” says the executive professor of innovation and entrepreneurship.

Today, SEI engages more than 400 undergraduates. Its students have raised $50,000 over the years to invest in field-study projects. And its Social Enterprise Fund (supported by alumni donations) and capital investment program have launched more than 300 microbusinesses in the Dominican Republic and South Africa. SEI is also exploring partnerships in India and Rwanda.

Esther Chou, AS’08, a former SEI student who now serves as assistant director of programs, recounts a particularly eye-opening trip with students last spring to Mata Los Indios in the Dominican Republic. “You could never envision a community so poor,” recalls Chou. “Most people didn’t eat a meal until 5 p.m.”

The group was tasked with evaluating the community’s viability as a site for microfinance loans with Esperanza International, an organization with a holistic approach to economic development. Each day, the students walked two miles to the village to interview residents—eighty-five families in all.

Esperanza is now teaming with SEI to use that data—since compiled into a 200-page report—to pilot a branch microcredit office to service the Dominican Republic’s Monte Plata region, which encompasses the nation’s poorest communities. They’re also working with Esperanza to create village microfinance banks in communities like Mata Los Indios, and investigating other enterprise solutions in partnership with Mata Los Indios residents.

“That’s the social enterprise approach to economic development,” says Shaughnessy. “It focuses on private-sector solutions to poverty instead of traditional charity.”
From the first light bulb and x-ray machine to the latest developments in clean energy, General Electric (GE) has been at the forefront of global innovation for well over a hundred years. Today, senior vice president and director of GE Global Research, Mark Little, ME’78, leads 3,000 scientists and engineers tasked with solving some of this century’s most pressing challenges.

It’s a massive undertaking. Little manages one of the world’s largest and most diversified industrial research and technology organizations, GE Research, headquartered in Niskayuna, New York. This innovative unit is focused on the next wave of cutting-edge technologies: sustainable energy, advanced propulsion, nanotechnology, energy conversion, diagnostics, electronic materials systems, and advanced software and analytics.

Little is proudest of the businesses that Global Research has developed from scratch, businesses that have, for instance, changed the face of women’s health through improved diagnostics, and reduced the use of fossil fuels with more-efficient wind turbines.

The keys to GE’s success? “We make sure the best innovators come here,” says Little. “We set them up to do deep research and develop more efficient technologies to solve real-world problems.”

Little joined the company the same year he received his master’s degree in mechanical engineering from Northeastern. After serving in several high-level positions, most recently as vice president of GE Power Generation, he was named one of the company’s “growth leaders.” This elite group of executives is charged with ensuring employee development and integrity, and with leading the company’s future success.

After more than three decades with the technology giant, Little looks forward to the next great challenge. “GE has the financial and technological depth to let me do things I never dreamed possible.”

“THE RESEARCH TECHNOLOGY DEVELOPED HERE IMPACTS THE WORLD.”

General Electric’s head of Global Research Mark Little on the magnitude of his team’s mission.
A dynamic student organization is shattering stereotypes about college students’ priorities and about how philanthropy happens. In a country that relies on the kindness of strangers to mend growing gaps in the social safety net—about $300 billion in kindness each year—reordering philanthropic priorities bodes well for the future.

In the few short years of its existence, Northeastern Students4Giving (NS4G), taking a multifaceted academic and experiential approach to philanthropy, has become a powerful force.

NS4G students have awarded nearly $60,000 in grants since 2008, to a range of organizations working in youth development, with families at financial risk, and with goals as lofty as eliminating intimate-partner violence. Students manage the entire cycle, from fundraising to deciding which worthy causes most merit their support.

It’s been life-changing for copresidents senior Jennifer Glynn from Poughkeepsie, New York, and senior Andrea Rodriguez from Costa Rica. “To see the grant-making process from beginning to very end is a mind-blowing experience,” says Glynn, who is also codirector of the Northeastern chapter of a mentoring program for at-risk girls. “It puts everything in perspective.”

“We’ve also learned about corporate social responsibility and the effect large companies can have on surrounding communities,” says Rodriguez.

“We were working with real money, nothing hypothetical,” says Robert Manzi, AS’10, a former NS4G member and now a placement specialist at Community Work Services in Boston. “I saw the process from an angle that many young adults don’t.”

“GIVING IS A MIND-BLOWING EXPERIENCE.”

Two student philanthropists on having their eyes opened to the power of giving.
In medical research, scalability is the difference between an excellent academic paper and an effective cure, says Northeastern pharmaceutical sciences professor Vladimir Torchilin. If a successful research outcome can’t be scaled up to make commercial production of a drug technically and economically feasible, the discovery stalls.

“For what we do, it is the big bottleneck,” says Torchilin. Therein lies the innovation behind Northeastern’s Center for Translational Cancer Nanomedicine (CTCN), the difference-maker that moved the National Cancer Institute to award it an initial $13.8 million grant in 2010.

CTCN director Torchilin and his collaborators at Northeastern, Harvard Medical School, and Auburn University have developed a process to ensure scalability even as they pursue actual drug development.

And because it’s Northeastern, it involves a partnership.

CTCN scientists are working on a wide spectrum of solid and aqueous nanoparticles that would target and release anticancer drugs directly into tumors, with a focus on pancreatic, brain, and lung cancers. They are also seeking to load the nanoparticles with genetic material that would inhibit cancer cells from developing resistance to the drugs.

And at each step, a private-sector partner, Nemucore Medical Innovation, is using special algorithms to test the scalability of the researchers’ output. “If they tell us they can scale it, we move to the next stage,” says Torchilin.

One facet of scalability is what Torchilin called “aggregating”—Nemucore is building on each development stage to identify commonalities and differences, with the goal of creating one basic structure for a cancer-killing nanoparticle that can be modified in certain standardized ways to treat different forms of cancer. Think of an automobile assembly line that churns out three different models simply by swapping out engines or transmissions.

“This,” says Torchilin, “is why our research is called translational.”